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EARLY EXCHANGE BETWEEN AFRICA AND THE WIDER INDIAN OCEAN WORLD

Edited by
Gwyn Campbell

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CHAPTER 1

Africa and the Early Indian Ocean World Exchange System in the Context of Human–Environment Interaction

Gwyn Campbell

This volume comprises a selection of chapters by leading scholars on aspects of early exchange between Africa and the wider Indian Ocean world (IOW)—a macro-region running from Africa to the Middle East, South and Southeast Asia, and the Far East. The rationale for regarding this region as a "world" is the central significance of the monsoon system. Unlike the Atlantic and Pacific, the IOW seas (the Indian Ocean and the Indonesian and China Seas) are capped by a huge continent—Asia. During northern hemisphere summers, as the Asian continent warms up, hot air rises from the land, causing a vacuum that, through the process of convection, sucks in moist air from the oceans to the south. This creates the southwest monsoon. In winter, the opposite process occurs, and air

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is expelled from the continent over the oceans, creating the northeast monsoon.

This regular biannual alternation of winds and currents governs the IOW littorals and oceans to about 12°S of the equator and has fundamentally shaped primary patterns of production and trade, and thus of human history, across most of the IOW. First, the rains that accompany the southwest monsoon between June and September created a zone of wet crop (predominantly rice) cultivation across southern Asia, north of which lies a drier belt of predominantly grain (wheat and barley) cultivation. Second, monsoon winds facilitated the emergence of early trans-IOW oceanic exchange. This developed in the early centuries BCE, laying the basis for an IOW global economy that preceded that of the Atlantic world by over 1500 years. As the monsoons regulated much of both agriculture and trade, there was, from the outset, remarkable synchronism between land-based production and commercial systems and trans-oceanic trade. Moreover, as other wind systems, such as the southern hemisphere trades and equatorial currents, could be used to link into the monsoons, the impact of the monsoon network of exchange extended to regions that lay beyond the actual reach of the monsoons, such as the inner Persian Gulf and southeast Africa.

This introductory chapter explores the environmental context for the development of an IOW global system of exchange and the significance within it of human–environment interaction from early times to about 1300 CE. Most histories of the IOW have underestimated the role of the environment, and the dynamic rather than static nature of human–environment interaction that, more than political events or the evolutionary march of capitalism, has moulded the major temporal phases in human history (see e.g., Chaudhuri 1985, 1992; Abu-Lughod 1989; Frank 1998; McPherson 1995; Pearson 2011; Sheriff 2010; Alpers 2014; Beaujard 2012). The primacy of human–environment interaction further devalues historical analyses based on conventional "country" or "area studies." In this introduction, exchange relations between Africa and the wider IOW go beyond the usual focus on East Africa to incorporate all regions of Indian Ocean Africa (IOA)—here defined as all areas of the continent littoral to the Indian Ocean and Red Sea, and hinterland regions with intimate early connections to the Indian Ocean.

Rise of the IOW Global Economy

The first major phase in modern human history followed the end of the last Ice Age, some 11,500 years ago, when significant melting of the Arctic pack-ice established the conditions for enhanced food and craft production. This in turn encouraged humans to disperse from equatorial and other regions with favourable micro-climates into previously inhospitable areas throughout the northern hemisphere. From around 6000 BCE, a period of prolonged aridity provoked a search for methods of conserving and managing water and food supplies that precipitated the Neolithic Revolution in which regular surpluses and improved storage facilities enabled the emergence of specialist non-agriculturalists, including artisans and soldiers. Enhanced agricultural and craft production, and growth in elite demand for luxuries, laid the basis for the rise of early trans-IOW trade. Scholarly attention has focused chiefly on exchange between the centralised polities of the Middle East, South Asia, and China along the so-called trans-Asia "Silk Road," parts of which operated from 3000 BCE and which appears to have been fully functional by the fifth-century BCE. By about 500 BCE, interlocking local maritime networks also connected the entire northern rim of the IOW, from the Red Sea to China. Maritime connections were assisted by the onset from about 300 BCE of a strong and relatively stable monsoon system, which provided the conditions, along with advances in astral navigation and boat-building, for IOW sailors to make direct trans-oceanic voyages (Gupta et al. 2003; Hourani 1995; Ray 1990). From that time, geographically extensive, sophisticated, and durable systems of exchange arose that reflected the birth of an IOW "global economy."

Two major trans-IOW maritime networks developed. The foremost ran along the northern rim of the South China Sea and Indian Ocean. Secondary routes connected South China via the Philippines and eastern Indonesia to Java, Sumatra, and the Malay Peninsula; and the Sunda Straits via the Maldive Islands and Sri Lanka to the Persian Gulf, Red Sea, and East Africa. However, few vessels sailed the entire maritime length of the IOW as the alternating regime of monsoon winds enabled return voyages to be completed within a year only in geographically restricted zones. Therefore, a pattern developed whereby most vessels remained within one of the three main IOW maritime zones: the Arabian Sea, Bay of Bengal, and the China and Indonesian Seas. Direct two-way trade developed as early as 200 BCE between East India and the Malay Peninsula, and from about 120 BCE between Egypt and Malabar. By the BCE/CE changeover, as Ephraim Lytle notes, some 120 ships of between 200 and 300 tons each left Egypt annually (Lytle in this volume; see also Hourani 1995; Warmington 1995; Wheatley 1964a).

Direct trans-oceanic voyages greatly stimulated trade between Africa and the wider IOW. Elite demand, notably in China, India, and the

Middle East, ensured a vibrant commerce in exotic tropical commodities, including ivory, pearls, tortoise-shell, ambergris, rhinoceros horn and hide, gums, musk, and incense—chiefly for ornamental, craft, culinary and medicinal purposes. India, for example, was a noted consumer of gold and exporter of fine pepper, luxury cloth, dyes, craftwork, jewellery, pearls, and precious stones (including emeralds, crystals, rubies, diamonds, sapphires, and lapis lazuli). African commodities reaching India did so both directly and via entrepôts in Arabia, such as Muza (for East Africa) and Adulis (for Ethiopia). In return, as Sunil Gupta notes, India exported to Red Sea Africa a wide variety of commodities, including cloth and ceramics (Casson 1989; Warmington 1995; Miller 1969; also Gupta, Lytle, and Hughes and Post, in this volume).

There is considerable debate about northeast Africa as a source of spices. The *Periplus* (c.13–140 CE), an invaluable early first-century CE Greek manuscript on western IOW trade, and Ptolemy's *Geography* (c.150 CE)—works discussed in this volume by Ephraim Lytle, Carl Hughes and Ruben Post—emphasise the Horn of Africa, termed the "Cape of Spices," as the world's chief source of cassia and/or cinnamon (Casson 1989), while Cosmas (mid-sixth century) specified that cinnamon was obtained in the Somali hinterland (McCrindle 1897). However, as Lytle indicates, there is much confusion in the literature over the terms "cinnamon," which is not mentioned in the *Periplus*, and "cassia." Both belong to the genus *Cinnamomum*, generically described as of the same origin, and used in the same way. The Greek texts might have been referring to plants indigenous to the countries bordering the eastern end of the Red Sea. Certainly Somalia produced myrrh and frankincense. However, cinnamon proper (*Cinnamomum verum* or *C. zeylanicum*) originated from Sri Lanka and, as Waruno Mahdi and Lytle (in this volume) point out, the famous passage in Pliny (quoted in the chapter by Lytle) concerning rafts transporting cinnamon on the high seas probably referred to a maritime trade in spices with, or transited through, South Asia (Mahdi 1999a; Warmington 1995; Hourani 1995; Lytle and Mahdi in this volume).

Azania—the term used by the *Periplus* and Ptolemy for the modern-day Swahili coast of East Africa—also developed regular direct linkages with the wider IOW. Claims to a very early maritime connection with East Africa have a long but disputed heritage. Felix Chami asserts that by 3000 BCE, Sub-Saharan Africans had settled the present-day Swahili coast and offshore islands of Zanzibar and Kilwa; and that by 600 BCE, or probably earlier, they had established trade relations with India from where they adopted the chicken, rice, cotton, and possibly the coconut (Chami 2009; Chami et al. 2003; Sinclair et al. 2006). Early staple East African exports included ivory, rhinoceros horn, possibly slaves and, according to Gupta, Mozambique copal (for the Iraqi market) (Mollat 1971; Harris 1971; Gupta in this volume).

Certainly by the BCE/CE changeover, Egyptian, Arab, Mediterranean, and possibly Indian and Axumite vessels sailed to Azania. By the first-century CE, the major Azanian trading centre was Rhapta. It boasted many resident foreign ship captains and traders, mostly Arabs, who had taken local wives and spoke the local language. By the second century, Rhapta had developed into what the *Periplus* calls a "metropolis," a term applied elsewhere only to Meroe and Aksum in IOA, Saphar and Saubatha in Yemen, and Minnagar in India (Casson 1989; Huntingford 1980). As noted by Hughes and Post in this volume, Rhapta's location is the subject of considerable conjecture. The *Periplus* indicates that it was situated near a coastal promontory and major river somewhere in the vicinity of Menouthias—generally considered to be modern-day Pemba. Scholars have placed Rhapta variously opposite Manda and Pate, at Mnyuzi 48 km up the Pangani river, in the Rufiji estuary opposite Mafia where Felix Chami discovered some 20 first- to fifth-century CE sites containing Egyptian or Mediterranean beads, and near present-day Dar es Salaam—the location Hughes and Post choose in applying geographic information system (GIS) techniques to a re-reading of the geographic coordinates and other information given in the *Periplus* and Ptolemy's *Geography* (Hughes and Post in this volume; see also Casson 1989; Allen 1993; Horton 1996; Huntingford 1980; Middleton 1992).

Rhapta exported large quantities of tortoise-shell and ivory—second in value only to, respectively, Indian tortoise-shell and Adulis ivory—and, alongside Adulis, was the sole IOA source of rhinoceros horn. It also produced small quantities of nautilus shell, possibly mangrove poles used for house construction in Arabia and the Persian Gulf, and iron ore or semi-processed iron for the Indian market. Imports included lances, axes, knives, small awls, glass beads and other glass objects, wine, and grain (Austen 1987; Casson 1989; Horton 1996; Huntingford 1980; Sutton 1990; Vérin 1986). Michael Pearson asserts that Muza merchants imported wheat and ghee (Pearson 2000), and Pra Shirodkar that corn, rice, butter, sesame, cotton, sugar, and iron goods were shipped directly from India (Shirodkar 1985). However, as Gupta notes for the BCE/CE changeover, Indian products are mentioned in early texts, or have been uncovered, only in connection with imports into northern

IOA. Chami claims to have found third-century CE Roman beads at Rufiji Delta sites in Tanzania, and Unguja Ukuu, a large (16–17 ha) site on Zanzibar (Chami 1999a,b). However, while Marilee Wood (in this volume) considers that in the early centuries CE, Roman captains may have shipped beads from India and Sri Lanka to Azania, she assigns to most early imported bead finds a probably late first millennium CE origin.

The introduction into Azania of the Southeast Asian tropical crop complex, centred on the banana, sweet potato, manioc (cassava), Southeast Asian yam, and—Alexander Adelaar argues (in this volume)—taro and rice, had enormous impact. Mahdi (in this volume) notes that the banana, which was domesticated in highland Papua-New Guinea around 4950–4440 BCE, can only be propagated through human intervention (planting parts of its underground stem), so it probably accompanied visitors to Southeast and South Asia, where it was crossed with local inedible wild species. Recent disputed claims that the banana was cultivated in Uganda by 3000 BCE and the Cameroons by 500 BCE could indicate that Southeast Asian plants were introduced into Africa over a much longer period and in a more haphazard fashion than originally thought (Boivin et al. 2013; Chami 2006; Denbow 2014). Because of the banana's sugar, vitamin, and potassium content, its cultivation may have supported unprecedentedly dense populations and, by extension, sophisticated polities.

Economic Uncertainty, c.300 CE to 850 CE

Overall, economic activity in the IOW, including trans-IOW exchange, slumped from the fourth century—events probably related to a prolonged period of environmental crisis from about 300 CE to 900 CE. During the economic upswing from around 300 BCE to 300 CE, there was a substantial increase in population, agriculture, industry, and trade which resulted in large-scale deforestation for crop cultivation, pasture, boat and building construction, and domestic and industrial fuel—notably for iron-smelting. This in turn caused a substantial increase in methane and carbon dioxide emissions, which had a significant climatic impact (Sapart et al. 2012). Despite considerable regional and temporal variations, the indications are that there was widespread aridification from about 280 CE to 900 CE in the northern hemisphere and a significant fall in temperatures and subsequent weakening in the southwest monsoon from about 250 CE to 800 CE (Chew 2007; Gupta et al. 2003; Yang et al. 2002).

Disease contributed to socio-economic and political instability. From 37 to 653 CE, China was hit by virgin diseases, including smallpox and measles, with devastating demographic consequences: the Chinese population slumped from an estimated 58.5 million in 2 CE to 42.33 million by 742 CE. Political disturbances and economic decay followed, accentuated by invasions from the steppe (Chang 1969; McNeill 1976). In the western IOW, Egypt experienced major harvest shortfalls between 155 CE and 299 CE due to deficient floods. A prolonged drought again hit the region in the sixth century, and an associated epidemic of bubonic plague (the "Justinian" plague) travelled via trade routes from Ethiopia to Egypt from where it went on to devastate Southern Europe from 542 CE (Connah 2001; Edwards 2013).

Axum, in northern Ethiopia, flourished until the sixth century. Located near the headwaters of two major Nile tributaries, Axum controlled busy caravan routes between the Red Sea and the African hinterland. By the mid-first century CE, it had largely diverted trade from Meroe and Sudan that traditionally flowed to Egypt to the Axum-dominated Red Sea ports of Ptolemais Theron (possibly Suakin or Trinkitat) and Adulis/Zeila (present-day Massowa). Axum expanded militarily to dominate Ethiopia and north-western Arabia. From around 270 CE, it minted its own coinage, and its fleet maintained a vigorous trade with Somalia, Socotra, Egypt, the Near and Middle East, and India. Axum's merchants and courtiers adopted Greek as a lingua franca, and in 303 CE, its court converted to Christianity—a reflection of important commercial relations with Egypt and the Levant. At its height from the fifth to the mid-sixth century, Axum contested Sassanid domination of maritime trade with East Africa and established a colony in Sri Lanka (McCrindle 1897; Warmington 1995; Young 2001). However, in 520, the Sassanids conquered Yemen and Oman, by 570 had expelled Axumites from Arabia, and in 576 seized Aden, thereby controlling the entrance to the Red Sea. Thereafter, Axum's commercial influence dwindled, accentuated by climatic change as a consistently wet period from roughly 1 to 730 CE was followed by two centuries of highly erratic rainfall, and the desiccation of highland Eritrea and Tigray. This accentuated declining soil fertility due to demographic expansion, tree clearance, and general land overuse and resulted in a shift southwards of population and political power (Barbosa 1918; Boardman 2010; Butzer 1981).

For many scholars, Azania also experienced economic vibrancy that, though less spectacular, proved more durable than that of Axum and laid the basis for the Swahili maritime culture that emerged in the late first millennium CE. They assert that during the first centuries CE, Bantu-speakers moved progressively east from the Great Lakes region, to reach the Indian Ocean coast sometime after the fourth century. By the late seventh century, they had developed a proto-Swahili maritime culture, and by the late 700s were speaking Kiswahili, structurally a Bantu language (Allen 1993; Nurse and Spear 1985; Pouwels 1987).

More radically, Chami has argued that as early as 1000 BCE, Bantu-speakers reached the coast where their iron-working and experience with boating on inland waters facilitated a rapid transition to a maritime lifestyle. They founded Rhapta, a prototype for later Swahili port-cities, and probably also Unguja Ukuu, a Zanzibari emporium that from about 500 to 900 CE traded extensively with India, the Middle East, and the Mediterranean world (Chami 2006; Chami and Msemwa 1997). However, Chami's claims are controversial. Neither method of absolute dating—radiocarbon or imported pottery—is totally reliable for the East African coast. Testing mangrove wood, commonly used in construction, is problematic as its contact with seawater, which has concentrations of carbon 14, can give misleading results. This leaves imported pottery, but most hypotheses are based on local rather than foreign pottery and its alleged association with iron-working—in which the relation between pottery types is subject to considerable speculation (Forslund 2003; Horton 1996; Ekblom et al. in this volume).

Cosmas in his sixth-century work failed to comment on Azania, which may indicate that it had by then experienced economic collapse (McCrindle 1897). Indeed, Rhapta disappears from the record in the fourth century, after which, from roughly 400 to 750 CE archaeological and historical evidence relating to Azania is scant (Chami 1999b). Azania's decline or demise appears to have been associated with climatic change. East Africa's climate is influenced chiefly by the Intertropical Convergence Zone (ITCZ), and by El-Niño - Southern Oscillation (ENSO) events and related sea surface temperature anomalies that drive variations in the biannual migration of the ITCZ. Changes in the monsoon system, which is heavily affected by ENSO patterns, also play a major role, as does the Indian Ocean dipole in which there is irregular warm–cold oscillation between the western and eastern poles of the Indian Ocean (Russell and Johnson 2007; Spinage 2012; Wolff et al. 2011). The indications are that the ITCZ shifted south in the third century CE, after which equatorial East Africa entered a period of greater aridity until the mid-ninth century. East Africa generally probably experienced a wet period from 500 to 600 CE, and a dry period from 600 to 680 CE. Thereafter, the evidence is conflicting. While most scholars accept that severe drought affected the East Africa–Central Africa borderlands until 890 CE, some argue that in East Africa generally the drought persisted until 1250 CE, while others argue for a wet period from 680 to 940 CE, at least in Kenya and north-eastern Tanzania (Alin and Cohen 2003; Eltahir and Wang 1999; Russell and Johnson 2007; Verschuren 2004).

The Second Economic Upswing: Ninth to Thirteenth Centuries

The IOW global economy started to recover from the mid-eighth century, and from the ninth to thirteenth centuries, experienced a prolonged upswing. Again, climate played a significant role. The period from circa 850 to 1200 CE was characterised by markedly higher temperatures and stronger southwest monsoons than those of the preceding 500 years. This assured regular rains, secured harvests, and produced surpluses, which provided a solid basis for the promotion of state revenues, craft production, and trade across Asia. The upswing lasted until about 1300 CE, when the climate became significantly colder and drier and the southwest monsoon weaker, prompting a decline in the IOW global economy (Gupta et al. 2003; Ji et al. 2005; Morrill et al. 2003; Wade 2009; Yang et al. 2002).

By the early eighth century, conflict between the Byzantine and Sasanian empires had left both exhausted, facilitating the rise of the new Muslim powers that captured the two main commercial routes from the Indian Ocean to Egypt and the Mediterranean in the Fertile Crescent and Red Sea regions, then overran the Persian Sassanid Empire, brought Persia and Iraq under common rule, and conquered Sind. They adopted the efficient administrative structure, mints and coinage, postal service, land-based tax system, and standing army of the previous Persian and Roman imperial regimes. By the ninth century, they had also developed a comprehensive legal framework in the form of the Sharia. The influence of such structures, forged in the *Dar al-Islam*, or Islamic heartland, spread via Muslim traders and missionaries to the *Dar al-Kufr*, or non-Muslim regions, where many local authorities embraced Islam. In addition, Arabic became increasingly employed as a lingua franca, facilitated in script by the teaching of the Quran as a canonical scripture and the adoption of papermaking. Written contracts further promoted accuracy in commercial transactions (Abu-Lughod 1989; Eaton 1993; Ricks 1970). Trans-IOW sail also improved. Some Arab Muslims were, by the late 900s, sailing directly to China, where maritime relations with the West peaked from 1127 to 1279 CE, by which time Chinese ships were sailing as far west as Quilon (Kollam) on the Malabar Coast (Duyvendak 1949; Lo 1955; Meilink-Roelofsz 1962; Wheatley 1964b).

Africa also became increasingly integrated into the wider IOW economy in this period. In 640 CE, Muslim forces captured Egypt, a major market and commercial crossroads, and from 969 CE, centre of the Fatimid Caliphate (909–1169 CE). Although the expanding Muslim frontier in northeast Africa created tensions, it did not assume the uniformly military or antagonistic form conventionally ascribed to it. Egypt became predominantly Muslim by the thirteenth century, but the Coptic Church survived. In the Sudan, local African communities largely continued to uphold traditional religious beliefs and practices. Muslim immigration and commercial inroads led to Somalia becoming predominantly Muslim by 1200 CE, and created considerable inter-community strain in Ethiopia, but Ethiopian Christian, Muslim, and "pagan" traders continued to interact commercially (Abir 1980, 1985; Campbell 2007; O'Fahey and Spaulding 1974).

Exports from northern IOA to the wider IOW included, from Egypt, grain, flax, linen, opium, glass and other beads, crystal, and rosewater and dried roses; from the Sudan, ivory, rhinoceros horn, and slaves; from Ethiopia, gold, ivory, civet musk, and slaves; and from Somalia, frankincense, myrrh, putchuk, liquid storax gum, animal skins, rhinoceros horn, tortoise-shell, ambergris, gold, beeswax, sandalwood, ivory, and slaves. Imports included Chinese coins and porcelain, Persian pearls, piece goods, dates and dried fish, coarse Cambay cloth, some silks, white cloths, and spices (Chang 1969; Duyvendak 1949; Hirth 1909; Meilink-Roelofsz 1962; Wheatley 1964b).

The period between the ninth and thirteenth centuries marked a major phase in southern IOA integration into the IOW global economy with the rise of the Swahili, Great Zimbabwe, and early Malagasy civilisations. Most scholars reject the traditional viewpoint that the Swahili (lit. "coastal dweller" or "people of the coast") civilisation was the result of Persian, Arab, and possibly Indian male immigration and intermarriage with local

Bantu-speaking women, arguing rather for a predominantly African genesis. Of central significance are the Bantu origins of the Kiswahili language. Moreover, only from the late ninth century, did porite stone and coral buildings start to replace “African” mud and thatch structures, and overseas Islamic influence become more evident. By 1200 CE, Swahili coastal entrepôts such as Mogadishu, Mombasa, Zanzibar, and Kilwa had become culturally vibrant city-states integral to the wider IOW commercial network into which they distributed commodities from more distant regions, such as Mozambique, the Comoros, and Madagascar (de Allen 1981; Horton 1996; Pouwels 1987).

Wood and Anneli Ekblom et al. (in this volume) note that two distinct trading hubs existed, one centred on the central east African coast and the other on Mozambique, the Comoros, and Madagascar. The Lamu archipelago was central to the northern maritime network, as is reflected in locally excavated beads of foreign, Middle Eastern, and possibly Indian origin. It was also a gateway to the continental interior. From about 800 CE, Lamu exported pottery from Wenje, 100 km up an earlier course of the Tana River, to the main Swahili ports and from about the mid-tenth to late eleventh centuries, rock crystal (quartz) from Kitui, about 350 km inland, to Persia and Fatimid Egypt (969–1171 CE) for the manufacture of medallions, jewelry, and mosque lamps (Elliot 1925; Allen 1993; Horton 1996; Wood in this volume). India was a growing source of imports into Zanj (the Arabic term, in this period, for East Africa). Annual Gujarati fleets brought copper, cloth, and beads. Wood considers that many of the beads found at Unguja Ukuu may have been produced at Mantai, an entrepôt at the Palk Straits, separating India from Sri Lanka (Wood in this volume; Barbosa 1918; Austen and Headrick 1983). Gupta also emphasises the import of Indian ceramics (Gupta in this volume). Genetic indications that from the eighth century CE chickens reached East Africa and Madagascar is a further reflection of trans-IOW maritime exchange, possibly via South Asia (Mwacharo 2013; Mwacharo in this volume).

Because the monsoons petered out about 12°S, overseas merchants were obliged to establish resident agents at locations such as Zanzibar and Kilwa in order to regularise trade with regions further south. Staple “southern” exports comprised ivory, shipped to Asia, Egypt, and the Mediterranean, rhinoceros horn, valued in China for ornamental and pharmaceutical uses, and “Sofala” gold from the highland interior centred on present-day Zimbabwe (Barbosa 1918).

Zanj also exported slaves, although the dimensions of the trade are contested. Central to the debate is the 869–883 CE rebellion in Lower Iraq, termed the "Zanj revolt." The conventional view that the rebels comprised massive numbers of adult male East African slaves was challenged in the late twentieth century by scholars such as John Hunwick (1978) and Humphrey Fisher (1989), but it has recently been endorsed by a number of prominent archaeologists and historians (Horton and Middleton 2000; Alexander 2001; Sheriff 2010; Beaujard 2012). In re-examining the issue later in this volume (Chap. 12), I note that evidence for a massive ninth-century East African slave export trade is weak and endorse the revisionist view that most slave rebels came from Ethiopia and the Sudan rather than the Swahili coast.

There is substantial evidence for strengthening coastal-hinterland relations. Gupta notes shell beads from the coast dating to around 2000 BCE deep in the east African interior (Gupta in this volume; see also Chami 1999b; Ehret 1998; Forslund 2003). However, only from around 900 CE did coastal-interior linkages become strong and major inland centres of power and trade emerge. Such developments were again linked to climate. A period of greater rainfall from circa 850 CE induced agro-pastoralists to spread into previously marginal areas, such as the fringes of the Kalahari and the Shashi-Limpopo basin where large, hierarchical centres developed from 900 to 1300 CE (Tyson et al. 2002). In response to a favourable climatic environment, centralised polities specialising in the production and trade of iron implements emerged at Kibengo, Munsa, Mubende, Bigo, and Ntusi in Lake Albert and the Victoria/Nyanza region between the thirteenth and fifteenth centuries (Sutton 1990). However, the most important polity was Great Zimbabwe (c. 1050–1500 CE) which in the fourteenth century boasted a population of possibly 10,000. Settlements associated with Great Zimbabwe included the Leopard's Kopje settlements at the Shashi-Limpopo confluence, notably Mapungubwe (c. 900–1250 CE). From the eleventh to thirteenth centuries, complex polities also emerged in central eastern Botswana, including Bosutswe, Shoshong, and notably, Toutse. Indeed, from the fourteenth to sixteenth centuries, there existed some 150 settlements associated with Great Zimbabwe in Zimbabwe, Mozambique, Botswana, and the Transvaal (Calabrese 2000; Denbow 1986; Fagan 1969; Huffman 1972, 1986).

Rising demand on the Swahili coast for ivory and minerals promoted the prosperity of these polities, which maintained vibrant trade contact with the IOW maritime trading system via the Limpopo, Zambesi, Luenha, and Mazoe rivers. Trading settlements on the east African littoral that linked the interior to the coast included Hola Hola, on the Sabi River, Chibuene, and Benguerua Island (Alpers 1984; Newitt 1972; Oliver and Atmore 2001). Growing IOW demand for African ivory, due to falling supplies in Asia and the higher quality of African tusks, stimulated specialised elephant hunting, long-distance porterage, and ivory working. There was also growing demand for gold from Muslim countries, notably from the Abbasid Empire (750–1258 CE), and after 1300 CE from the Far East and Europe. In the latter part of the first millennium CE, over 200 gold mines operated in Botswana, between Domboshoba and the Tati River. Gold was exported as nuggets, dust (in porcupine quills), and in processed forms. At Mapungubwe, for example, it was fashioned into beads, metal sheets, bangles, and bracelets (Denbow 1986; Fagan 1969; Sutton 1990).

There was a return flow of cowries, cloth, Chinese porcelain, and beads. Glass beads have been found in coastal markets such as Manekweni, but the greatest concentrations are from the sites of large commercial centres in the interior, such as Mapungubwe, Great Zimbabwe, Ingombe Ilede, and Toutse in present-day Botswana (Alpers 1984; Barbosa 1918; Calabrese 2000; Fagan 1969). Wood (in this volume) notes that, unlike those of Zanzibar, "Zhizo" style beads, which passed through Chibuene into interior Southern Africa probably came not from Sri Lanka but from the Persian Gulf, possibly from Sohar.

The boom in IOW trade and expansion of the Swahili trading complex also helped to stimulate the rise of the first Malagasy civilisation. The origins of the Malagasy are the subject of considerable debate. Most scholars follow Otto Dahl who on the grounds of the affinity of the Malagasy and Maanyan languages argued that Kalimantan, south east Borneo, was the ancestral home of the Malagasy people (Dahl 1951). However, Kalimantan lies in the deep interior, its inhabitants have no tradition of maritime activities, and they possess a different spiritual and material culture to that of the Malagasy. There are also linguistic influences on Malagasy from across the Indonesian region, where more than 1200 languages currently exist (Adelaar 1995c; Blust 1995). While recognising a Malay and Javanese influence on the Malagasy language both before and after the proto-Malagasy migration, Adelaar (in this volume) emphasises that Malagasy derived from South Borneo, specifically from Manyaan speakers living in and around the political centre of Banjarmasin. He contends that the forebears of today's Manyaan speakers migrated inland following the Javanese invasion of Banjarmasin towards the close of the sixteenth or start of the seventeenth century. In addition, he argues that the Arabic script was introduced to Madagascar not from the Middle East, but from Southeast Asia.

On a final though major issue of early connections between Africa and the wider Indian Ocean world, considerable speculation also surrounds the issue of human migration to Madagascar. Mahdi (in this volume) notes that the Indonesian archipelago, with its multitude of both islands and inundated areas, comprised an environment particularly favourable to the development of a maritime culture, which developed further from 12,000 to 5000 BCE, when sea levels rose, flooding the Sunda Shelf. This induced migration to the South China coast where the double canoe possibly gave rise to the Chinese junk. In subsequent generations, this maritime culture moved south as part of the Malayo-Polynesian dispersion. In this sense, argues Mahdi, the Austronesian, and hence Proto-Malagasy, homeland lay in a geographic triangle connecting Taiwan, Sumatra, and Timor. Mahdi contends further, that "Negrito" or "equatorial" peoples were ascribed a servile status within the Malay-Polynesian grouping.

Between about 1500 BCE and 1500 CE, in the largest dispersal of its kind prior to the European "Voyages of Discovery," Austronesians colonised previously uninhabited islands over some 26,000 km of ocean, east across the Pacific and west across the Indian Ocean to Madagascar. Estimates as to when the proto-Malagasy left their homeland vary enormously, from 3000 BCE to the thirteenth century CE (Adelaar 1989; Dahl 1991). Adelaar (in this volume) argues on linguistic grounds that they left their native country in South Borneo in the seventh century CE and settled in Madagascar in the eighth century. Yet others link the proto-Malagasy specifically to the Srivijayan thalassocracy of the late seventh to thirteenth centuries (Wheatley 1964a). Mahdi (in this volume) contends, without claiming that they were necessarily the Austronesian proto-Malagasy, that Negrito Austronesians sailed both to China, and westwards, in the process introducing their boat-building techniques to South Asia.

Pierre-Yves Manguin (in this volume) points out that Austronesians not only possessed great shipbuilding and navigational skills but were also close to the source of spices—among the most valuable of IOW trading commodities. Others also associate the Indonesian component of the proto-Malagasy with the spice trade (Dick-Read 2005; Marschall 1983–1984; Miller 1969). Certainly by 300 CE, Indonesians possessed boats 50 metres long, with four sails, which could carry up to 700 people for long distances in rough seas (Ray 1990). Manguin notes that their large ocean-going vessels were built in the lashed-lug rather than sewn-boat tradition of the western Indian Ocean, and while outrigger canoes might have accompanied their ships, they were not dependent on them (chapter by Manguin). He argues that Austronesian sailors were fully aware of routes west to the Cape of Good Hope and beyond, and continued to be in maritime contact with the western IOW until the fifteenth century. Adelaar (in this volume) contends that such contact was maintained possibly into the sixteenth century.

Two routes from Indonesia to Madagascar have been proposed, one 4800 km directly across the Indian Ocean to Madagascar and another indirect via East Africa. Manguin considers it likely that Austronesians followed the direct equatorial route, in the process taking their lashed-lug boat-building techniques to the Maldives. Certainly Kon-Tiki type expeditions have proved the feasibility of such lengthy direct trans-oceanic trajectories (Beale 2006). A direct route nevertheless raises the question of why the Indonesians did not also settle on the smaller, more manageable Mascarene Islands which remained unpopulated until the first European contact.

Most scholars of Madagascar support Gabriel Ferrand's (1918) hypothesis that the proto-Malagasy followed the main maritime routes along the northern Indian Ocean rim, establishing posts en route, and eventually reached East Africa from where some subsequently migrated to Madagascar (see e.g., Deschamps 1960; Vérin 1986). They receive support from historical linguists such as Christopher Ehret (1998) and Adelaar (in this volume) who consider that, between the first and third centuries CE, Austronesians introduced the Southeast Asian complex of crops into East Africa. By contrast, most historians of East Africa point to the absence there of evidence for ancient Indonesian or Malagasy influence. They argue rather that Arab and Indian traders indirectly, gradually and haphazardly introduced Southeast Asian crops to East Africa, and that the appearance of outriggers on the Swahili coast may have been a local development. They thus endorse the thesis of direct and separate migrations to Madagascar by Indonesian and African groups (see e.g., Chami and Msemwa 1997; Allen 1993).

There is similarly contention over the issue of human settlement of Madagascar. Ekblom et al (in this volume) give tentative support to Robert Dewar's claims for human occupation of Lakaton'I Anja, on the north coast of the island, around 2400 BCE, and for occupation of Ambjohibe Cave in the northwest between 2343 and 1461 BCE, and sites in the southwest between 805 and 204 BCE (Burney et al. 2004; Dewar et al. 2013; Stiles 1998). However, they note that accurate dating of Dewar's findings is a problem and that non-human causes might have been responsible for some cut marks on animal bones discovered that allegedly date to that early period. If human causation is established, this may indicate the activity of visiting African hunters rather than settlers, there being no sign of Austronesians involvement (Ekblom et al. in this volume; Boivin et al. 2013).

Moreover, the earliest permanent settlements discovered, on Nosy Mangabe and in the Mananara Valley of northern Madagascar, date, as do those on the Comoros, to the eighth or ninth century CE. They were small—a maximum of twenty households (Dewar 2008; Vérin 1986; Wright 1986). The claim (Cox et al. 2012) that the initial female colonists were about 30 in number and predominantly Southeast Asian has been countered by both earlier evidence of mixed, rather than separate, Bantu-speaking-Austronesian migrations to Madagascar (Jenkins et al. 1996), and more recent evidence indicating a founding population of at least 500 individuals of approximately equal Austronesian and African genetic makeup (Hodgson et al. 2014b). Jason Hodgson (in this volume) notes that genomic single nucleotide polymorphism (SNP) data in selected Malagasy populations today reveals African ancestry ranging from 42 percent in the highland Merina to between 62 and 65 percent in the coastal Vezo, Temoro, and Mikea, and finds no evidence of Middle Eastern genetic input.

The predominant view is that Southeast Asian voyages to Madagascar resulted from pull factors, notably the expansion of IOW maritime trade from the ninth to thirteenth centuries, although Adelaar here argues that the Malagasy derive from Manyaan speakers shipped as vassals aboard Malay ships. The first settlers possessed Iron Age technology and practised a mixture of lagoon or estuary gathering and fishing, while early Mananara Valley occupants manufactured earthenware pottery, iron and soapstone (chlorite schist) vessels, and beads. Small, generally hybrid, Afro-Indonesian communities spread gradually throughout the island. On the east coast, they exploited littoral lagoons, in the west, they exploited marine and riverine resources, cultivated sugarcane, manioc, banana trees, and pandanus, and on the hinterland plains, raised herds of zebu. Evidence for South Madagascar points to human settlement and subsequently incorporation into long-distance trade from around the start of the second millennium CE (Vérin 1986; Wright 1986; Dewar 2008; Ekblom et al. in this volume).

Wood and Ekblom et al. suggest here that Madagascar was initially commercially linked to the Mozambique coast, and from there to the wider IOW. However, Madagascar's northern coasts were also easily accessible by boat from the Comoros and on the monsoon winds from India, and between the eleventh and fifteenth centuries, became increasingly integrated into the Swahili trading network, experienced considerable population growth, and formed the core of what archaeologist Pierre Vérin termed the first "Malagasy civilisation" (Vérin 1999). From the fourteenth century, Islam and Swahili architectural styles reached Madagascar, where a number of trading settlements emerged, all connected to Kilwa, Malindi, and Mombasa. They possessed hierarchical societies with Swahili (called "Antalaotra" in Madagascar) political and commercial elites. Mahilaka, in Ampasindava Bay, on the northwest coast, developed into a 70 ha walled town with 5000 to 10,000 inhabitants, stone buildings, and at least one mosque. By 1500, major settlements existed on the lower Manambolo (of 9000–10,000 inhabitants) and along the rivers Morondava, Mangoky, and Kitombo in Menabe; Boeny and Mazalagem (6000–7000 inhabitants) in Boina Bay; Nosy Langany/Doany Manja (Mahajamba Bay); and along the river Betsiboka on the northwest coast (Vérin 1986; Wright 1986; Dewar 2008; Ekblom et al. in this volume).

Malagasy exports to the IOW included: to East Africa, rice, livestock (from the twelfth century), soapstone, gum copal resin, and coral stone; to the Persian Gulf and Arabia, mangrove trees, rice, tortoise-shell, crystal quartz, and possibly gold, silk, spices such as ginger, and mangrove poles; to the Middle East and Indonesia, slaves; and to India, iron. Imports included Cambay beads and cotton and silk cloth, Middle Eastern pottery, glass vessels, silver, gold, and probably pearls, Chinese ceramics (from the 1300s), silver coins and jewelry, and spices—of possibly Indonesian origin (Barbosa 1918; Dewar 2008; Grandidier 1902; Radimilahy and Crossland 2015; Vérin 1986; Vérin and Wright 1999; Wright 1986).

The first indications of a human presence in the highlands date to the early second millennium CE, but the first signs of permanent human occupation date to the twelfth century, and that of sizeable communities to the fifteenth century (Dewar 2008; Radimilahy and Crossland 2015; Ekblom et al. in this volume). While most scholars argue that the proto-Merina arrived probably in the twelfth century, the date of the last textual evidence for "Indonesian" voyages to Madagascar, indigenous traditions indicate that the proto-Merina arrived well after Indians in the eleventh to twelfth centuries (Callet 1974; Marschall 1983–1984; Ottino 1982; Vérin 1986).

There are linguistic indications of continued contact between Southeast Asia and Madagascar after the introduction of Islam to Indonesia, and possibly after the advent of the Portuguese presence in the IOW (Adelaar in this volume). In this context, it is possible that the Merina, as is reported in their oral traditions, reached the highlands at the start of the sixteenth century.

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CHAPTER 2

Origins of Southeast Asian Shipping and Maritime Communication Across the Indian Ocean

Waruno Mahdi

Introduction

Unlike agriculture with its stone and metal instruments, permanent settlements, and early sacral and hierarchic monuments—land defense led to early social stratification—maritime communication is difficult to trace. Seafaring proceeded on water, involved watercraft and housing of wood or other perishable material, and the transported commodities too were often foodstuffs, herbs, aromatics, and organic decorative materials. Even when durable items, like beads and sherds, testify to maritime communication,

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they do not identify the watercraft or shippers. One is often compelled to rely on indirect evidence.

Insular Southeast Asia (ISEA) is known for early involvement in maritime communication across the Bay of Bengal and further (Solheim 1980: 334; Bellina and Glover 2004: 73–80). It seems quite convincing that Malayo-Polynesians played a key role in earliest maritime communication and dispersal of shipbuilding technology not only into Oceania but also across the Indian Ocean.[1] There remain, however, three problems: First, the Austronesian homeland of Taiwan and the adjacent Chinese mainland do not present a likelier littoral environment for the development of maritime mobility than any other worldwide; second, the earliest inhabitants of Taiwan are described as agriculturists (Chang 1969: 60, 64, 249–250; Bellwood 1984–1985, 2005: 36), not seafarers; and third, as will become apparent below, there does not appear to be a unique original Austronesian word for "boat."

I argue here that Austronesians, rather than being the original developers of seagoing watercraft, acquired their maritime mobility from Negritos[2] who came north from ISEA. It seems likely that these latter also sailed to the east and the west, so that earliest maritime communication along the north coast of the Indian Ocean too was probably performed by Negritos.

ISEA as the Original Scene of Maritime Mobility

Unlike Taiwan, the natural environment of ISEA seems uniquely propitious for development of maritime mobility as it constitutes an archipelago with (today) by far the greatest number of islands in the world and has a humid tropical monsoon climate, leading to riverine landscapes with sophisticated deltas and frequent floods. Archaeological investigations confirm this: the settlement of Sahul, dated to c. 45,000 BP (O'Connell and Allen 2004: 849) or 49,000–43,000 BP (Summerhayes et al. 2010: 78)[3] implies dispersion first across the Wallacean Sea. The subsequent migration into Near Oceania proceeded with a 130–150 km crossing from New Ireland to the North Solomons by 28,000 BP (Wickler and Spriggs 1988: 703–704; Gosden 1992: 55; Broodbank 2006: 205–206).

These were not "accidental" crossings in consequence of storms or tsunamis, but demonstrably reflected maritime mobility. Remains of high-sea fish at sites in Sahul, dated to before 30,000 BP, imply offshore fishing (Erlandson 2010: 22; O'Connell et al. 2010: 60). In East Timor, the 35,000–30,000 BP horizon in the Lene Hara cave reveals a heavy reliance on marine sources (Lape et al. 2007: 240), while the lowest layers in Jerimalai contain the remains of marine turtles and deep-water fish (O'Connor 2007: 530).

The primeval forms of watercraft, rafts and bark canoes, have been reported along the entire east coast of Australia and Tasmania (Doran 1981: 74–75). Two developments from a primitive raft seem likely. One is a tapered raft (see Fig. 2.1a; cf. Edwards 1965: 94), originally called a catamaran (from Tamil *kaṭṭu-maram*, lit. "tied timber"). As over time this term has unwittingly been applied to double-hulled yachts, I will use *kattumaram* for the South Indian craft (cf. a.o. Kentley 2003: 178), and *tapered raft* as cover term for any watercraft of this basic construction.

Another development was the multiple dugout (Fig. 2.1b) which appeared at different times in several places, including Europe (Johnstone 1980: 48–49). The raft, already used much earlier in ISEA, probably served there as model for the multiple dugout. A raft's stability against capsizing sideward, and its capacity to carry heavy loads, would suggest putting together several dugouts like logs in a raft. Improved carving of the dugout hull permitted a reduction in the number of hulls, the minimal construction being the double canoe (Fig. 2.1c). Finally, augmentation of the dugout with side-planks and V-shaped end-structures resulted in the five-part hull (Fig. 2.1d; see also Horridge 2008: 88, fig. 3b–c). In an earlier publication, I suggested that these constructional sophistications took place when rising sea levels led to inundation of the Sunda Shelf (Mahdi 1988: 349), that is, during the Late Pleistocene and Holocene (from 14,000 till 7000 BP, and more gradually up to c. 4000 BP; Milliman and

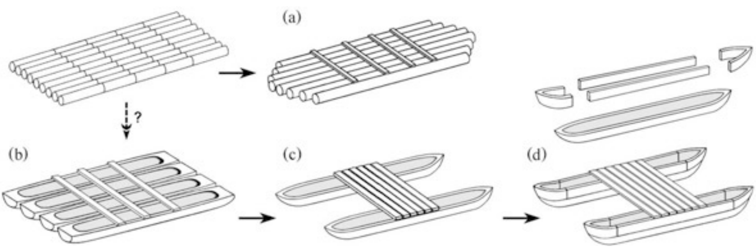

Fig. 2.1 A postulated scheme of primeval developments of watercraft construction in ISEA and around the South China Sea: (**a**) a tapered raft; (**b**) a multiple dugout; (**c**) a double canoe with advanced dugouts, and (**d**) with five-part hulls

Emery 1968: 1122–1123); see Fig. 2.2.[4] This period witnessed the first sea crossings elsewhere in the world, leading in particular to the settlement of islands in the Mediterranean (Broodbank 2006; Ammerman 2010; Farr 2010) and before the Pacific coast of North America (Erlandson et al. 2008; Fitzhugh and Kennett 2010).[5]

However, as noted above, systematic evidence of migration across the Wallacean Sea dates to c. 49,000–43,000 BP and of deep-sea food acquisition in ISEA and Melanesia to before 30,000 BP, that is, 20–30 millennia before the rise of sea levels in the Late Pleistocene and Holocene. Furthermore, far greater expanses of land were inundated in ISEA than elsewhere, leading to sufficiently high concentrations of mainland population to cause a transition into the Neolithic (Mahdi 1988: 348–349).

In the east, Golson (1977) indicates early horticulture and the digging of an irrigation canal in the Kuk Swamp in highland Papua-New Guinea (PNG). There, multidisciplinary investigations reveal a gradual development of shifting cultivation of taro from the early Holocene, leading to its intensive wetland cultivation and to deliberate planting of banana, by 6950–6440 BP (Denham et al. 2003: 192; Haberle et al. 2012). In the

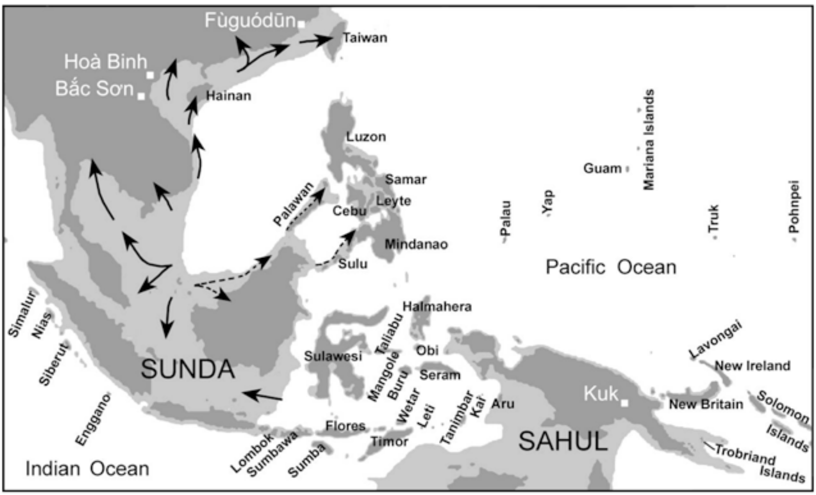

Fig. 2.2 Presumed routes of Late Pleistocene and early Holocene migrations of Sunda Shelf populations into Indochina and further northwards to Southeast China and Taiwan

west, transition from the Mesolithic Hoabinhian to Neolithic Bacsonian is dated to c. 11,000–6500 BP (Bellwood 1997: 161–162). Hence, the postulated sophistication of watercraft construction was not an isolated process but part of a wider material culture development in Southeast Asia that expanded northward: the Neolithic Fuguodun site dates to around 6700–6000 BP (Jiao 2007: 55), and a Dapenkeng site in Taiwan to c. 4400 BP (Chang 1977: 85; see also Chang and Goodenough 1996). Hence, in addition to causing a concentration of population in Indochina, inundation of the Sunda Shelf probably led to a northward migration of equatorial populations as suggested in Fig. 2.2, implying also a northward dispersal of the culture of maritime mobility.

Northward Migration of Equatorial Populations

It seems likely that this northward dispersal of seafaring culture was accompanied by the emergence of sea-nomad communities resembling the Negrito Sama-Bajau and Sea-People (*Orang Laut*) of recent times.[6] In his *Nusantao*[7] hypothesis, Solheim (1984–1985: 79–81) assumed a dispersal of early Austronesians from East Indonesia through the Philippines to Taiwan. However, it is difficult to accept that the rising sea level led to migrations from islands in Wallacea rather than inundated areas and to more distant other islands rather than nearest *terra firma*. Meacham (1984–1985: 94–95), who excluded a movement along the Chinese coast and denied a South China origin for Formosans, located the Austronesian homeland more generally in a "broad triangular area formed by Taiwan, Sumatra, and Timor."

Nonetheless, there is ample evidence of common linguistic elements linking Austronesian with Austrasiatic, Kradai (Tai-Kadai), and Sino-Tibetan languages of the mainland; see for example Reid (2005); Ostapirat (2005); and Sagart (2005). Some early data already suggested that Austronesians were formed by a meeting of two populations, one of equatorial, the other of "[Southern] Mongoloid" complexion (Mahdi 1994: 465–466). Meanwhile, Donohue and Denham (2010) have found that the Malayo-Polynesian (MP) dispersal involved considerable interaction of migrants from Taiwan with Pre-Austronesian inhabitants of ISEA which led in particular to considerable material culture exchange.

Genetic studies of distribution of genome mutations show that Taiwan population groups share features with Filipinos, Indonesians, and Maoris on the one side, in clear distinction from Thai, Chinese, Japanese, and

Europeans on the other (Lin et al. 2005: 240). Certain alleles are common to both the Ami of Taiwan and population groups in the PNG Highlands and Australia (ibid: 235, 242). As these alleles were not taken from Taiwan by Malayo-Polynesians,[8] this implies they were brought there by northward migrating Australoids. This dispersal of DNA probably resulted from an early migration to the north of equatorial populations who subsequently participated in a southward MP dispersal (Mahdi "Comment" in Donohue and Denham 2010: 242).

There is a distinct Proto-Malayo-Polynesian (PMP) word for persons with equatorial complexion. In languages of peoples with such complexion, it is often the word for "person." In some languages of Central and East Indonesia, apparently of later-arrived migrants, it reportedly means "slave"[9] (Mahdi 1988: 58; 1994: 464–465):[10]

PMP **qata* > (2) Ata-Manobo *ʔata*, (4) Karo-Batak *hata ~ ata*, Enggano *ek-aka*, (5) Manggarai *ata*, Lio *ata*, (8) Belau *gad*, North Kanak *kac* "person";
besides:

(2) Samal *ata*, (3) Tombulu *ata*, Muna *gata*, (5) Sumba *ata*, Wetar *ada*, (6) Rumakai *ata* "slave."[11]

The dispersal suggests that people of the first MP migration waves were predominantly Australoid and that they reached New Caledonia (Kanak), in the east, and the Barrier Islands before the Sumatran Pacific coast, in the west. There is a Philippinic (Phil.) doublet with infixed **R*,[12] the reflexes of which mean "Negrito" in languages of Negritos as well as Non-Negritos:

Phil. **qaRta* > (2) Casiguran-Agta *agta*, Pangasinan *ʔayta*, Isneg, Tagalog *ʔagta*, West Bukidnon-Manobo *agta* "Negrito person." (Charles 1974: 460)

There also is an Early Austronesian (EAn) protoform for "person" (Kern 1886: 178; Dempwolff 1938: 132 sub *[t]avu[ʻ]*), which apparently referred to Non-Negrito migrants:

EAn **Cau* > (1) Pazeh *saw*, Puyuma *ṭau*, (2) Tagalog *táo*, (3) Bugis *tau*, (7) Nakanai *tau*, Motu *tau*, (8) Fiji *tau*, Futuna *tau* "person."[13]

A composite with **qata* was apparently formed at contact between the two population types:

> **Cau ma-qata* > (3) Sangir *taumata*, Ratahan *tomata*, (6) Paulohi *tamata*, Yamdena *tomwate*, (7) Sobei *tɛmto*, Mussau *taumata*, (8) Fiji *tamata*, Samoa *taŋata* "person."[14]

The Oceanic distribution of the latter two forms suggests a transit of **Cau* [*ma-qata*] through areas originally settled by **qata* (corresponding genetic data will be considered below).

It is noteworthy that the protoform **qata* appears to contain the Proto-Austronesian root **ta*, which, in combination with a prefixed **a*-, **i*-, or **ki*-, forms the personal pronoun "we" (inclusive) (Mahdi 1994: 465):

> **ata* > (1) Bunun *ʔata*, Saaroa *ɨɬ-ata* "we" (inclusive)
> **ita* > (1) Squliq-Atayal *itaʔ*, Thao *ʔitaʔ*, Kavalan *a-ytáʔ*, (4) Ngaju *ita*, (7) Motu *ita*-, (8) Samoa *ita*, "id.";
> **kita* > (1) Kanakanabu *i-kita*, Ami *kitaʔ*, (2) Cebuano *kita*, (3) Tondano *kita*, (4) Malay *kita*, (6) Buru *kita*, (8) Futuna *kita* "id."[15];

The Negrito seafarers who brought maritime mobility to the north evidently assimilated linguistically with Early Austronesians to the extent of assuming the latter's collective reference to communal fellows, so as to refer to themselves as **qata*.

Introduction of Seafaring to China

The watercraft of equatorial peoples migrating northwards as suggested in Fig. 2.2 must have been more advanced than that of mainland populations. One would thus expect the double canoe to have been introduced to Southeast China by northwards migrating peoples. Indeed, Hornell (1946: 88–89) and Gibson (1958: 16–17) considered the Chinese junk to have derived from a double canoe. Needham (1971: 392) assumed derivation from a raft instead, there being no longitudinal bulkheads where the inboard sides had been. However, Gibson (loc. cit.) had already explained that the inboard sides were removed to lower the deck, to which I added that this was predictable if the double canoe had five-part hulls (Mahdi 1992, and see Fig. 2.3).

The character *zhōu* "watercraft" (舟; Giles 1912: #2446),[16] which functions as a semantic radical in complex characters referring to watercraft, seems to confirm origin from a double canoe. Needham (1971: 439) thought the character originally depicted a raft. However, in inscriptions

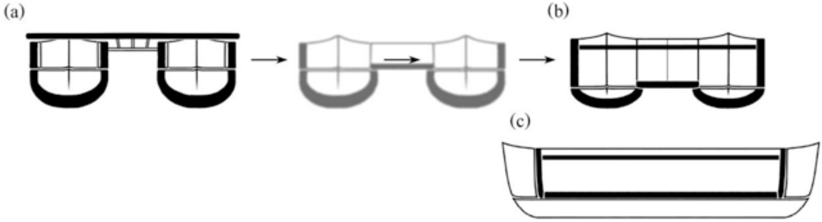

Fig. 2.3 Theoretical development scheme of a Chinese junk from a double canoe with five-part hulls: (**a**) cross-section of the double canoe; hazy intermediate is purely hypothetic; (**b**, **c**) transversal and longitudinal cross-sections of a prototypical junk

on Shang (Yin) bone (1300–1046 BCE)[17] and Eastern Zhou bronze (770–250 BCE) the character *zhōu* did not have many longitudinal lines depicting logs of a raft, but always only two, one on each side, connected by several transversal lines, which never mark the bow and stern ends as would be the case if a raft were implied (Mahdi 1992; and see Table 2.1).

The early pronunciation of the character has been reconstructed as:[18]

> OC **tju* (Baxter 1992: 810) > EMC * *tɕuw* (Pulleyblank 1991: 411) > modern *zhōu* (舟).

Subsequently, a number of words referring to two boats lashed together, sometimes also to a rectangularly formed ship, appeared in Chinese. The oldest one is:

> Chinese *fǎng* (舫) "two boats lashed together, a large boat, a galley" (Giles 1912: #3447) << EMC **puaŋh* (Pulleyblank 1991: 92) < OC **paŋ* (Karlgren 1940: #740h).

According to one source, the composite *fǎngchuán* (舫船), literally "*fǎng* ship"—of which both components are attested for Eastern Zhou (Karlgren 1940: ##740h, 229f)—denoted "double-hulled boats" used in a military expedition in 312 BCE (Needham 1971: 441 fn. c, citing Lo Jung-pang[19]).

Other words similarly meaning "two boats lashed together, a large boat" appeared later: first *háng* (航; Giles 1912: #3852) attested for Early Middle Chinese (< EMC **γaŋ*; Pulleyblank 1991: 120); later also: 艕

Table 2.1 Shape of the Chinese character *zhōu* "watercraft" at different times

Shang (Yin) bone	Eastern Zhou bronze	*c.* 100–1000 CE	More recent
Karlgren (1940: #1084b–e)		Wieger (1924: 168)	

bàng, 艎 *huáng*,[20] and 艂 *páng* (Giles ##8665, 5117, 8694; Needham 1971: 392; Mahdi 1994: 456). Note the *zhōu* radical on the left side of each of the characters. The custom to lash two boats together possibly reflects early familiarity with double canoes, further confirming the assumed origin of the junk.

Watercraft in Taiwan and Malayo-Polynesia

As noted above, Taiwan's early inhabitants are described as agriculturalists, not as seafarers, let alone shipbuilders. Indeed, instead of a unique Austronesian protoform for "boat," one finds several such protoforms, including likely doublets, all with limited dispersal areas:

(a) **qaCu* > (1) Squliq-Atayal *qasuʔ*, Pazeh *ʔasuʔ*, Bunun *hatoʔ* (Ferrell 1969: 247);
(b) **qabaŋ* > (1) Kanakanabu *abaŋu*, Oponohu-Rukai *havaŋu*, Siraya *avang*, (2) Gaddang *ʔabaŋ*, Tiruray *ʔawaŋ*, Ilanun *awaŋ*, (4) Mentawai *abak*, Moken *kabaŋ*;[21]
(c) **baŋkaʔ* > (1) Kavalan *baŋka*, (2) Tagalog *baŋkaʔ*, Tausug *baŋkaʔ*, (3) Mori, Muna *baŋka*, (5) Sumbawa *baŋka*;[22]
(d) **waŋka*[23] > (5) Manggarai, Rembong *waŋka*, (6) Tifu *waga*, (7) Yautefa *wăğĕ*, Yabem *waŋ*, Suau *waga*, (8) Fiji *waŋga*, Tonga *vaka*.[24]

Protoforms (b) and (c) appear to be composites of a monosyllabic common precursor **baŋ* with a preposed **qa-* or postpositioned **-kaʔ*, respectively; (c) and (d) are probably doublets.

Kavalan *baŋka*, sole reflex of (c) in Taiwan, is probably a Philippinic borrowing (Ferrell 1969: 20; Wolff 2010: 756), leaving only (a) and (b) represented in Taiwan. Both are reflected in several highest-level branches of Austronesian (see Blust 2009: 49), and should formally be assigned to Proto-Austronesian. However, their parallel distribution suggests horizontal dispersal by borrowing, and I assign them to a not more precisely defined "Early Austronesian." The dispersal of reflexes of (b) and (c)—both including the Philippines—does not conform to division between West and Central-East MP, meaning that it does not reflect exclusive inheritance from parent to daughter language. The four reconstructs seem to ultimately represent two monosyllabic precursor forms **Cu* and **baŋ*. Note worthily, the former could be a borrowing from OC **tju* (modern *zhōu* 舟), while OC **paŋ* (modern *fǎng* 舫) was perhaps borrowed from Early Austronesian **baŋ*.

Traditional MP shipping features several basic watercraft constructions: symmetric and asymmetric double canoes, non-reversible and reversible single outrigger boats, double-outrigger boats, and single-hulled plank boats without outriggers (often with lashed-lug hulls, see Horridge 1982). Originally, it was postulated that Austronesian watercraft originated from a boat with sponsons (outboard beams running along the hull, regarded as outrigger precursors), which developed into a double-outrigger boat, then a single outrigger boat, and subsequently to a double canoe by enlargement of the outrigger to a hull (Heine-Geldern 1932; Hornell 1943). A closer investigation revealed an opposite chronological sequence: symmetrical double canoe > asymmetrical double canoe (with one hull smaller) > non-reversible single outrigger boat > reversible single outrigger boat > double-outrigger boat.[25]

This implies that the watercraft at start of the MP dispersal was a double canoe. As anti-sway stability did not require both hulls to be full-sized, one of them became increasingly smaller, until it ended as a mere outrigger. This raised a new problem: to advance against the wind, a double canoe tacks (see Fig. 2.4a; Lewis 1975: 261, fig. 55), but when a single outrigger boat performs the same maneuver, the outrigger is alternatingly to windward and to leeward (see Fig. 2.4b; Doran 1981: 38, fig. 20A). The latter constellation is very impractical.

The solution was reversibility of sailing direction, which allowed advancing against the wind with constant windward orientation of the outrigger by shunting as shown in Fig. 2.4c.[26] This meant replacing the older triangular Oceanic sprit sail (as termed by Doran 1981: 42, fig. 22 *middle*), stretched between a flexible mast and an equally flexible spar, with the Oceanic lateen,[27] stretched between two V-aligned spars, so that

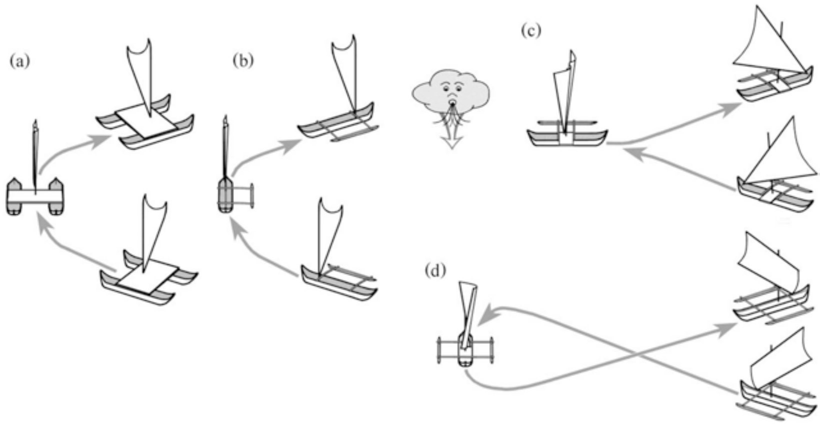

Fig. 2.4 Advancing against the wind, (**a**) a double canoe tacks, as does (**b**) a non-reversible single outrigger boat; (**c**) a reversible single outrigger boat shunts; while (**d**) a double-outrigger boat wears (the wind is blowing from the back/top of the figure to the front/bottom)

the apex could be re-socketed from fore to aft (which becomes the new "fore") at every reversal of direction (see Fig. 2.4c).

The double-outrigger was a late development in ISEA with limited dispersal into Near Oceania. It is less versatile when advancing against the wind and wears (see Fig. 2.4d) instead of tacking, cf. Horridge (1987: 26, fig. 21e, 85, fig. 46; 2008: 92, fig. 9) who describes double-outrigger boats with Oceanic lateen sail instead of canted rectangular sail as shown in Fig. 2.4d.[28] Canted rectangular sails are depicted on reliefs on the Borobudur temple,[29] dated c. 800 CE, and probably reflect Near-Eastern influence (Mahdi 1999a: 157–159).

Besides other circumstances (see Mahdi 1999a: 145–148), the change in the maneuver for advancing against the wind, and in the form of the sail, most convincingly demonstrate that the double canoe must indeed have been the earliest MP boat form.

The dispersal of the five-part hull between Bali and Hawaii (Horridge 1987: 29, 144), and elsewhere in Oceania (Koch 1984: 17, Abb. 7; Prins 1986: 111, 113ff), even suggests that the original MP double canoe may also have had five-part hulls. However, in Melanesia, there also are double canoes without five-part hulls and even tapered rafts and multiple dugouts. Hence, the original double canoe of the first wave of MP dispersal probably did not have five-part hulls. The latter construction probably developed at the meeting of mainland ancestors of the **Cau* [*ma-qata*] with the people who had migrated north into the Fujian area (cf. Chang and Goodenough 1996: 52) and was subsequently dispersed by the former into ISEA and Oceania. This may also have been when the double canoe with five-part hulls was introduced to the Chinese. This supposes two phases in the MP dispersal into Oceania: a "slow boat" of the **qata* on multiple and double canoes with dugout hulls, followed by an "express train" of the **Cau* [*ma-qata*] on watercraft with five-part hulls. While there apparently was linguistic assimilation between the two groups, so that all Austronesian languages of Oceania appear to descend from a single Proto-Oceanic, the transit migration of the latter group appears to be supported by the genetic observations of Friedlaender et al. (2008); see also Allaby et al. (2010: 151–152, 155).

East and Westward Dispersal of Pre- and Early MP Watercraft

As suggested by the distribution maps of Doran (1981: 77–79, figs. 40–42) and Mahdi (1999a: 148, 150–151, figs. 5.4, 5.5),[30] the dispersal of successive MP boat forms—double canoe, single outrigger boat, double-outrigger boat—proceeded by a progressive displacement of one form by the next, fanning out from ISEA eastwards into Oceania, and westwards into South Asia.

If the description of Negrito development of maritime mobility is correct, the primeval watercraft sophistications (tapered raft, multiple dugout) must have been similarly dispersed in both directions. This also appears evident from the distribution maps of Doran (1981: 75, fig. 36) and Mahdi (1999a: 149, fig. 5.3). However, primeval constructions such as tapered rafts and multiple dugouts are likely to appear in different regions independently. Besides finding examples of a given watercraft construction to the east and west of ISEA, it seems important to consider the likelihood that they were dispersed in both directions by migrants from ISEA.

With reference to tapered rafts in the region west of ISEA, allusion was made above to the kattumaram (see Fig. 2.5a; Bowrey 1903: Plate VIII-top). To the east of ISEA, we find the konga on Eddystone Island in the Solomons (see Fig. 2.5b, drawn from photograph in Hornell 1946: Plate VIIA B; Johnstone 1980: 217 #15.15). Tapered rafts also occurred in America, known as balsas on the Pacific coast and jangadas

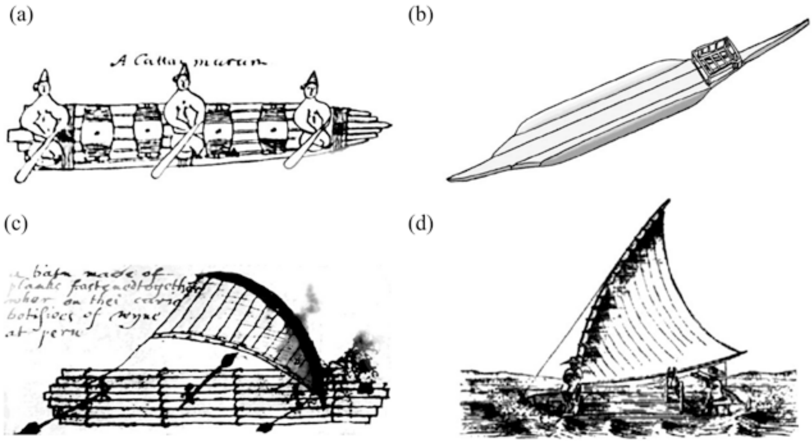

Fig. 2.5 Tapered rafts: (**a**) The kattumaram of Malabar, drawing by Thomas Bowrey between 1669 and 1679 (Bowrey 1903); (**b**) a konga of Eddystone Island, the Solomons (drawn from photograph); (**c**) a "batu" (balsa?) of Peru in the 1582 diary of Richard Madox (Donno 1976; courtesy the Hackluyt Society); (**d**) a jangada of Brazil in 1587, notations of Gabriel Soares (Charton 1850; courtesy Bibliotheque nationale de France)

on the Atlantic.[31] An apparent balsa, named a "batu," was drawn in Peru by Richard Madox in 1582 (see Fig 2.5c; Donno 1976: fig. 17 opposite p. 241). The jangada was imaged by Gabriel Soares in his 1587 *Noticia do Brazil*, published in Lisbon in 1825 (see Fig. 2.5d; Charton 1850: 304). Earliest reports of these craft are cited here in order to minimize the consequences of colonial influence on construction and design.

Like the double canoes and non-reversible single outrigger boat shown in Fig. 2.4a, b, the batu and jangada carry an Oceanic sprit.[32] As Polynesians are not known to have sailed on tapered rafts, it was apparently only their sail which was borrowed. The tapered raft must have been a local Amerindian development, so the kattumaram in Malabar too could have developed independently.

The situation with multiple dugouts is more complicated. None are reported in the Indian Ocean or explicitly mentioned in historiographical sources. However, there may be indirect evidence of their early use along the southern west coast of India (Mahdi 1999a: 152–153). The *Periplus of the Erythrean Sea* notes "local ships that sail along the coast up to Limyrikē, also others which are very large ships of single logs bound together, called *sángara*."[33] "Single logs bound together" suggest a raft. The term *sángara*, however, appears cognate with Tamil *sangādam*, Malayalam *changādam*, Kannada *jangāla*[34]—"a double canoe"—which is the minimal variant of a multiple dugout. It seems likely, therefore, that the *sángara* was a multiple dugout. I have earlier suggested that the confused passage on transport of cinnamon on "rafts" in Pliny the Elder's *Naturalis historia* (XII. 86–87) perhaps referred to the same watercraft (Mahdi 1999a: 155–156).

That those "rafts" were multiple dugouts becomes likely when compared with the Lakatoi, the multiple dugout of the Motu in the Gulf of Papua (see Lewis 1969: 109, 1975: 94). A more detailed description can be found in Haddon and Hornell (1937: 227–231), and two of them are shown in Fig. 2.6 (taken from Wirz 1931: 351). From these, it would appear understandable that an observer described them as "large ships of single logs bound together."

It is also significant that Lakatois were used by the Motu for ritual trading tours known as the *hiri* (Lewis 1969). Such ritualized forms of trade were discussed in detail in the example of the *kula* of Kiriwina (Trobriand Islands) by Malinowski (1984). Considering that the *sángara* of the

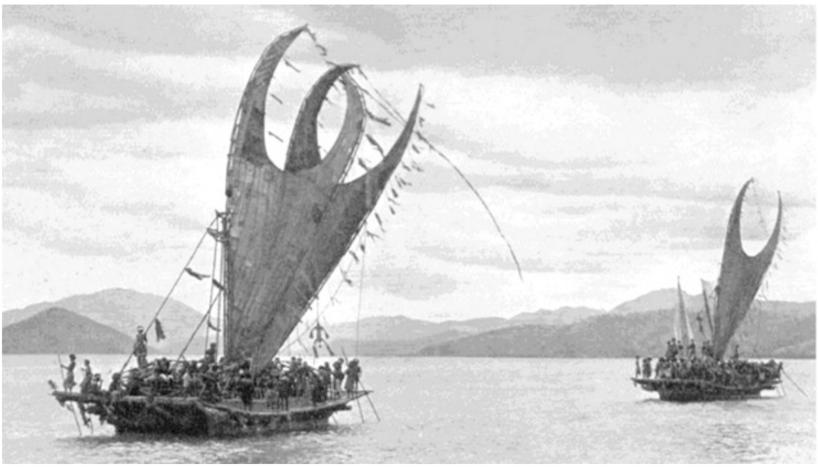

Fig. 2.6 Two lakatois in the Gulf of Papua. Note their Oceanic sprit sails (Wirz 1931; courtesy Staatsbibliothek zu Berlin).

Periplus were apparently trading ships, this increases the likelihood that they represent a westward counterpart to eastern Lakatois.

That the protohistorical *sáṅgara* represents a westward dispersal of multiple dugouts from ISEA is supported by developments in the intervening area, for we find double canoes and outrigger boats dispersed not only in northward and eastward directions but also to India and Sri Lanka, as is described by Hornell (1920). It is noteworthy that contemporaneous Indian iconographic images of watercraft depicted single-hulled ships, never "rafts" (cf. Deloche 1996). This suggests that the *sáṅgara* did not belong to the Indo-Aryan or Dravidian societies which produced the iconographs, but to some coastal seafarer communities.

It is also of significance that the double canoes and outrigger boats do not have five-part hulls. Although westward MP sailings in the first millennium CE brought advanced shipbuilding technology as far as East Africa and Madagascar (cf. Hornell 1944), a significant part of South Asian shipping tradition was apparently introduced earlier by ISEA Negritos and MP-speaking **qata* not yet having watercraft with five-part hulls. Furthermore, South Asian double canoes and outrigger boats carry a different rigging, the bifid-mast or double-sprit sail.

Another feature is a constructional sophistication of the double canoe in Sri Lanka, analogical to the transition to a junk in China. However, as Hornell (1946: 88–89) noted, instead of lowering the deck between the hulls (as in Fig. 2.3), the log hull was split into two halves between which planks were laid, resulting in a rectangular vessel formed like a punt. Kentley (2003: 171–173) provides a detailed description of its construction with reference to the Sri Lankan *madel poruwa* (see Fig. 2.7).

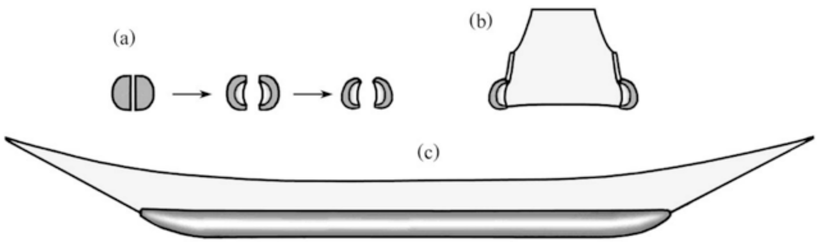

Fig. 2.7 (**a**) Splitting and successive carving of a log; (**b**, **c**) cross-section and side view of a Sri Lankan *madel poruwa*, based on Kentley (2003: 169, fig. 6.2)

Concluding Remarks

Early Chinese, MP, and South Asian shipping had one basic feature in common: their sideward stability was achieved not by shifting their center of gravity below surface-level, as, for example, with the help of ballast, but through alternating activation of two buoyancy centers. In double canoes, tilting causes the hull on one side to sink, raising its buoyancy, and lifts the other hull, which reduces its buoyancy; tilting causes an outrigger to either resist submergence, or serve as counterweight when raised (see Doran 1981: 57, fig. 30). In case of Chinese junks, the so-called floating duck principle operates similarly, raising the buoyancy of the downward tilted side and lowering that of the lifted side. The same principle applies to the *madel poruwa* and analogically constructed Sri Lankan watercraft.

This common tilt-resisting mechanism of early shipping in China, Malayo-Polynesia, and the South Asian subcontinent apparently reflects their common origin from boat forms developed by seafaring Negritos from ISEA in the Middle and early Late Holocene. Only later did Chinese junks with narrower hulls and South Asian and ISEA single-hulled ships without outriggers require either freight or ballast.[35]

Negritos from the Sunda Shelf evidently migrated both northwards, as suggested in Fig. 2.2, and westwards. The first MP speakers who, coming from the north, then also sailed westwards into the Indian Ocean were, like those sailing eastwards into Melanesia, apparently Negritos. This is also supported by linguistic data cited earlier (Mahdi 2009), which indicate the substantial role of ancestors of Moken and Moklen (so-called Sea Gypsies)—also Negritos—in early lexical transmission between ISEA and the northern peripheries of the Indian Ocean.

This and further evidence, brought forward for reasons of space in a further article (Mahdi in press), underscores the key role of Negritos in primeval maritime communication and earliest transfer of shipping technology.

Notes

1. See Hornell (1920: 140, 221–222, 225–246; 1944); Manguin (1996, 2004: 283); Mahdi (1999a: 144–145, 150–151, 155–165, 169–174); Hoogervorst (2013: 78–93).
2. For want of a more differentiated classification, I provisionally refer to Pre-Austronesian ISEA indigenes to the west of Halmehera–

New Guinea–Timor as Negritos, and to those on and around these islands as Papuans. I will use Australoids as a generic term that embraces both these groups, Melanesians and Australian Aborigines.

3. Dates of 65,000–60,000 BP (see references in Redd and Stoneking 1999: 808) were apparently not calibrated.
4. O'Connell and Allen (2004: 836) and Voris (2000) were consulted for information on the Late Pleistocene shoreline.
5. Hominin traces on Socotra are reported by Amirkhanov et al. (2009: 68) from the Oldovan (2.5–1.4 Mio. years BP), but external contacts date from the first century BCE (Doe 1992: 12; De Geest 2012).
6. For Negrito sea-nomads, see for example, Sopher (1965: 54–59, 291–293).
7. Supposedly meaning "people of the island homeland," although it more likely means "island homeland of the people." The desired expression would be **Tau-* or **To-nusa*. Compare this with *Toraja* (lit. "people of the interior or highlands," **daya* "interior, highlands") and *Tondano* ("people of the water," **danaw* "body of water, lake").
8. The PNG highland population remained free from Malayo-Polynesian admixture, as elaborately confirmed by Redd and Stoneking (1999).
9. "Slave" in early descriptions should possibly read "member of a subordinate community."
10. To save space, only skeletal listings demonstrating the areal distribution will be provided, with the following enumeration of areas: (1) Taiwan; (2) The Philippines; (3) Sulawesi with neighboring islands; (4) west of Sulawesi; (5) Nusa Tenggara; (6) Maluku; (7) West Papua and PNG; (8) Further Oceania.
11. See also Verheijen (1967: 19); Pätzold (1968: 170); A.-G. Haudricourt in Grace (1972); Blust (1972b); Sneddon (1978: 123); Nothofer (1994: 403); Mahdi (1994: 464–465).
12. Speculations that the **R* is part of the base are contradicted among others by Karo-Batak and Tombulu. Expected for **qaRta* would be Karo-Batak ***[h]arta* (cf. *berŋi* "night" < **beRŋi*, Adelaar 1981: 16 #96) and Tombulu ***ahta* (cf. *ahdan* "ladder" < **haReZan*, Sneddon 1978: 120).

13. Also Ferrell (1969: 175); Zorc (1994: 575); Wolff (2010: 1000–1001).
14. Cf. Dempwolff (1938: 132); Blust (1981: 235); Sneddon (1984: 107); Mahdi (1994: 461); Wolff (2010: 1000–1001). In Central-East MP languages (6–8) there is fusion > **taumata* > **tawmata*, then metathesis > **tamwata* and dissimilation > **taŋwata* > *taŋata*.
15. Dempwolff (1938: 81); Ferrell (1969: 190); Wolff (2010: 987).
16. Here and further, the Wade–Giles transliteration used in Giles (1912) is replaced by currently standard *Pinyin*.
17. The Late Shang of Lee (2002: 18, table 1).
18. *EMC* Early Middle Chinese, c. 590–680 CE (Pulleyblank 1991), *OC* Old Chinese, c. 770–250 BCE (Baxter 1992), referred to as "Chou III/IV" by Karlgren (1940), that is, Eastern Zhou.
19. "Communications and Transport in the Chhin and Han Periods," unpub. MS, p. 29.
20. The meaning "ship, two boats lashed together" is given by Couvreur (1904: 768).
21. Ferrell (1969: 247); Pawley and Pawley (1994: 338); Zorc (1994: 585); Mahdi (1994: 455); Wolff (2010: 947).
22. Dempwolff (1938: 20); Blust (1972a: #83); Pawley and Pawley (1994: 338); Zorc (1994: 572); Mahdi (1994: 455); Wolff (2010: 756).
23. Erroneously reconstructed **waŋkaŋ* by Dempwolff (1938: 164 sub *vaŋkaŋ*); Zorc (1994: 594); Wolff (2010: 1027), but see Mahdi (1994: 217 #109, 2012: 218).
24. Stresemann (1927: 67); Capell (1943: 115 #319); Pawley and Pawley (1994: 337); Mahdi (1994: 195–196).
25. Doran (1981); Mahdi (1988: 54–55; 1992: Abb. 3; 1994: 457, 481 n. 180; 1999a: 145–148).
26. Lewis (1975: 262, fig. 56); Doran (1981: 38, fig. 20B); Horridge (1987: 147, fig. 87; 2008: 93, fig. 10); Mahdi (1992: Abb. 11).
27. Haddon and Hornell (1937: 48–52), while Doran (1981: 42, fig. 22 *bottom*) calls it crane sprit.
28. See also Doran (1981: 35, fig. 18 *top* and *bottom left*); Horridge (2008: 97, fig. 15).
29. Van Erp (1923: 236, 244, 246, 248); Bernet Kempers (1976: 50 #32, 118 #79).

30. For single and double-outrigger canoes, see also Hornell (1946: fold-out map at the back).
31. Hornell (1946: 81); Edwards (1965: 94–96); Johnstone (1980: 224–228).
32. Referred to as "gaff" sail by Edwards (1965: Plate 10*b* and Plate 11*a*).
33. §60 … *topikà mén estin ploīa méchri Limyrikē̃s paralegómena tè̃n gē̃n, hétera d' ek monoxýlôn ploíôn megístôn hafaīs ezeugména, legómena sángara* (Frisk 1927: 20, lines 7–8).
34. The name of the Brazilian jangada was perhaps introduced by South Indian personnel of the Portuguese.
35. The Classical Malay word for "ballast" was *tolak ba[ha]ra*, lit. "repell (i.e., replace) freight."

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CHAPTER 3

Austronesian Shipping in the Indian Ocean: From Outrigger Boats to Trading Ships

Pierre-Yves Manguin

> [The Javanese…] are all very proficient in the art of navigation, to the extent that they claim to be the most ancient navigators. […] There is no doubt that they have sailed all the way to the Cape of Good Hope and that they had been in touch with the outer [i.e., Eastern] coast of the Island of São Lourenço [Madagascar] where one finds many coloured and Javanised indigenous people whom they say are their descendants.
>
> Diogo do Couto, *Décadas da Ásia*[1]

The peopling of Madagascar by Austronesian-speaking communities is one foremost—and indisputable—witness to their long-distance ventures across the Indian Ocean.[2] Linguistic, anthropological, and various other types of evidence regarding Austronesian expansion west of Southeast Asia have been thoroughly studied during the past century. In this chapter, I will concentrate only on the maritime orientations of those people of Insular Southeast Asia who are known to have played a role in long-distance ventures in the Indian Ocean in proto-historic and historic times.

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I will therefore necessarily favour a view of Indian Ocean history that is taken from the shores of the western façade of Insular Southeast Asia.

Over the past two-and-a-half millennia, the societies of the islands of Sumatra, Java, and Borneo, and the Malay Peninsula progressively formed complex polities of various sizes that played an active role in shaping Indian Ocean exchange and trade networks (though of course people from other islands may have participated in such ventures). Most relevant late prehistoric to early historic sites brought to light by archaeologists along a string of favoured coasts lie astride the enduring trans-Asian maritime route and along its extensions towards areas of production of trade commodities, many of them unique to these regions (clove and nutmeg of the Moluccas, camphor of Borneo, sandalwood of Timor, to name only a few). Due to their exceptional geographical position, Southeast Asian coastal polities, with their harbour cities acting as central places, became inescapable crossroads between three crucial regions: the two economically and culturally commanding continental masses of China and South Asia, and the multitude of mainland and Insular Southeast Asian ecosystems, harbouring peoples of various origins. Following the pioneering work by Ian Glover (1989) linking early trade between Southeast Asia and India with developments in world history, many authors have now pursued the study of this crucial period (see e.g., Glover and Bellwood 2004; Bellina et al. 2010; Manguin et al. 2011; Revire and Murphy 2013).

Among these people, those speaking Austronesian languages shared technologically advanced shipping skills and control over valuable and often irreplaceable commodities. The diffusion over much of the Indian Ocean coastal areas of boat-building traditions associated with such Austronesian-speaking people has been noted for more than a century. Pioneers such as Hornell (1919, 1920) or Haddon (1918, 1920) wrote about technological affinities between Southeast Asian and East African small fishing boats. With the waning of diffusionist theories, such studies have long been neglected. However, within different paradigms and renewed interdisciplinary approaches, these issues are again being raised in Indian Ocean studies. Moreover, during the past two decades, sustained progress in nautical history and archaeology in Southeast Asian waters (particularly in Austronesian-speaking areas) has brought to light a considerable body of data on sailing vessels that needs to be taken into account.

As inhabitants of the largest archipelago in the world, the people of Insular Southeast Asia have for long been routinely described as skilled mariners. It is generally accepted that Austronesian-speaking peoples, after leaving their homeland in Taiwan approximately 5000 years ago, sailed south into Insular Southeast Asia, where they soon mixed with pre-existing populations. They continued sailing east into the Pacific, all the way to Easter Island, leaving few islands unpopulated, and west across the Indian Ocean, partly turning Madagascar, culturally and linguistically, into an offshoot of Insular Southeast Asia.[3]

However, for long, once lip service was paid to such geographically determined maritime adaptations and sailing talents, the issue attracted little additional attention. Excellent studies of the surviving small sailing boats of Oceania and Southeast Asia were carried out, and many pages devoted to the distribution of such features as outriggers (single or double) and sail types from Southeast Asia into Oceania and, via India, to Southern Africa and Madagascar. Cultural diffusionists were content to discuss the origins of such features, without placing such issues in the historical context of Southeast Asia,[4] while mainstream historians of Southeast Asia were mainly preoccupied with monumental archaeology and art history. The unsuspecting scholar was therefore largely left with the romantic but unsubstantiated idea that fearless Austronesians had paddled halfway around the planet on flimsy boats. Given this obsessive focus on origins and diffusion, with no consideration to the full historical processes, it was difficult to figure out why and how the Austronesian-speakers who had first spread into Insular Southeast Asia subsequently leaped west across the Indian Ocean, reached East Africa and peopled Madagascar (or the reverse).

The very few scholars who remarked that in proto-historical and historical times Austronesian-speakers of the western half of Insular Southeast Asia could also have built larger vessels for high-sea navigation and long-distance, large-scale trade, tended to be experienced sailors who knew something was amiss. An exception was diplomat and linguist Gabriel Ferrand (1910, 1918, 1919), who, drawing on Portuguese and Arabic sources, noted in his 1910 paper “Les voyages des Javanais à Madagascar” that Malay World sailing traditions had a lot more to show for them than was commonly acknowledged. Sociologist and historian Bertram Schrieke made a similar point in a short essay entitled “The Javanese as maritime and trading people” (1919). Some 30 years later, Christiaan Nooteboom, who had written a dissertation on Indonesian boats, followed up on Ferrand and Schrieke in another short work on “Sumatra and Indian Ocean shipping” (1950).

The first major challenge to the early, negligent approaches came from the Pacific fringes of the Austronesian world, from scholars concerned with navigational techniques who experimentally re-enacted, with the help of the last generation of skilled indigenous high-seas navigators, a variety of far-reaching Oceanic crossings. In the process, they brought to light the sophisticated non-instrumental navigational techniques which allowed Austronesian-speakers to progressively occupy the Pacific Islands, to reach and keep contact with remote and often tiny islands thousands of miles apart, in a process that lasted well into the first millennium CE (e.g., Gladwin 1970; Lewis D. 1975, 1980a; Feinberg 1988). Through reassessing eighteenth-century descriptions by Western explorers, it was also proven that the vessels that carried these people into the Pacific had often been complex, large, plank-built canoes, not mere dugouts. However, the development of boat-building practices in Oceania, which occurred after the prehistoric split-up between Southeast Asia and Pacific peoples, does not concern us here; only those developments that took place in Southeast Asian waters and eventually found their way into the Indian Ocean will be considered.

Linguistic and anthropological approaches helped in the construction of a new paradigm for the role of Austronesians in shaping their seascapes as a new wave of scholars studied recurring references to sea, ships and maritime trade in rituals, mythology, iconography and literatures. Linguists, for their part, reconstructed terms in proto-Austronesian languages, revealing the early adaptations to a maritime environment and the mastering of sailing techniques that Austronesian-speakers needed for their far-ranging ventures east and west (Blust 1976, 1984–1985; Scott 1985; Manguin 1986; Adelaar 1995, 1996, 1997, 2009; Zorc 1994; Pawley and Pawley 1998; Waruno Mahdi 1999a,b). In Indonesian seas, where large-scale trade aboard true sailing ships survived into the second half of the twentieth century, scholars such as Gene Ammarell (1999) endeavoured to record traditional navigation practices, which turned out to be comparable to those of Oceania (see also Lewis D. 1980b; Manguin 2011).[5] New developments in Indian Ocean studies have also shown that prehistoric movements of plants and animals across this vast maritime expanse were considerably more frequent than conventionally believed (Fuller et al. 2011; Hoogervorst 2012).

The Boats and Ships of the Austronesian World

Thanks to recent progress in Southeast Asian history and in the archaeology of shipbuilding technologies, it has now been confirmed that polities of the western façade of Southeast Asia were instrumental in sending to sea vessels of more than respectable tonnage at least as early as the first few centuries CE. It can be surmised from their usage at the dawn of the historical period that the technology must have developed in Southeast Asia over the preceding centuries, when exchange with India has also been proven to be vigorous. As will be seen, solid textual and archaeological data on ancient ships is available from the first half of the first millennium CE, initially for the incipient trade-oriented, coastal polities of Southern Sumatra and Java (Manguin 2004), and later for their successors, the more complex Indianized states, such as Sumatra-based Srivijaya (seventh to thirteenth centuries) and Java-based Majapahit (twelfth to fourteenth centuries), and finally by the multiple Islamic harbour cities of the thirteenth to sixteenth centuries, such as Pasai, Malacca, Japara, and possibly others further east. Most of these polities are now known to have operated locally built trading vessels of more than respectable size (a few hundred tons is a figure one often comes across in written sources).

Based on ethnographic, textual, and now archaeological sources, one technical tradition—known as "stitched-plank and lashed-lug tradition"—has been progressively associated with first and early second millennium CE seafaring in Southeast Asian waters. Because they have been identified in Austronesian-speaking areas of Southeast Asia, and no doubt also because of the Austronesian-speakers' role in the peopling of Madagascar, such technologies have been closely associated with what is usually called "the Malay World." A brief presentation will retrace the genesis of these finds.[6]

The Earliest Records: From Ethnography to Archaeology

As soon as Europeans entered the eastern waters of Southeast Asia in the sixteenth-century CE, they described "sewn" boats that were significantly different from those they had first met in Indian Ocean waters. One striking characteristic of the tradition they observed in Eastern Indonesia and the Philippines was the lashing with vegetal fibres of the frames of such boats to lugs carved out of the inner side of the planks, in which holes had been drilled. Sixteenth- and seventeenth-century observations in Eastern Indonesia and in the Philippines by Portuguese and Spanish authors provide excellent technical details on the Southeast Asian way of assembling the planks of a boat. Since that time, a variety of travellers have reported the existence of such exotic boat structures. During the twentieth century, and in some rare cases to this day, a few similar boats were still to be observed in Eastern Indonesia or in Botel Tobago (Taiwan). With few exceptions, all those described had their planks, from which lugs were carved out, lashed to the frames with ropes made from the sugar palm tree (the *ijok* fibre of Malays, the *cabo negro* of Tagalog speakers, made from the bark of *Arenga pinnata,* or *A. saccharifera*). These same planks, however, were not "sewn" but fastened together by way of wooden dowels. They, therefore, did not technically belong to the "sewn-plank" building tradition, as known in a variety of other places in the world, including the Mediterranean in antiquity and the Indian Ocean until today. Adrian Horridge (1978, 1982) provided the best analysis of the structural features of this boatbuilding tradition and coined the term "lashed-lug" to designate it.

The relationship between the lashed-lug vessels observed in ethnographic contexts and the only comparable boat remains from Southeast Asian archaeological sites did not escape early observers. Starting in the 1920s, a variety of remains of boats were recovered from sites on both coasts of the Thai-Malay Peninsula, in insufficiently controlled conditions. *Ijok* fibres had been used to lash the protruding lugs on the planks to the frames, as observed to this day. They were also used, however, to stitch the planks together, through holes dug into their seams, a feature not encountered in the boats mentioned above; only a few dowels were added to keep the planks together. Their antiquity was later confirmed by a series of radiocarbon dates that placed them between the third- and seventh-century CE.

The First Millennium CE Textual Record

Textual sources on the Southeast Asian maritime scene are not limited to those written by European writers. The ethnography and history of "sewn" vessels of Southeast Asia, in fact, go back a long time and include descriptions by first millennium CE Chinese authors who started describing Southeast Asian tropical flora and those travellers who boarded large Southeast Asian ships ("the *bo* of the *Kunlun* people"), leaving testimonies of their amazement at such shipbuilding features; they were indeed as exotic to Chinese observers of the early first millennium, who were used to iron nails and clamps, as they would later be to modern European witnesses. An early fourth century CE Chinese description of the flora of the South Seas discussed the sugar palm tree, the bark of which "can be made into ropes which become pliable in water [and are used by] the foreigners (…) to bind timbers together into boats" (Li Hui-Lin 1979: 90–91). The latter botanically accurate remark no doubt points to the fibre of *ijok*, which does not rot in (sea-)water and has been in continuous use in Southeast Asian houses and boats until recently. In an early ninth century CE comment on a Chinese Buddhist canonical text, we also learn that: "With the fibrous bark of the coconut tree, they [the *Kunlun* people] make cords which bind the parts of the ship together (…). Nails and clamps are not used (…)" Other mid-first millennium CE Chinese sources describe Southeast Asian ships that are said to have carried hundreds of passengers plus a sizeable cargo, with multiple masts and sails (Manguin 1980, 1996, in press).

The Recent Archaeological Record

What was still in need in the late 1980s, however, when this ancient Southeast Asian boatbuilding tradition was being revealed, was more archaeological finds to document the considerable gaps between the data from the relatively small and poorly-preserved boats from archaeological contexts, modern observations of the lashed-lug technique on small boats, and the Chinese texts describing the extremely large ships that plied the South China Sea (Map 3.1).

When the well-preserved and assembled remains of five larger boats were found in the ancient harbour site at Butuan (Mindanao, Philippines) in the late 1970s, they attracted considerable attention and resulted in a number of publications. Radiocarbon dating was carried out on three Butuan boats, with results that placed the remains in a relatively late time period (twelfth to fourteenth century CE). All belonged to the lashed-lug tradition: frames were lashed to the lugs with *ijok* ties, but no *ijok* was used to fasten the planks together; only numerous, closely spaced dowels were used to do so, as in modern survivals of Eastern Indonesia (Clark et al. 1993) (Fig. 3.1).

After the Butuan finds, and for the next 30 years, no connected structures of lashed-lug boats appeared in archaeological contexts. In the course of archaeological programmes carried out in river and harbour sites in Sumatra in the 1980s and 1990s, however, salvage excavations of boat and ship timbers were carried out in a variety of disturbed sites dating from the seventh to the thirteenth centuries. All, without exception, belong to the lashed-lug family, thus confirming that this technical tradition was in general use in western Southeast Asian waters during the first millennium

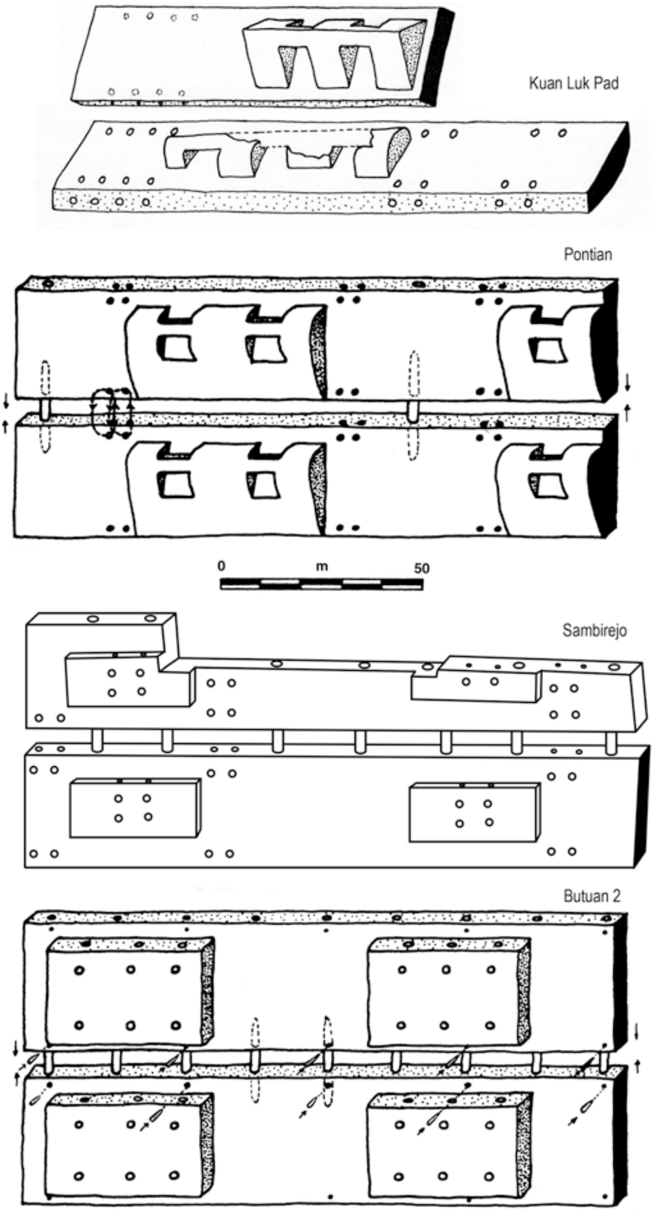


Fig. 3.1 Evolution of fastening of the planks in the lashed-lug and stitched-plank tradition (drawings: P.-Y. Manguin)

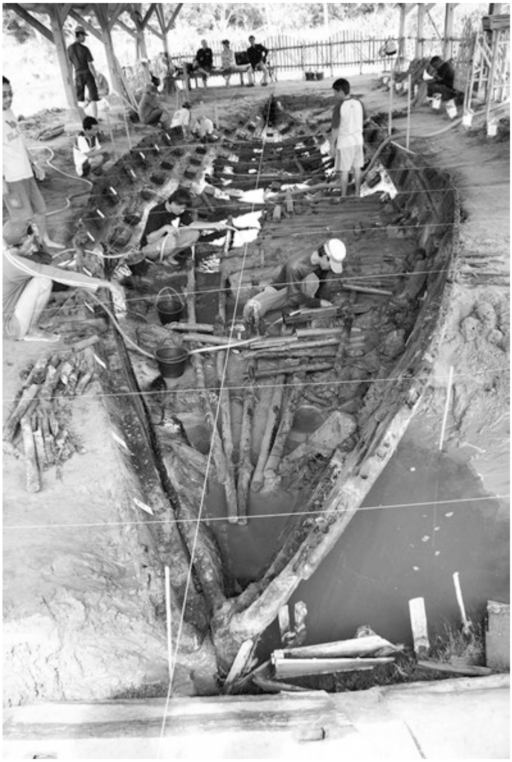


Fig. 3.2 The Punjulharjo ship during excavation (photo: EFEO/ P.-Y. Manguin)

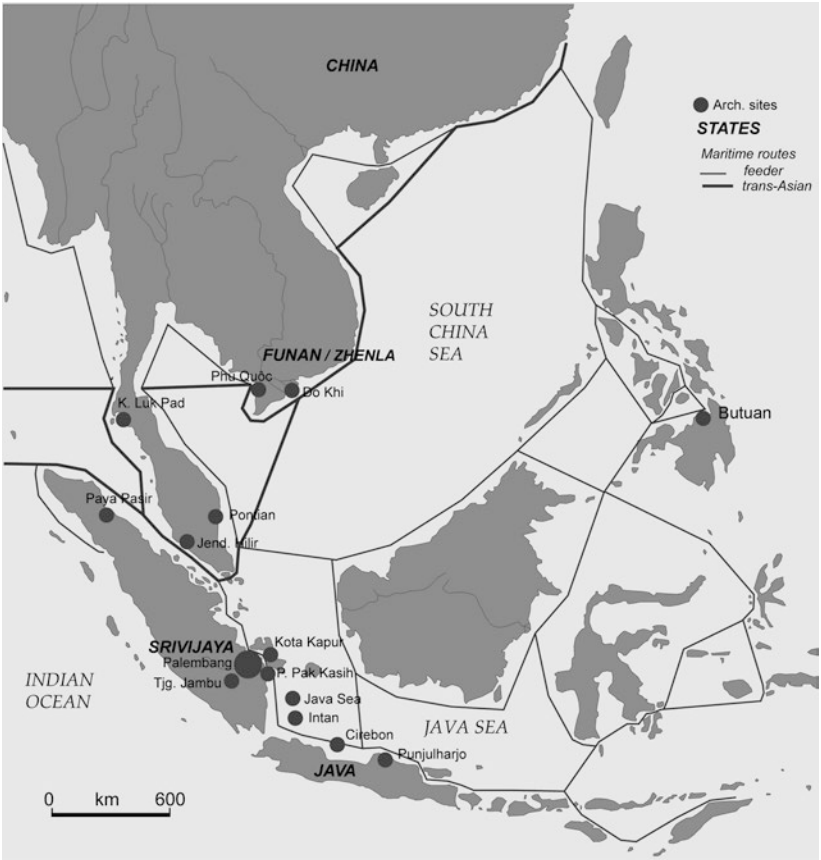
and the first half of the second millennium CE (most probably no later than the thirteenth to fourteenth centuries) (Manguin 1985, 1989, 1996, in press). These archaeological finds, notwithstanding the disturbed contexts, were informative enough to complement earlier finds and allowed the proposal of a preliminary scheme for the evolution of the lashed-lug tradition. In the past decade, however, the discovery of two new archaeological sites with extensive, connected hull structures has finally brought about confirmation of most of the earlier hypotheses regarding very large ships being built within a unique Southeast Asian technical tradition.

The Cirebon shipwreck (also called Nan Han wreck), discovered some 50 metres underwater off the West Java coast, was commercially excavated in 2004. It is the largest of all the lashed-lug structures brought to light so far. It carried a considerable cargo of late tenth century Chinese ceramics and other artefacts and may have measured over 30 metres in length. Because of the commercial nature of the excavation and the murky status

Fig. 3.3 The structure of the Punjulharjo ship: stitched planks with lugs, frames, and stringers (photo: EFEO/P.-Y. Manguin)

of underwater heritage in Indonesia, we have, as yet, only a partial analysis of the Cirebon wreck, thanks to the indefatigable work of Horst Liebner (2014). Nevertheless, it confirms the existence of vessels of Southeast Asian origin of considerable tonnage during the first millennium CE, as suggested in Chinese textual sources. It also corroborates these sources as regards the specific stitching and lashing technique used to assemble the timbers of these ships. Two other large shipwrecks of the tenth and the thirteenth centuries CE, both from the Java Sea (known as the Intan and Java Sea wrecks), with comparable cargoes, probably belonged to the same technical tradition; although the timbers were insufficiently well preserved, this hypothesis rests on circumstantial but convincing evidence (Flecker 2002, 2003). It goes without saying that such locally-made large ships carrying considerable cargoes of Chinese and other exports, partly (re)loaded in and destined for, Southeast Asian harbour cities, also confirm the major role played by Southeast Asian entrepreneurs in South China Sea trade networks.

The second discovery was made in 2007 at Punjulharjo, on an ancient beach ridge along the northern coast of Java, between Lasem and Rembang, excavated by the Balai Arkeologi Yogyakarta team of nautical archaeologists. A smaller but superbly preserved hull was uncovered that would have been about 17 metres in overall length, with a keel plank carved out of a single timber and six strakes remaining on each side,



Map 3.1 Main shipwreck sites of Southeast Asia with locally built vessels (map: P.-Y. Manguin)

together with stern and stem pieces and a profusion of practically intact *ijok* stitches and lashings. The vessel was probably abandoned after a long and busy life, as attested by the numerous repairs in the planking. With no significant cargo left inside the hull, it is difficult to ascertain her earlier usage; it could have been a medium-sized coaster or a large fishing boat. A radiocarbon analysis of the *ijok* rope used to tie her strakes together yielded a 660–780 CE calibrated date (Novida Abbas 2010; Priyatno Hadi 2010) Figs. 3.2 and 3.3.

These new discoveries, together with data gathered from previous finds, allow us to confirm earlier hypotheses regarding the evolution of the technologies used to fasten planks together, and planks to frames, in the Southeast Asian shipbuilding tradition. As seen above, these defining features are easily observable even in the most disturbed archaeological contexts. The binding technique was of crucial importance, one that shipwrights needed to master in order to put a large ship to sea in safe and economically viable conditions. As we have seen, whereas the lashing of the frames to the planks via lugs carved out of the same planks remains in use with only minor variations in modern survivals, the technique used to fasten the strakes together evolved over time and was then abandoned. In earlier sites, it appears that keel and hull planks were fastened together by way of discrete stitches of *ijok* driven through holes drilled on the inner side of the planks and out of their seams (thus invisible from the outside of the hull). A few dowels inserted away from each other complemented these stitches and prevented the planks from riding apart. Remains from larger vessels dated to the second half of the first millennium CE also had their planks stitched together with *ijok* ties, but the number of dowels were greater, providing more structural strength to the hull. It was thus possible to coin a term to designate this original Southeast Asian tradition as the "stitched-plank and lashed-lug" technique. This essential feature is structurally different from the continuous "sewing" of the planks together, as attested in Mediterranean antiquity or in the Indian Ocean until recent times.

The technology evolved over the centuries. There are, as yet, insufficient examples to fully comprehend this evolution, but improvements may well have been introduced in larger trading vessels, such as the Cirebon ship, where more structural strength was required to carry large cargoes. Towards the end of the first millennium CE, stitches for fastening the planks disappear altogether, leaving only the wooden dowels to perform this essential function. Ethnographic evidence from the sixteenth to twentieth centuries corroborates this evolution from stitches (plus dowels) to dowels only.

The fastening techniques observed from the sixteenth century to modern times comprised the final step in the evolution of the "stitched-plank and lashed-lug" tradition described above. After dowels replaced stitches in tying planks together, the lashing of planks to the frames in large vessels was also abandoned in favour of using dowels to fasten the frames to the hull. Detailed sixteenth-century Portuguese descriptions of large traders (mainly the very large *jong*) encountered in the Melaka Strait and the Java Sea mention dowels but never lashings with *ijok* ropes or iron nails, the absence of which was as surprising to the Europeans as it had been to the Chinese a millennium before (Manguin 1980). We have, unfortunately, no archaeological confirmation of this fully dowelled technique, as no remains of large *jong*-type vessels of the fifteenth to sixteenth centuries have yet been found. The observations made about the lashed-lug tradition appear, however, to confirm the direct continuity between Southeast Asian shipbuilding traditions of the first and second millennia CE.

Southeast Asian Ships in the Indian Ocean

As noted above, much has been written about the diffusion from Southeast Asia into the Indian Ocean of canoe-building techniques (particularly that of single and double outriggers or the lateen sail). There is little doubt that Austronesian-speaking people introduced such techniques to India, East Africa and Madagascar. This, however, does not necessarily carry the corollary that they actually sailed in these small vessels across the Indian Ocean or along its shores, all the way to and from Madagascar. We have now seen that Insular Southeast Asian people mastered the techniques necessary to build large trading vessels from at least the first few centuries CE, when the initial contacts with Madagascar may well have taken place, and certainly up to the fourteenth or fifteenth century, when regular contact between the two coasts of the Indian Ocean was discontinued. I therefore believe it is more reasonable, if only in economic terms, to picture them sailing large vessels rather than frail outrigger canoes.

In the absence of archaeological remains to confirm it, this common sense argument remains largely undocumented. There are indications, however, that do reinforce it. Large plank-built boats were still to be observed on the east coast of Madagascar in the nineteenth century. Due to the lack of relevant sources on the structures of such vessels, it has been unfeasible so far to ascertain if they were descendants of Southeast Asian vessels (Macé Descartes 1846: 299–301; Hornell 1944). The smaller canoes (or the associated technical know-how) would, however, have accompanied them.[7] An assortment of more or less explicit tenth- to thirteenth-century Arabic texts informs us of people—thought to be Southeast Asians—sailing in ships and large fleets to Madagascar and surrounding areas of East Africa and the Middle East, but this is about as much as we can gather from historical sources (summarized in Vérin 1986: 41–45, and in Vérin and Wright 1999). However, it has now been determined that boatbuilding techniques in the Maldives belonged to the “lashed-lug” tradition, thus indicating a close relationship between Southeast Asian shippers and the Maldive archipelago which was located in the middle of the Indian Ocean (Millar 1993; Manguin 2000), half way to Madagascar (on which route, see below).

On linguistic grounds, there are also elements which denote that Southeast Asian and Bay of Bengal traditions shared a so far undetermined range of common characteristics. Various terms used to designate different types of vessels are common to languages on both sides of the Bay of Bengal (and at times further east or west). The term *wangkang/bangka* and cognate forms are found in most Austronesian languages, including those spoken in the Pacific. It has been reconstructed into the Proto-Malayo-Polynesian stock, which establishes its Southeast Asian origin. It is, however, attested under the form *vangkam* in a Tamil nautical treatise of the sixteenth century, and in a variety of Tamil texts of various periods, where it designates a large plank-built vessel; its earlier attestations appear to be in early first millennium CE Sangam texts such as the *Maduraikkañci*, where it is the most commonly used word for a ship. The term must therefore have been adopted into Dravidian languages at the beginning of the first millennium CE at the latest, proving that exchange of vocabulary and probably technological transfers were then already underway.[8] The well-known Malay and Javanese term *perahu/parawu* for ship is no doubt cognate to the Dravidian *pataku/patavu/padahu*, with the same meaning. This has long been said to be a word of Dravidian origin, as it appeared not to be attested in Austronesian languages earlier than in ninth-century inscriptions. Linguists, however, now appear to have reconstructed the term into proto-Oceanic, which would also make it of Austronesian origin. Another well-known word of possible Austronesian origin is *sampan*, attested in a 684 CE Old Malay inscription, which also appears in Tamil and Sri Lankan (as it does in Khmer, Thai, Burmese, Mon and Chinese).[9] Other more general terms found in the Austronesian stock—such as cognates of Proto-Austronesian *layaR (Malay *layar*) for sail—are known to have spread widely across the Pacific and the Indian Ocean, as they are found in the Maldives and in a variety of South Asian languages (not to speak of Malagasy) (Hoogervorst 2012: 202 sq.; Fuller et al. 2011).

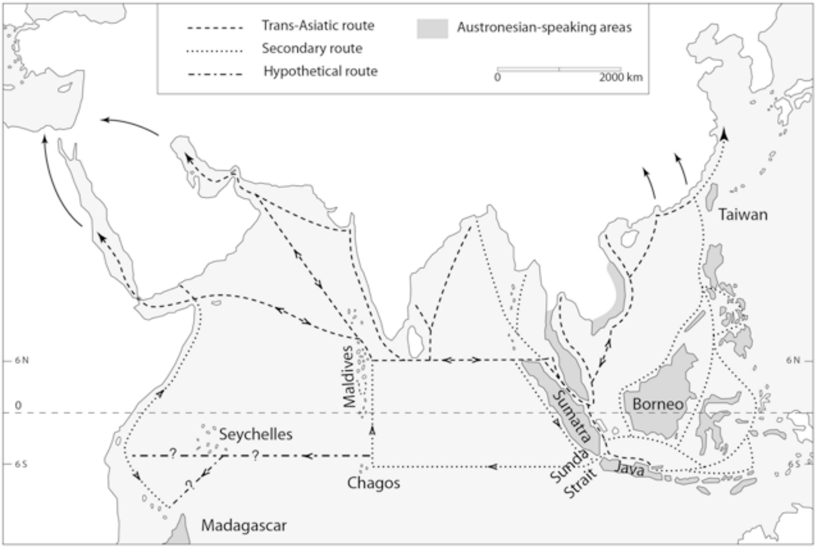
Austronesian Shipping Routes in the Indian Ocean

The building and operation of large sailing vessels by the people and polities of Insular Southeast Asia during the first millennium CE (and probably earlier) has now been confirmed by both textual and archaeological sources. The question remains as to which maritime routes these large ships would have plied in historical times. All Southeast Asian ship remains found in archaeological sites were brought to light in the South China Sea and in Southeast Asian waters. So far, no comparable ship structures have been found in the Indian Ocean.[10] We therefore have to rely mainly on written sources to reconstruct Southeast Asian networks in the Indian Ocean during the first fifteen centuries CE (the scant archaeological data available rarely tells us which were the shippers of the artefacts found in recovered assemblages).

The Northern Route

The northern rim of the Indian Ocean bordered on the most developed Asian regions. In late prehistoric, proto-historic, and historic times, such sea routes were part and parcel of the essential trans-Asiatic maritime route leading from East Asia to the Mediterranean, via the straits of Southeast Asia, the coasts of South Asia, and the Middle Eastern isthmuses. The key economic areas of Insular Southeast Asia, mainly the Malay Peninsula, Sumatra, and Java sat astride the Equator; it has become an established fact that the large ships the Malays, Sumatrans, and Javanese built and operated plied most commercial routes to the north of the Equator, from China to the Middle East.

We know, based on Chinese first millennium CE sources, that the Buddhist monks who sailed from China on Southeast Asian ships towards the harbours of Sumatra, Java, and the Thai-Malay Peninsula boarded the same vessels on their way to and from harbours in the Bay of Bengal. The same Chinese sources also tell us that, during the three centuries preceding the rise of the kingdom of Srivijaya in the seventh century, Southeast Asian ships plied Indian Ocean lanes to collect Middle Eastern products at Ceylon and sell them back in China (Wolters 1967: esp. 139–172). Early sixteenth-century sources clearly refer to Indian Ocean voyages by large Southeast Asian ships as far west as the Maldives, Calicut, Oman, Aden, and the Red Sea.[11] For more than two thousand years, therefore, Southeast Asian shippers actively participated in and sailed along the regular northern trans-Asiatic trade networks (Map 3.2).



Map 3.2 The Maldives at the heart of Indian Ocean networks (map: P.-Y. Manguin)

The Southern Indian Ocean and the Maldives connection

Due to their geographic position, Insular Southeast Asian polities were also in a unique position in that they had easy access to routes leading into the Indian Ocean south of the Equator. Indeed, there appears sufficient navigational evidence to put up a strong case for a southern route westward from the Strait of Sunda to Madagascar. In the late fifteenth century, there was a well-maintained contact between the Sunda Strait and the Maldives (Manguin 2011: 269–270). The easiest and most common way of navigating was to run along a parallel, keeping a star at the same height above the horizon. This technique was well known to Pacific navigators and to other Asian navigators of the Indian Ocean. The 6°S parallel route described by early sixteenth century Portuguese sources leads precisely from the Sunda Strait to the Chagos archipelago, a convenient watering place from which it was easy to sail north to the main atolls of the Maldives.

Late fifteenth and early sixteenth-century Portuguese witnesses make it clear (as is evident in the quotation from Diogo do Couto that opens this chapter) that memories of Indonesian exchange with Madagascar were then still vivid. However, the same sources fail to indicate the routes west of the Maldives. Possibly, after reaching the Maldives, Indonesians sailed straight to Madagascar but there is no evidence supporting such a hypothesis in the available literature, either Asian or European. Insular Southeast Asia shippers, who had no tradition of written sea pilots to draw upon, would probably have been the only ones to sail along these routes (Manguin 2011: 273–274). In such a context, the art of navigation would have been essentially an empirical one, comparable to that evolved by their Southeast Asian forbears when they sailed east and peopled the Pacific. Research on surviving high-seas navigation practices of the Indonesian shippers of South Celebes and Madura certainly points in this direction. Their use of stars and star patterns to set and maintain course, their acute awareness of sun, winds, wave shapes and patterns, currents, tides, and the behaviour of birds and fish are all reminiscent of the better documented and still existent body of indigenous knowledge among Polynesians (Ammarell 1999).

Austronesian Traders and Shipmasters in the Indian Ocean

Mastering the requisite boat-building and navigational technologies is essential for long-distance sailing and trade. However, in order to reconstruct the maritime endeavours of Southeast Asians across the Indian Ocean, one also needs to consider the people and institutions involved, in other words to return agency and entrepreneurship to Southeast Asian shippers. This goes against earlier paradigms that considered them, at best, as simple mariners or subaltern operators. Archaeological work carried out in the past two decades in Southeast Asia has proven that trading communities of complex Southeast Asian polities were active in the Bay of Bengal and South China Sea networks during the past two-and-a-half millennia. Such networks must also have extended, at some point in time, further west into the Middle East, East Africa, and, of course, Madagascar.

Those Austronesian-speaking people that developed large states during the first millennium CE left behind a number of written sources and monuments as a testimony to their early grandeur. Until recently, the emphasis on the apparent imposition of foreign cultural traits known as “Indianization,” from the fourth to fifth century CE onwards, followed by “Islamization” after the thirteenth century, largely concealed the internal dynamics of these Southeast Asian polities. As a reaction to this approach, historians started to draw attention to the vital role played by some of these early polities in shaping local, then regional, and soon Asia-wide long-distance exchange and trade networks.[12] Upon such foundations laid down by historians and since confirmed by archaeologists, we are now in a position to reassess the trans-cultural processes linking the two shores of the Bay of Bengal. They comprised complex sets of networks within what Sunil Gupta terms the "Bay of Bengal Interaction Sphere" (Gupta 2005).

It is in this context that two essential characters start to appear in the early written records of the region: the sea merchant and the shipmaster.[13] In the first vernacular inscription of Insular Southeast Asia, written in Old Malay and erected at Palembang, in South Sumatra, to accompany the foundation of the new polity of Srivijaya in the 680s, these characters appear together among the principal social bodies of the emerging state. In this Sabokingking inscription, they are designated by two terms: one a Sanskrit borrowing, *vanyaga*, the sea merchant, and the other of purely Malay (or Austronesian) stock, *puhawang*, the shipmaster (Kulke 1993). Sea merchants and foreign merchants would soon make regular appearances in Javanese and Balinese epigraphy. One other early mention of the shipmaster character appears in a court chronicle of the Song dynasty recording information obtained from the Javanese ambassador to the Court of China in 993 CE. It quotes him as saying, "the ship master (*bo zhu*) is called [in Javanese] *bo he wang*," the latter being a perfect phonetic rendering of Malay/Javanese *puhawang*. This vernacular term is repeatedly found in local epigraphy of the times, epitomizing the significance of indigenous shipmasters in contemporary maritime networks. It can be followed into the early modern and modern sources, as *puhawang* in foundation myths of local trading polities and, in the local Malay texts of the Islamic period, as *nakhoda*—a word of Persian origin, ubiquitous in Indian Ocean literature to designate shipmasters, and by then adopted in Malay.[14]

As other shipmasters of the South China Sea and the Indian Ocean, irrespective of their ethnic origin—Chinese *bo zhu*, Arabo-Persian *nakhodas*, Indian *mahanavikas* and *nauvittakas*—shipmasters of Java and Sumatra who carried the title *puhawang* constituted a non-noble intermediate social class, closely linked to the highest offices at the court. All sources concur in revealing their agency in overseas trading networks and merchant diasporas, their position as entrepreneurs in these trade ventures, and their role as *passeurs culturels*.

Conclusions

It seems clear that maritime powers of Insular Southeast Asia not only controlled a significant share of the trade carried along the trans-Asiatic maritime route but were also major shippers along time-honoured, regional, and long-distance maritime trade networks of the Indian Ocean, acting as both shipbuilders and shipmasters. The acknowledgement of such entrepreneurial activities returns agency to Austronesian-speaking trading communities in the Indian Ocean world and provides a largely renewed historical context, during the first fifteen centuries CE, for contacts between Madagascar and Insular Southeast Asia. This places these shipbuilders and shipmasters, and the Southeast Asian coastal societies to which they belonged and which they represented abroad, firmly into the mainstream of the global history of the Indian Ocean. We are now far from the long-held clichés of feeble Barito-speaking sailors migrating to Madagascar in small outrigger canoes.

Notes

1. Ferrand (1910: 281) was the first to use this quotation from Diogo do Couto's *Décadas da Ásia*, based on data from the early sixteenth century (década IV/iii/i; vol. 10, p. 169 of the 1777–1978 edition).
2. The share of Austronesian-speaking populations of Southeast Asia and the Pacific appear to have been overwhelming in the development of sea-going techniques. The context of this essay being the exchange between Madagascar and the Austronesian-speaking part of Southeast Asia, I will only mention the latter. However, Melanesians, Mon, and pre-Han populations of Southern China may well also have had their say in the process, but it remains undocumented.
3. The books by Bellwood (1997) and Glover and Bellwood (2004) provide the most up-to-date synthesis of the available evidence on early peopling of Southeast Asia. In the past decade, Bellwood's "out of Taiwan" model has been challenged and new models proposed for prehistoric developments in Eastern Indonesia. These, however, do not affect the arguments in this essay, which concentrates on the Common Era.
4. An extreme point of view is expressed by Adrian Horridge (1995): based on flawed historical and archaeological premises, he denies any agency to Austronesian-speakers in the Indian Ocean maritime scene.

5. Archibald Lewis, in his study on maritime skills in the Indian Ocean in the fourteenth to fifteenth century, was the first to suggest a nautical tradition shared between Southeast Asians and Polynesians (1973: 252, n. 3).
6. On Southeast Asian shipbuilding techniques and trading ships in ethnographical, historical, and archaeological contexts, as described in the following paragraphs, and for full references to sources, see, among others: Hornell (1935, 1936); Barnes (1985); Green (1990, 2001); Clark et al. (1993); Flecker (2001, 2002, 2003, 2007, 2010); McGrail (2001: 296–307); Manguin (1980, 1985, 1989, 1993, 1996, 2000, 2012, in press); Liebner (2014).
7. Though, of course, a crossing on an outrigger canoe is technically possible: such a canoe, 20 metres long and built following the stitched-plank and lashed-lug technique, successfully sailed from Indonesia to Madagascar under the command of skipper Robert Hobman in 1985, and has overwhelmingly proven the seaworthiness of such vessels (Hobman 1987, 1989). A replica of the outrigger vessel represented on the ninth-century Borobudur reliefs was also sailed across the Indian Ocean in 2005.
8. There are disagreements among linguists and historians regarding the filiation between *wangkang/bangka* and *qabang* forms (through a hypothetical metathesis). Whichever the linguistic arguments, one cannot dismiss the similarities between Dravidian and Austronesian forms.
9. More details and full references regarding the borrowings between Southeast and South Asian languages will be found in Manguin (2012: 609–610, and note 50). The linguistic evidence has been discussed at length by Waruno Mahdi (1999a,b).
10. Pre-modern shipwrecks excavated in the Indian Ocean are surprisingly scarce. In fact, only two have been found so far. One discovered in the backwaters of Kerala is not a sea-going ship (Selvakumar 2011a,b; Tomalin et al. 2004). The much publicized early first millennium CE shipwreck off the Godawaya site in coastal Sri Lanka has so far produced no timbers and is therefore of no utility for our purpose (Carlson and Trethewey 2013; Trethewey 2013; Gaur et al. 2011).
11. See Manguin (1993, 2012) for full textual references.
12. Historians J.C. van Leur (1955) and O.W. Wolters (1967), in their trend-setting books on Southeast Asian trade were instrumental in

shifting the attention of scholars to Malay shippers and traders. Studies by J. Wisseman Christie (1990) on the relationship between maritime trade and state formation in early first millennium AD Southeast Asia provide clear examples of what has been achieved in this field.

13. This issue forms part of an on-going research project which can only be summarized here; it shall soon be published in an extensive form elsewhere.
14. On shipmasters in the Indian Ocean, see Chakravarti (2000); Goitein and Mordechai (2008: 122–164); on foundation myths of Insular Southeast Asia, see Manguin (1991).

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CHAPTER 4

Austronesians in Madagascar: A Critical Assessment of the Works of Paul Ottino and Philippe Beaujard

Alexander Adelaar

Introduction

The history of contacts between East Africa and island South East Asia (henceforth ISEA) is a long one. Based on current research, this history is punctuated by at least three important events. The first of these is the beginning of any contacts between East Africa and ISEA, which dates

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from 300 BC or possibly earlier and involves the transfer of cultigens (including banana, yam, taro, and rice) as well as boat technology and several other elements. This transfer has usually been assumed to go from ISEA to East Africa, but it also went in opposite direction (Mahdi 1998; Blench 2014). A second event is the settlement of Madagascar by speakers of Austronesian languages. It covers a period probably beginning around the seventh-century CE, when people from the shores of the Barito River in South Borneo moved to East Africa, and ending with the settlement of Madagascar in the eighth century. A third event consists of contact that was maintained between ISEA and Madagascar after the latter's settlement. It continued until after the arrival of Europeans in the Indian Ocean and brought about some important cultural influences on (at least) Madagascar's southeast coast. In this chapter, I concentrate on the nature and extent of these influences in as far as they are reflected in the Malagasy language. More particularly, I critically evaluate the ideas of Paul Ottino and Philippe Beaujard, who both argue for a distinct Malay and Javanese influence leaving a heavy imprint on east and central Madagascar. Ottino uses evidence from origin myths and early literature to argue that the Malagasy descend from Sumatra Malays. Beaujard adduces linguistic and other evidence to claim that the Austronesian element in Malagasy culture is more multi-ethnic than previously assumed, involving a particularly strong Malay and Javanese influence, but also involving various elements from Sulawesi, Timor and the Philippines. It would also involve direct influence from South India. Here I use linguistic arguments to show that the sources of these influences were much less pluriform. Genetically, Malagasy clearly belongs to the South East Barito (henceforth SEB) subgroup of Austronesian languages in Borneo, and it also underwent significant influence from other Austronesian languages. However, these languages are few in number. These are Malay and Javanese (the hegemonic languages in ISEA at the time of the Malagasy migrations) as well as a few languages directly neighbouring the Malagasy homeland such as South Sulawesi languages and Ngaju (in Central Kalimantan, Indonesian Borneo). It is obvious that contacts between Madagascar and the Malayo-Javanese world in Indonesia continued until the arrival of the Portuguese in the Indian Ocean. However, much of what Ottino attributes to Sumatran influence and Beaujard sees as general South East Asian and South Indian influence in Madagascar from between the twelfth and sixteenth centuries CE was in fact already part of the cultural make-up of the early Malagasy before they migrated to East Africa. They had already undergone Malay and Javanese influence while still in South Borneo, where a Hindu-Malay polity was established in or before the seventh century CE.

This chapter is divided into three main sections. The first gives a short overview of the various scholarly ideas about the origins of the Malagasy people since Dahl (1951), the second critically assesses Ottino's perspective involving a Malay origin of the Malagasy people, and the final section evaluates Beaujard's views on the settlement of Madagascar and its continued contacts with ISEA and South India. The languages and places referred to in this chapter are shown on Maps 4.1 and 4.2 featuring ISEA and Madagascar, respectively.

Map 4.1 Languages and locations in insular South East Asia that are referred to in this chapter (© Alexander Adelaar)

Map 4.2 Map showing Malagasy dialects and Zafiraminia migrations (© Alexander Adelaar)

Ideas About the Origins of the Malagasy Since Dahl (1951)

Otto Dahl in his (1951) thesis showed that Malagasy is directly related to Ma'anyan and other Barito languages along the eastern shores of the Barito River in South Borneo. Dahl's thesis solved a problem that had kept Austronesianists guessing for more than a century, namely where Malagasy genetically belonged within the Austronesian language family at large. Dahl estimated SEB speakers arrived in Madagascar in the fifth-century CE. He also believed that upon their arrival, the island already had a Bantu population speaking a form of "Old Comorian." This population was later absorbed by the new migrants, but not without leaving an Old Comorian substratum in their language.

Not long afterwards, George Murdock (1959) proposed a different scenario: the Austronesians had not settled Madagascar directly from South Borneo, as assumed by Dahl (1951), but indirectly via East Africa, where they had interacted and mixed with Africans before moving to Madagascar as their final destination. Hubert Deschamps (1960/1972) held a similar view. He furthermore thought that Austronesian speakers had arrived in several waves: an initial wave of SEB speakers was followed by a later one bringing the Zafiraminia, who were supposedly Malays introducing typically Hindu-Malay and Hindu-Javanese cultural elements to East and Central Madagascar.

Alfred B. Hudson (1967a) published wordlists of various Barito languages. He also made a classification of these languages and reconstructed Proto Barito phonology. In his classification, Malagasy and Ma'anyan (together with Samihim, Paku, Dusun Malang and Dusun Witu) belong to the SEB subgroup of the eastern branch of Barito languages.

Two other important works appeared in 1988. Waruno Mahdi (1988) wrote a detailed history of the phonological and morphological developments that have taken place in Malagasy. Pierre Simon (2006) reconstructed several levels of earlier forms of Malagasy and proposed a comprehensive theory of the settlement of Madagascar. According to him, among the migrants there was a pure SEB group and a more acculturated group that had undergone Hindu-Malay and Hindu-Javanese influences; however, they arrived together and were part of the same migration event. As for the African component in Malagasy, he distinguished several Sabaki[1] sources (Swahili and Comorian being among the most recent ones).

My 1989 and later publications are primarily concerned with loanwords. In them, I demonstrate that the Austronesian vocabulary of Malagasy is not always inherited from Proto SEB but also contains many loanwords from Malay, Javanese, Sanskrit and South Sulawesi languages. Also, most Malay loanwords appear to be borrowed from a Sumatran variety of Malay, while only a minor part is demonstrably from a South Bornean variant of Malay (the ancestor language of Banjar Malay).[2] Furthermore, some Malay loanwords in Malagasy show early phonological adaptations, whereas other loanwords have escaped these, indicating that contact between Malagasy and Malay must have continued for some time after the settlement of Madagascar.[3] Some of the Sumatran loanwords and terms for cardinal directions that were borrowed at an early stage indicate that the ancient Malay seaborne empire Srivijaya on Sumatra's east coast already played a significant role at the time of the first migrations, as they refer to a South Sumatran topography and do not match the topographical context of South Borneo. I further argue (Adelaar 1989) that the estimated time of the first migrations to East Africa correlates with the emergence of Srivijaya and the occurrence of the earliest Malay inscriptions (dating from the end of seventh century CE) in South Sumatra. As the rise of Srivijaya and the Old Malay inscriptions constitute the first palpable evidence of the emergence of a Malay state, and there is a strong Malay influence in Malagasy, I propose the end of the seventh century CE as a last possible date for the migrations to Madagascar, rather than the fifth century CE as Dahl argues. Another sign of the decisive role Malays (and Javanese) played in the history of Malagasy is that almost all Sanskrit loanwords in Malagasy were borrowed via Malay and Javanese, and not directly from Sanskrit or another Indian language. In the past, the Malagasy used an adaptation of the Arabic script, which is called Sorabe. I argue (Adelaar 1995a) that some structural features in Sorabe show that it was introduced from ISEA, rather than grafted on an Omani adaptation of the Arabic writing system (cf. Dahl 1983). Furthermore, the east coast Malagasy term *sumbili* ("to slaughter meat according Muslim ritual") constitutes further evidence of ongoing contacts between Madagascar and the Malay World until after Islam had gained a firm foothold in ISEA. It ultimately derives from the Muslim phrase *b'ismi'llahi* ("in the Name of God") but its phonological history shows that it must have done so via Malay *səmbəlih*, which historically refers to slaughtering meat according Muslim ritual. I further indicate some South Sulawesi vocabulary in Malagasy (Adelaar 1995a) that was most likely borrowed before the migrations, and not afterwards through direct contacts between Sulawesi and Madagascar.

In 1991, Dahl published a book in which he correlated early Malagasy migrations with the Orang Lom on Bangka Island who allegedly spoke a language descending from "Old Ma'anyan". He also proposed that the Orang Sekak (another group on Bangka Island and a subdivision of the Orang Laut[4]) had played an active role in the shipment of Old Ma'anyan (read SEB) speakers to Madagascar. He equated the Orang Sekak and Orang Laut with Bajau people[5] and believed that the Vezo, a nation of seafarers and fishermen in coastal South West Madagascar were related to the Bajau. These ethnic associations were ill-informed (Nothofer 1995; Adelaar 1995a) and have had the unfortunate effect of re-enforcing a tendency in the ethnographic literature to conflate the various semi-nomadic maritime populations in ISEA (see further below).

A human genetic study by Hurles et al. (2005) provides renewed support to Dahl's South Borneo origins of the Malagasy (1951). It concludes that the Malagasy have more genes in common with the inhabitants of Borneo than with people in other Austronesian regions. It furthermore concludes that throughout Madagascar, the population has both Austronesian and Bantu genes, and that it obtained these genes via both parental lines (mitochondrial and Y-chromosome DNA).

Recent studies (Adelaar 2007; Blench 2007, 2010) point to the fact that first contacts between East Africa and ISEA, dated to around 300 BCE, are much more ancient than the earliest settlement of Madagascar by Austronesian speakers in about the seventh century CE. They also indicate that the Malagasy are of mixed Austronesian-Bantu ancestry and were already an ethnically mixed group before they came to Madagascar. I argue that both the homogeneity of the DNA described in Hurles et al. and the structural uniformity of Malagasy dialects point to a bottleneck pattern in the settlement of Madagascar, implying that the migrants must already have been a mixed Asian-African population before they set foot on the island. Blench points out that Malagasy names of domestic animals and basic food crops are predominantly Bantu.

Finally, there is a growing body of paleontological, environmental and other evidence suggesting that Madagascar was already populated by humans before the arrival of SEB—and Bantu speakers (see Blench 2010 for an overview).

Ottino's Literary and Sociopolitical Evidence for a Malay Origin of the Malagasy

Ottino followed Deschamps in believing that there had been several migration waves to Madagascar. He thought that the first wave was traditionally Austronesian in nature, and later waves were more distinctly Hindu-Malay and Hindu-Javanese. These later waves also brought along the epic of Ibonia, who became the culture hero of the Merina, and eventually the national hero of Madagascar. Ottino (1986) shows that there are many parallels between the myth of Ibonia and the royal chronicle of the city of Banjarmasin in South Borneo (Ras 1968). Both the Ibonia tale and Malay royal chronicles were used as a blueprint and justification for the sociopolitical structures built by respectively the royal dynasty of the Merina in the eighteenth and nineteenth centuries and the Banjar Malay rulers ever since they founded a political stronghold in South Borneo. According to Ottino, the Ibonia tale originated in (South) East Madagascar, whence it was introduced to central Madagascar by the Zafiraminia, who were allegedly Malays. This group and various later migrant groups, so Ottino thought, established themselves as a ruling class among several earlier ethnic groups in East Madagascar and later in the central highlands, where they created a power base and founded a monarchy. They became known as the Merina, who would go a long way in uniting the island under their rule. They also introduced an early form of Islam, which seems to have originated in India. They purportedly brought with them Indian and Islamic cultural concepts adopted in the Malay and Javanese world such as divine royalty, caste, circumcision and Muslim food taboos among high caste members, noble purity along both hereditary kinship lines, cattle sacrifice, a sacred relationship between royalty and wet rice culture, a particular colour symbolism and the attachment of cosmological importance to cardinal directions. Ottino deemed the Ibonia myth remarkable for a Shi'ite Muslim imagery.

The merit of Ottino's work is that it shows how the Ibonia tale and its application in the social and political structure of Merina society are embedded in the literary and political traditions of the Malays and the Javanese. The latter are the hegemonic nations par excellence in ISEA, and they have been so for fourteen centuries, if not longer, both in a political and cultural sense. They became heavily influenced by Indian culture, first in the form of Buddhism and Hinduism, and later in an Indianised form of Islam. Indian civilisation also brought a sociopolitical system organised around the concept of divine kingship and a strong social stratification. The fact that some aspects of Islam in East Madagascar have a South East Asian signature (cf. Adelaar 1995a) agrees with Ottino's literary analysis.

However, Ottino also believed that Dahl (1951) had no currency against the evidence he found in the classical Malay texts. He concluded that Malagasy was next-of-kin to Malay and originally hailed from Sumatra, making no attempt to disprove Dahl's arguments. His work does not distinguish between inherited and borrowed elements, whether these were cultural or linguistic: he noticed motives, patterns and words that had their parallels in Malay culture and language, but he was not concerned with the question where they came from, and how or when they had ended up in Madagascar.

His work also suffers from a number of inconsistencies that rather contradict his overall lack of appreciation of linguistic argumentation. For instance, he often proposed etymologies to underscore his claims. Since the quality of etymologies largely depends on the ability to handle historical linguistic methodology, the ones he adduced are highly unprofessional, which is unfortunate but hardly comes as a surprise. He furthermore uses the chronicles of Banjarmasin city (the "Hikayat Banjar"—Ras 1968), as a main source and archetypal text for the tale of Ibonia. While these chronicles are Malay, they also specifically concern a region in South Borneo that is adjacent to SEB settlements and the homeland of Ma'anyan and Malagasy. Considering the historical symbiosis between Malay speakers in Banjarmasin (the centre of royal power) and Ma'anyan speakers living not far from the metropolis—a symbiosis which may have been much stronger in the far past than it is today—Ottino's choice of text is difficult to explain and paradoxical to his argument. If his aim was to show that the roots of Malagasy culture are in Malay Sumatra, why did he use a Malay text from South Borneo to prove it? And how could he have expected that the chronicles of Banjarmasin were free from cultural interference from the SEB peoples living nearby?

Ottino's approach was by definition a-historical, as he himself signalled.[6] It may explain why his work found limited resonance. Nevertheless, as argued by Beaujard, the Malay literary influence that Ottino tried to highlight makes sense in a general way, as long as it is taken to be the result of influence instead of common inheritance.

Beaujard's Views on the Origins, Settlement and Cultural History of Madagascar

In a series of articles culminating in a chapter in his impressive work on the history of the Indian Ocean (Beaujard 2012), Beaujard tries to reconstruct the cultural and material history of Madagascar. Using a multidisciplinary approach, he makes a systematic attempt to synthesise the research results of other scholars, incorporating linguistic, anthropological, archaeological, literary and ethnobotanical information, among others. As such his writings are of great significance for the history of Madagascar. In his use of Malagasy literary data, Beaujard also stresses the value of Ottino's (1986) analysis based on mythology. But unlike the latter, he accepts that Malagasy is an SEB language and does not believe in several distinct migration waves but argues for continued Indonesian influence (until the arrival of Portuguese).

The overall importance of Beaujard's work for the study of the history of Madagascar is uncontested. It is my aim here to address some of his linguistic assumptions and offer alternative ways to interpret them.

1. Beaujard speculates that in the past SEB speakers not only lived in South Borneo, but also in Southeast Sumatra and Bangka Island (2012: 550). His argument is based firstly on the work of Robert Blust (2006), who indicated that the Malays in South Sumatra may have supplanted some earlier populations, secondly on the presence of a few lines in what seems to be an SEB language the Malay inscriptions from South Sumatra, and thirdly on Dahl (1991), who also believed that the current Lom language on Bangka Island is related to Ma'anyan (see subsection 2 below). However, there are no linguistic grounds for this speculation.

   Blust used the notion of "linguistic levelling" to explain the current predominance of Malay varieties in South Sumatra. In doing so he speculated that Malay may have expanded at the expense of other languages in the area. He might have had languages such as Rejang or Lampung in mind (both endangered Sumatran languages), but most certainly not Ma'anyan. The seventh century inscriptions of South Sumatra and Bangka Island are predominantly in archaic Malay, but they also contain a few lines in the so-called B language tentatively identified as an Old form of Ma'anyan by Walther Aichele (1936) and Otto Dahl (1991: 49–55). Some of its vocabulary shows strong similarities with SEB words, but there is no absolute guarantee that it represents SEB. The overall meaning of the lines in the B language remains obscure. If it were established beyond doubt that they were a form of Ma'anyan, it would leave room for interesting speculations on how they ended up outside South Borneo. But even if so, they are hardly evidence for the proposition that East Sumatra and Bangka once were home to SEB speakers.

2. Dahl (1991) believed in a relationship between the Vezo and the Sama Bajau. Beaujard (2012: 542) gives credence to his speculations and toys with the possibility that Sama Bajau people from Sulawesi Island may have conveyed eastern Indonesian terms to Madagascar. However, these speculations are based on superficial similarities in the ethnic names and lifestyles of the peoples involved. Both the Sama Bajau and the Vezo are fishermen who spend much time on the sea, the former in central and eastern parts of ISEA and the latter on Madagascar's Southwest coast. Apart from these similarities, both peoples have ethnologically very little in common (see Pallesen 1977; Astuti 1995; Sather 1997). Phonologically, the first vowels in the words *bajau* and *vezo* are somewhat problematic as they do not conform to the regular sound changes that usually take place in Indonesian loanwords in Malagasy. Finally, the occurrence of similar ethnic names in several places does not necessarily point to a historical connection. There are other, more straightforward, explanations for the occurrence of an ethnonym related to "Bajau" in Madagascar. One is of course chance resemblance. Another is that "Bajau" may have evolved from an ethnonym to a term referring to a way of life. We are reminded that it is an exonym: it is a name given to the Sama Bajau by others, and not chosen by themselves (their endonym is Sama, and Sama Bajau is a scholarly consensus). Those who gave the name "Bajau" to the Sama Bajau most probably also attached certain associations to it, such as a life at sea, spending much time on boats, being "Sea Gypsies." As a term associated with a certain lifestyle, it can easily be used as an exonym for others who share that lifestyle. As to its origin, a fair speculation would be that it originally referred to the South Sulawesi kingdom of Wajo (a word historically deriving from *bajaw), which was home to Buginese seafarers—that is not to the Sama Bajau. It is not difficult to find parallel lexical histories in a European context: "Gypsy" is an exonym for Roma and Sindi people and derives from the word "Egyptian."

which used to be an endonym for people from Egypt. However, "Gypsy" later on also became a designation for other people who live in caravans and wander about, such as the Tinkers in Ireland (who are essentially Irish); in fact, it is sometimes used for anyone who has no fixed address and wanders about. A similar range of meanings is covered by the term "Bohemian," another exonym for Roma and Sindi people. In view of the above arguments, an identification of the Vezu with Bajau people is fairly pointless.

In the literature, the much-famed Sama Bajau seafaring skills have led to many speculations. As the migrations to Madagascar involve trans-ocean crossing, it has often been assumed that the Sama Bajau must have been instrumental in the settlement of Madagascar. In fact, they appear rather late in the historical record (first mentioned by Tomé Pires in 1511).[7] What their activities were before the colonial period remains undocumented and is therefore pure speculation. Their languages were understudied until very recently. New data have enabled Blust (2009: 731) to point out some striking similarities between Sama Bajau and Barito languages. He cautiously concludes that the Sama Bajau languages form an early off-shoot of the larger Barito language subgroup and conjectures that the dispersal of their speakers is a consequence of the expansion of Srivijaya. While these conclusions open interesting perspectives for the early history of South Borneo and Barito speaking peoples, they do not justify speculations involving a link between the dispersal of Sama Bajau people and the SEB migrations to East Africa (Blench 2008: 20), let alone an enhanced role of Sama Bajau in contacts with East Africa (Dahl 1991; Beaujard 2012). A link between the dispersal of Sama Bajau people and the rise of Srivijaya remains unproven. Furthermore, although the Sama Bajau languages may be Barito, they definitely do not belong to its SEB subdivision. Both Sama Bajau and SEB are separate East Barito subgroups: they must have split off from a putative Proto East Barito several centuries before the diversification of the present-day SEB and Sama Bajau languages.

3. There is also no justification for equations between Sama Bajau and Orang Laut[8] or between Vezo and Orang Laut (Beaujard 2012: 549). The Sama Bajau and Orang Laut are both sea-oriented peoples, but they live in different parts of ISEA and speak only distantly related languages. As mentioned above, the Sama Bajau languages

live in central and eastern parts of ISEA and seem to belong to the Barito language group. The Orang Laut, on the other hand, live along the Strait of Malacca. Their languages are closely related to Malay. There are even strong indications that not too long ago their ancestors spoke languages belonging to the Austro-Asiatic language family. One way or another, their linguistic history is rather different from that of the Sama Bajau. These nations are also ethnically and socio-economically different and have separate histories (see Sather 1997: 320–333). Then again, the ethnic and linguistic differences between both groups and the Vezo (who speak a south western Malagasy dialect) are obvious.

4. According to Beaujard (2012: 546–548), the early SEB speaking migrants made the journey to Madagascar without assistance from others. Appealing to the likelihood that the Ma'anyan originally lived close to the sea, he argues that they must have played a more active role in their migrations than I have assumed, as I argue that they were transported to East Africa as subordinates on Malay ships (Adelaar 1989, 1995a). Beaujard's view is obviously related to his notion that the Ma'anyan were originally a coastal group occupying a larger region including Bangka Island and the East Sumatran coast (see above).

However, nothing in the SEB ethnographical literature suggests that they or any other SEB society had a seafaring past. Generally speaking, the same applies for most Malagasy ethnic divisions. Furthermore, that a community lives near the sea by no means implies that it has an intimate relation with it. This is particularly clear in Borneo, where traditional societies living along the coast are as inland-oriented as traditional societies in the interior. According to their own traditional history, the Ma'anyan hail from a region further south around the Sarunai River, a tributary of the Barito river close to Amuntai Town (Hudson 1967b: 26). Amuntai used to be the metropolis and residence of the regional Malay sovereign before, in the sixteenth century, he moved closer to the coast and built a capital with better access to the sea in Banjarmasin. It is certainly not a coastal town today, although Ras (1968: 196–200) suggests that it was one in the past and only became landlocked as a consequence of large amounts of alluvial material brought down by the major rivers in South Borneo. At present only one SEB subgroup, the Samihim, live close to the sea. Their language is mutually intelligible with Ma'anyan and is basically a dialect of it (Adelaar 1995b). One could be tempted to speculate that the Samihim are essentially a Ma'anyan group[9] who were left behind in a Ma'anyan homeland on Borneo's southeast coast, whereas the other Ma'anyan moved further inland. But a homeland near the coast would run counter to Ma'anyan traditional history locating the original homeland in the Sarunai region. It makes more sense to speculate that the Samihim once were part of the same ethnicity as the Ma'anyan and also hail from the Sarunai region. Both must have left this homeland at the same time, with the Samihim moving in north-eastern direction towards the coast, and other Ma'anyan migrating further upriver in northern direction.[10] The reason for the Ma'anyan (and Samihim) to leave the Sarunai region was to stay out of reach of Banjarmasin after it had come under the influence of Javanese invaders from Demak in the late sixteenth century, and Mataram in the early seventeenth century (Hudson 1967b: 20, 24).

Rather than having been a nation of independent seafarers, it is more likely that the Ma'anyan (and Samihim) originally lived in the forests around the Malay regional metropolis and were in a vassal relationship with its ruler. It must have been in this context that they interacted with Malays and eventually joined them on their voyages to East Africa (Adelaar forthcoming). Even had the Ma'anyan lived closer to the coast, they would not necessarily have had a maritime history. Moreover, such a history is not crucial for a better understanding of the role they played in their own migrations. A more fruitful approach would be to investigate their historical relation to the rulers of the regional metropolis and to Malays in general, as it is more than likely that the Malays rather than SEB people had an active involvement in the voyages to East Africa. The early Malays were remarkable for their entrepreneurship, trade networks and ability to sail across foreign seas, including the Indian Ocean. The number of Malay loanwords in Malagasy pertaining to maritime life, ship technology, directional terms and wind names is overwhelming. There is also much Malay cultural vocabulary in Malagasy. The Malay relexification that took place in socially sensitive semantic domains such as body-part terms shows that the Malays were clearly a prestige group to early Malagasy speakers. Other loanwords from Malay into Malagasy—and from SEB into Malay and Javanese—demonstrate the social imbalance in the relation between Malay and SEB or Malagasy societies in the past: compare Borneo Malay *daŋaw* "field hut," which was borrowed into Malagasy as *trànu* "house"; Malay *sakay* "subject, dependent." borrowed into Malagasy as *sakaìza* "companion"[11]; and Malagasy *ùlună*, Ma'anyan *ulun* "human being"

(< Proto-SEB *hulun “human being” < *qulu+Vn “belonging to upriver area”?), borrowed into Malay and Javanese as *(h)ulun* “servant.”

The relationship between Malays and Ma’anyan must have been unequal in many ways but may not have been characterised by overt subordination. It is more likely that there was a peaceful coexistence between the Hindu-Malay metropolis (which apparently had undergone a strong level of Javanisation even long before the sixteenth century) and the Ma’anyan hinterland. Ma’anyan traditional history relates how this relatively harmonious situation was disrupted by Javanese invasions towards the end of the sixteenth century, bringing a new religion (Islam) to local Hindus and adherents to indigenous religions (Hudson 1967b: 26–32). Be it as it may, these disruptions were relatively recent and have no bearing on the history of migrations to Madagascar in the seventh century. A similar situation apparently existed in Malacca where, up to the eighteenth century, Malays lived in apparent harmony with the Orang Asli and the Orang Laut[12] with whom they entertained strong economic, military and kinship ties (Andaya and Andaya 2001: 44–49, 81, 87). The relationship deteriorated after political upheavals and the shift of Malay society to Islam.

5. Beaujard (2003) believes that the first migrants sailed directly from ISEA to the Comoros and North Madagascar. They then spread along the east coast of Madagascar and moved into the central highlands. Bantu speakers arrived somewhat later, settling on the west coast and bringing their own distinctly African features. A subsequent creolisation process and migrations within Madagascar would have created the linguistic and ethnic situation as we know it today. This is different from Murdock’s “Out-of-Africa” scenario. It is also an unlikely course of events as it is hard to square with the homogeneity of Madagascar mentioned in Sect. 2. Beaujard (2011: 172) somewhat reluctantly allows for the possibility that the SEB migrants had mixed with local Bantus in the Comoros before they moved to their final destination, and Beaujard (2012: 565) even allows for the possibility that the early migrants had undergone Bantu influence on the East African coast before they settled in Madagascar itself. However, a separate arrival of Austronesians and Bantus would have created a very different situation from the one we find today. It would not tally with the linguistic unity of the island, the lack of expected creolisation phenomena involving Bantu features in certain regions, the occurrence of a layer of early Bantu loanwords and

grammatical features which is common to all Malagasy dialects, and the fact that the West coast dialects are just as Austronesian in structure as the central and eastern ones. In this context, it is also worth noticing that Bantu features in Malagasy are not always due to borrowing from Comorian or Swahili, and that some older Bantu influence seem to have come from elsewhere (Dahl 1951; Simon 2006; Adelaar 2007).

A separate arrival would also be hard to reconcile with the common gene pool of the Malagasy consisting of a mix of Austronesian and Bantu genes in both the mitochondrial and Y-chromosome DNA.[13] All these facts favour a course of events in which the Malagasy people came to the island as a mixed Austronesian-Bantu group rather than as two separate groups. Finally, there is the common sense question why Asian migrants would have come all the way to Madagascar and the Comoros while ignoring the vast East African coast, which was economically much more attractive and a rich supplier of ivory, slaves, gold and other metals. According to Beaujard, the almost total absence in Madagascar of Tana pottery (typical of Sabaki settlements between the seventh and tenth centuries CE in coastal East Africa) shows that archaeology does not support the Out-of-Africa scenario. However, the argument is hardly critical. Beaujard himself (2011: 172) already noted that there is at least some Tana pottery at the mouths of the Menarandra and Manambovo Rivers in Madagascar's extreme South, and one reason for the apparent lack of it elsewhere could be the dearth of systematic archaeology in Madagascar in the first place (Parker Pearson et al. 2010: 79, 514–515). Referring to Vérin and Wright (1999: 39), Beaujard (2012: 554) also points to the occurrence of arca shell motives on pottery in the Comoros, which he attributes to Austronesian influence. However, the case is not well-argued and I have found no significant evidence of the use of arca shells or arca shell motives in ISEA.

6. The Sulawesi impact on the history of Madagascar should not be overstated. Beaujard (2012:556) argues for a presence of Sulawesi people among the first migrants to Madagascar as well as (Beaujard 2012: 540) Sulawesi influence in the first half of the second millennium. That there is South Sulawesi influence in the vocabulary of Malagasy is clear (Adelaar 1995a, 2012; Blust 2009), but this is in all likelihood the result of influence exerted in pre-migratory times

on SEB languages in South Borneo. Such influence is hardly surprising given that South Sulawesi and South Borneo are geographically close and within easy reach (Adelaar 1995a), and South Sulawesi speakers had already migrated to Borneo in times preceding recorded history. However, there is no compelling evidence of Sulawesi influence reaching Madagascar directly, let alone of Sulawesi people crossing over to East Africa independently at any time in history.

Much of Beaujard's evidence for South Sulawesi influence is lexical and can easily be dismissed. A general weakness in his lexical evidence is that it comes from a large and undifferentiated variety of languages from different parts of Sulawesi, instead of one or two languages that can clearly be identified as important sources of lexical diffusion. Beaujard draws loanwords from no less than 35 languages spread all over Sulawesi. Along similar lines, his Philippine influence is based loanwords from fifteen supposed source languages from all over the Philippines, and his Timorese influence draws evidence from three languages. Bringing in so many languages without checking their political or commercial status seriously undermines one's argument as it amounts to a form of loanword shopping in which "everything goes." One will no doubt find many word pairs with members that look similar and have seemingly related meanings (the so-called look-alikes), but their significance will be inversely commensurate to the number of source languages used, and there is little structural regularity involved in these loanwords as a group.

Another weakness in some of Beaujard's etymologies is their lack of regular sound correspondences. One case is noteworthy because Beaujard (2011: 176) advocates it as a regular sound change. It is manifested in some of the pairs of source forms versus loanwords that he proposes which show a correspondence between *l* and *r*. Pronunciations of *l* as *r* and vice versa are of course recurrent phenomena in language contact, but in the case at hand, the impression of regularity of sound change is merely based on the fact that Beaujard frequently makes use of it to demonstrate cognation between words that are in fact unrelated. These changes are neither part of Malagasy phonological history, nor of the history of loanwords in this language (compare Dahl 1951; Mahdi 1988). The putative sound change is also ill-defined because it lacks directionality: it runs from *l to *r* in *hùraka* "paddy field, marsh" < *kulak* "water reservoir" (putatively from Malay, see below) and in *kuku-*

ràmpu "name of a earth spirit" (presumably < *lampu* "forest spirits" in some South Sulawesi languages, [Beaujard 2003: 131]); however, it runs from *r to *l* in *vilivili* "sheep" (< Malay *biri-biri* [same meaning]). In a few other pairs, the alleged sound change from *b or *v to *k* should be rejected because it is phonetically unlikely and can usually be explained in other ways (see subsection 11, below).

The use of loanwords as evidence is subject to various conditions. The following ones tend to be neglected in Beaujard's approach:

(i) The sound correspondences between loanwords and their source forms should be regular.
(ii) The correspondences should also bear a strong phonological signal, for example some regular sound correspondences are so recurrent among languages in general that they are not significant for making a distinction between borrowed and inherited vocabulary (for instance, in many cases where *e* is pronounced as ɛ, or if b is pronounced as p at the end of a word).
(iii) There should be a reasonable context for borrowing in terms of history, culture, geographical proximity, social setting, and so on.
(iv) In a given area source languages should be few rather than many, and they should be (or have been) a lingua franca or at least a hegemonic or neighbouring language.

Mahdi (1988) discusses the possibility of a South Sulawesi areal influence causing the development of vocalic endings in the history of Malagasy. Beaujard (2012: 540 fn.2127) finds support in this for direct South Sulawesi influence on Malagasy. However, as Beaujard acknowledges himself, in Mahdi's view this areal feature was at work in Indonesia itself and hence in regions that were in regular contact with South Sulawesi. It would also have affected an early form of Malagasy when it was still spoken in South Borneo (which is close to South Sulawesi), but not the Malagasy of the migrants once they had set sail to East Africa. However, it is noteworthy that of all the SEB languages only Malagasy has vocalic endings, whereas SEB languages in Borneo do not. Therefore, a more obvious explanation for Malagasy vocalic endings is that they are due to influence from Sabaki languages, which share this feature and have been in close contact with Malagasy for some 1300 years.

Finally, in order to stem speculations about the role of South Sulawesi speakers in maritime contacts with East Africa, it is worth noting that the fame of some Sulawesi peoples as long-distance sailors has a rather recent history. Various sources (including Pelras 1996: 254) point to the fact that the Buginese, most of whom have remained farmers up to this day, had not engaged in sea trade until after the fall of Makassar in 1666–1667, and their current reputation as pre-eminent sailors is based on their activities after that event. As to the earliest history of South Sulawesi peoples, Caldwell writes that Buginese kingdoms and the earliest recorded mention of the Buginese date back to at least the fourteenth century CE. Trade relations between Sulawesi and other parts of the Indonesian archipelago possibly existed as early as 1300 CE (Caldwell 1988: 180–184). We do not know about the history of South Sulawesi peoples before that time, although archaeological sites indicate that they were already present in the thirteenth century CE (Bulbeck and Caldwell 2000: 106).

7. Beaujard argues that much of the Hindu-Malay and Hindu-Javanese cultural influence was introduced by later migrants who arrived from the twelfth century CE, and not by the early migrants half a millennium before. In line with Ottino, he believes that these later migrants practiced a Shi'ite form of Islam and brought with them wet rice cultivation and various values and rituals that come with its practice. They would also have introduced rituals involving cattle sacrifice.

   The presence of an ancient and somewhat syncretic form of Islam in East Madagascar is well known. Using orthographic and lexical evidence, I argue that is was introduced by Malays or Javanese (Adelaar 1995a). That it was predominantly Shi'ite in nature, as claimed by Ottino and Beaujard, is much less evident. Some of the imagery that Ottino recognises as typically Shi'ite—such as luminescent water—should be evaluated with caution. Practices not belonging to orthodox Sunni Islam are often attributed to Shi'ism, although many of these occur all over the Muslim world, which is in majority Sunni oriented.[14] It should come as no surprise that the earliest form of Islam in Madagascar had a "Shi'ite flavour," as it was introduced from ISEA. ISEA in turn received the religion from sources in India and the Far East, and not directly from the Middle East. In both India and ISEA, traditional Islam bears some (mystical and other) features that are often associated with Shi'ism, but it remains to be seen whether they really are Shi'ite in origin or adaptations based on local practices. By implication, the emergence of such practices in

Madagascar does not mean that early Islam there was in fact Shi'ite. In the context of the present chapter, it is important to realise that if we find some of these features in the rituals and literature of the Zafiraminia and other East Malagasy Muslim groups, they are more likely a reflection of the way Islam became acculturated in ISEA (and previously in India) than due to direct interference from a Shi'ite Muslim source. The matter is clearly in need of further investigation.

It is debatable if wet rice cultivation and cattle sacrifice were introduced in East Madagascar by Malays in the second millennium. As lexical evidence is crucial in Beaujard's argumentation, I will proceed to cast new light on the etymologies proposed. Concerning wet rice cultivation, the Proto Austronesian form *pajey "rice in the field, paddy" survived in Malagasy as *fàri* "sugarcane." The common Malagasy term for rice (whether in the field, cooked or uncooked) is nowadays *vàri*, which is a different word with an unrelated history. Beaujard notices that various eastern and central Malagasy varieties have maintained the original meaning in derivations such as Merina Malagasy *kifarifàri*, *tsimparifàri* "rice-like weeds," Merina Malagasy *farimànga* "kind of rice-like weed," and Betsimisaraka Malagasy *farifàri* "rice."[15] He explains this as a reintroduction of *fàri* "rice" by Malay migrants in the beginning of the second millennium CE, but there are several factors militating against this. Had a word for "rice" been reintroduced by Malays, it is highly unlikely that it would have been realised as *fàri*. The Malay term for rice (in the field) is *padi*: if borrowed into Malagasy this should have come out as *fàtri or (if the introduction was recent) as *fàdi or *pàdi. The fact that the form in question is *fàri* shows that it can only be SEB or (in the unlikely event that this would be the donor language) Javanese.

If a word undergoes semantic change, its original meaning is sometimes kept in derivations, compounds or expressions. The English word "meat" may serve as an example: originally it meant "food" in general, but nowadays it refers to the edible flesh of animals; however, the old meaning can still be gleaned in the compound "sweetmeat," which refers to sweet food. Here, the word has generally changed its meaning but has kept it in some "protected environments." The same opposition between words in general versus their occurrence in protected environments is seen in *fàri*, which, as a root, has acquired a new meaning "sugarcane" but has retained its original meaning "rice" in the derivations *kifarifàri*, *tsimparifàri*, *farimàŋga*, and *farifàri*.[16] Beaujard ignores this tendency, arguing instead that the root in these derivations is a recent borrowing from Malay.

Finally, Simon (2006) points out that Merina Malagasy rice vocabulary has a distinct Bantu flavour. He lists the following terms of Bantu provenance:

Tsifàla, "name of a rice variety; (also: name of farming season)."
Akùtri, "unhusked rice."
Ampùmbu, "rice bran."
Ampàŋgu, "rice crust."
Ampaŋgùru, "steamed rice."

Although Beaujard is aware of this terminology, in his effort to link wet rice cultivation to the alleged later migrations of Malays to East Madagascar, he speculates that some of these terms were introduced during the dispersal of African slaves in the early 1800s or before (Beaujard 2011: 178). However, it is unlikely that slaves had a large impact on the terminology of an agricultural practice so rooted in the lives of the Malagasy. This explanation is ad hoc and at odds with Beaujard's own argument that wet rice cultivation in East Madagascar was a late introduction by Malays.

It is also striking that *kifarifàri* and *tsimparifàri* have the Bantu nominal prefixes *ki- and *tsi-. Had these words been reintroduced by Malays in the twelfth century or later, how could they have acquired these Bantu prefixes, especially since the alleged Malay migrations were a South East coast phenomenon, whereas post-migratory influence from Bantu languages affected primarily Madagascar's western regions? The evidence for a secondary introduction of wet rice cultivation by Malays is very thin indeed. It seems to me that Merina rice cultivation is much older, and that it has a Bantu imprint. I do not see a reason to dissociate it from the earliest migrations to Madagascar.

The case against a late introduction of cattle sacrifice runs along parallel lines. In Malay, the term for bovine is *ləmbu*, and in Banjar Malay, where all mute *ə*'s have become *a*, the corresponding term is *lambu*. SEB languages such as Ma'anyan and Malagasy borrowed the latter, yielding Ma'anyan *lam'u* "bovine" and Malagasy *làmbu* "pig." Malagasy *làmbu* has undergone a semantic shift, and the current Malagasy word for "bovine" is *ùmbe*, a loanword from Sabaki languages. However, there are a few derivations in which the old meaning "cattle" can still be gleaned:

Tanala Malagasy *lambuhàmba* "twin cattle" (*hàmba* "twins, pair"),
Taimoro Malagasy *an-duha-n-dàmbu* "at the head of the cow/bull" (*aN-* 'locative prefix', *lùha* "head," *-N-* "ligature" in compounds),
Ra-làmbu (name of a Merina king).

Again, according to Beaujard, the root of this derivation was reintroduced by the (supposedly Malay) Zafiraminia in the early second millennium CE. My argument against this explanation runs as follows. Parallel to the *fàri* case just discussed, *làmbu* is not a recent loanword when it occurs in derivations with the meaning "cattle": on the contrary, these derivations represent protected environments in which the root has been able to maintain its original meaning. In explaining cattle sacrifice and the root *lambu* with the meaning of "cattle" as recent Malay influence, Beaujard overlooks the fact that cattle sacrifices are also practiced among the Ma'anyan (more precisely those belonging to the Paju Epat subdivision). Moreover, the penultimate vowel *a* in *làmbu* is highly problematic. The Malays who stayed in touch with Madagascar were most probably Malay speakers from Sumatra or Java: the chance that they were Malays from Banjar or other parts of Borneo is relatively small. And yet, the term in question is realised as *làmbu* (according to Banjar Malay pronunciation), and not as *ləmbu*, (as expected in mainstream Malay). Given this context, a reintroduction of the term *làmbu* via mainstream Malays is rather far-fetched.

In an Islamic context, the use of the word for "pig" to refer to one's king is hard to conceive. Given this embargo and the general meaning of *làmbu*, *Ra-làmbu* as the name of a sovereign is more likely to be ancient and have retained the original meaning "bovine" in a protected environment than a recent loanword which is homonymous to a word with a taboo notion. But more importantly, this name must be linked to *Lambu Mangkurat* (also *Lambung Mangkurat*), the name of a legendary administrator of Banjarmasin or one of its precursors in South Borneo, and a central figure in the annals of the city of Banjar.[17] Here, the link with Malay culture is clear, but it leads right back to South Borneo, where the Ma'anyan lived under the patronage of local Malay kings, and not to the Malays elsewhere, who in precolonial times used to have their sociopolitical centres along the Strait of Malacca.

Another domestic animal term ascribed to Malay influence is Malagasy *vili-vìli*. Beaujard traces this old word for "sheep" from Malay *biri-biri*. However, a direct Malay source seems excluded on account of the irregular correspondence between *l* and *r*. Finally, and at the risk of stating the obvious, a reintroduction of words like *fàri* and *làmbu* is difficult to understand from the point of view of linguistic motivation: (i) why would Malagasy speakers borrow them if their language already had words for rice and cattle (namely *vàri* and *ùmbe*)? Furthermore, (ii) why would they have reintroduced *fàri* and *làmbu* if they already had words of that shape with related but not identical meanings (respectively "sugar cane" and "pig")? Borrowing such homonyms is awkward as it could easily impede communication.

Beaujard (2012: 546) also proposes other second introductions of historically identical roots, which are allegedly borrowed from Malay. He sees a similar contrast between the dialectal form *tàiki* denoting "sea"[18] and the alleged root *tasika in *Itasihànakă*. *taiky* is the regular inherited reflex of *tasik "sea; lake." *Itasihànakă* is the name of a lake east of Tananarivo in the central highlands. According to Dahl (1951: 316), *Itasihànakă* derives from *i (personal pronoun), *tasik- < Proto Malayo-Polynesian *tasik', and *ànak*ă* "child." Dahl argued that *ànak*ă* had a diminutive meaning and he translated *i-tasih-ànakă* as "small lake." Beaujard adopts this explanation, and he believes that *tàsih-* is basically a post-migratory loanword from Malay (compare Malay *tasik* "lake"), in which the Malay loan phoneme *s has been maintained. However, Dahl's etymology is syntactically problematic because when Malay *anak* or Malagasy *zànakă* occur as diminutives, they precede the nominal head instead of following it.[19] Finally, deriving *tàsih-* from Malay is not an obvious explanation: other analyses of the name Itasihànaka are more straightforward.[20]

8. In another case, Beaujard (2011: 184) proposes that a South Sulawesi loanword, *ùntsi* "banana," was introduced in the second millennium CE (see also paragraph 6). His reasons for such late borrowing from a South Sulawesi language are unclear, but the implication is that Madagascar and South Sulawesi maintained contact until long after the initial migrations. There is no ground for this, nor for any form of borrowing from South Sulawesi languages into Malagasy that would have taken place outside the South Borneo region. Malagasy *ùntsi* and *fùntsi* "banana" ultimately derive from Proto Malayo-Polynesian *punti "banana." The loss of

*p in *ùntsi* is irregular, and it must have been borrowed from a South Sulawesi language before the SEB migrations to East Africa (Adelaar 1995a).

9. Following some ideas proposed by Ottino, Beaujard (2012: 556–558) tries to demonstrate that the many variations in colour symbolism that exist in Madagascar are the result of external influences after the initial settlement of Madagascar. These influences allegedly came from ISEA, East Africa, Persia and India. Here, Beaujard is confronted with a rich spectre of stratification systems invariably based on the colours red, white and black. However, why should these systems be the result of outside influence, rather than be based on the natural environment of the communities involved? In an attempt to describe the cosmic order of Barito peoples in general, Beaujard uses the Ngaju as a model, although as a West Barito group they are culturally and linguistically rather different from the SEB groups. It is therefore not appropriate to use their cosmological views as prototypical for cosmologies in Madagascar. It also seems rather speculative to trace the use of red as a royal colour to Persian influence (deriving Malagasy *mena* "red" from Indonesian *hinay* and Arabic/Persian *hinna'* "henna"), and to link it further to colour symbolisms found among East African groups such as the Ndembe, who associate red and blood with power, white with milk and life, and black with death and evil. Outside influence is also not particularly obvious in the associations made in central and eastern Madagascar of red with political power, white with aristocracy (apparently under the influence of Islam), and black with an earlier population. While it remains possible that some of this symbolism is due to external influences, Beaujard's treatment is too diffuse and impressionistic to be readily accepted.

As to Malagasy mena "red," there is good reason to consider it an inherited SEB word. Other SEB languages have the cognate forms (Samihim) *mɛaʔ*, (Dusun Witu) *mɛyaʔ*, (Dusun Malang) *mɛyąʔ*, all with the same meaning. In the North East Barito languages, there is Taboyan *mɛyaʔ* and Luangan (or Lawangan) *mɛgaʔ* (same meaning). The *n* in Malagasy *mena* seems irregular but must be the result of nasalisation of *y under the influence of a preceding nasal, a phenomenon also observed in *(man-)anatră* "to learn" < Malay *(məŋ-)ajar* (same meaning) and possibly in *aniană* "oath," *mananiană* "to swear," if this word can be shown to derive from Malay *aniaya* "injustice" (ultimately a Sanskrit loanword). It is even clearer in Ma'anyan *mamañat* "to pay" (root: *wayat*), *manuñu* "to order" (root: *huyu*) and *ŋañak* "to invite or lead people" (root: *ayak*). This nasalisation of consecutive consonants is also common in Ngaju and suggests the presence of an areal feature in southern Borneo in the past.

10. While acknowledging that the roots of Malagasy are clearly SEB, Beaujard also believes that the South East Asian component of Madagascar's ancestry was more pluriform. He argues that the Malagasy were culturally and economically much more linked in with other parts of ISEA (and South India) than appears from their SEB roots and from some loanwords that are predominantly Malay.

    It is not difficult to see the logic of this, and there is good reason to follow Beaujard's assumption that around the seventh century CE there was already a certain measure of integration among most ethnic groups in ISEA itself. And we also know that this part of the world remained in touch with Madagascar until the sixteenth century. However, the lexical evidence for such contact—on which Beaujard's views are largely based—does not allow for much elaboration beyond the fact that it was maintained by Malays and Javanese. There is simply no solid lexical evidence to demonstrate that people in Madagascar had relations with any other ethnic groups in ISEA and South Asia. This outcome is of course not surprising, bearing in mind that the Malays and Javanese definitely had a considerable maritime past and have been the hegemonic forces in ISEA for fourteen centuries. The overseas contacts with very distant nations they had are not every nation's prerogative, not even that of the Sama Bajau, Buginese or Makassarese, whose seafaring activities were much more limited in time and scope. The Malays and Javanese were also the go-betweens for Indian influence, not only in the case of Madagascar, but also in that of virtually every part of ISEA. Finally, one cannot expect to find too much detailed and unambiguous evidence during one's investigations into cultural contact and trade relations between the aforementioned regions in the period between the seventh and sixteenth centuries CE. The time depth involved is enormous, and there remain too many gaps in our knowledge of the local languages, societies, ecologies and economies in the regions in question.

Quite apart from these considerations, Beaujard's loanwords do not always meet the criteria for an adequate etymology. He tries to demonstrate that Sama Bajau and people from South Sulawesi, Timor, the Philippines (see Sect. 7) and South India all contributed directly to the development of Madagascar's language, culture and society. I have, above, already assessed the non-evidence for Sama Bajau involvement in the history of Madagascar and the lack of demonstrable influence from Sulawesi languages beyond a handful of loanwords that probably had already been borrowed into SEB languages before the early SEB migrations to East Africa. In what follows I will discuss Beaujard's evidence for Timorese, Philippine and South Indian lexical influence.

The evidence of lexical influence from the Timor area rests on two words. Malagasy *tàhu* "taro" would be borrowed from languages from Timor Leste (East Timor), compare Makasae *muta'u* and Naueti *muto'u*[21], both meaning "taro" (Beaujard 2012: 540). Furthermore, *fuku-n'ùluna* "lineage" derives from a dialect of Tetun spoken in Wehali (West Timor, Indonesia), which has *fukun* "fundamental social group." Historical relations between Madagascar and Timor are far from obvious if not for these alleged loanwords. The fact that there is more than one Timorese loanword is hardly a strengthening point in Beaujard's argumentation, as these loanwords come from two distinct languages spoken in rather distant parts of the island. In spite of the superficial resemblance between *tàhu* and Makasae *muta'u*/Naueti *muto'u*, a relation between the two is phonologically hard to defend: the *h* in this word is irregular (as a rule, a glottal in the lending language is lost in Malagasy); furthermore, the first syllable of *muta'u/muto'u* is missing in Malagasy *tàhu*, which is left unexplained. As to *fuku-n'ùluna* and *fukun*, although the formal similarity is obvious, the sound correspondences are not the same as those in other loanwords. The final *-n* (basically, a suffix denoting non-alienability) is not reflected in Malagasy *fùku*; it is admittedly not the only word that has lost its historical final nasal (Adelaar 2012), but generally final *-n should have appeared in Malagasy as *-nă*. Furthermore, in this form Wehali Tetun *-k-* corresponds to Malagasy *-k-*, whereas a

*-k- as a rule became -*h*-, unless very recent borrowing is involved. On the basis of the formal similarity of these words, and the ambiguity of the phonological evidence involved, one might still be tempted to accept the possibility that Malagasy *fùku* is related to Wehali Tetun *fuku-n*. However, this is unlikely, given the lack of other lexical evidence from Tetun and of proper historical context.

As already mentioned (Sect. 6), the Philippine lexical evidence also suffers from the fact that the alleged loanwords come from too many different source languages. In Beaujard (2003: 136), we find no less than fifteen potential donor languages, some of which (Palawan, Kalinga, Molbog) are very unlikely sources on account of their low political and trade status. As Beaujard already indicates himself, most of the Philippine loanwords listed by him are unlikely because they do not show regular sound correspondences and/or semantic compatibility. The problem is compounded further by a more general lack of proper context. Whereas there are many Malay (and some Javanese) loanwords in Philippine languages, one would be hard-pressed to find any Philippine loanwords in Indonesian languages other than the ones directly neighbouring the Philippines. On account of this alone, it would be quite unexpected to find Philippine loanwords all the way in Malagasy. Moreover, in the unlikely case that some Philippine loanword ended up in Madagascar, it would in all probability have been brought there via one of the hegemonic languages in western and central Indonesia (basically Malay or Javanese), which would disqualify them as evidence for direct contact between Madagascar and the Philippines.

Of the six loanwords that meet basic standards of phonological and semantic compatibility (cf. Beaujard 2003: 136; 2012: 548), Malagasy *avài* "shoulder" is a totally regular reflex of Proto Austronesian *qabaRa (same meaning), and there is no reason to assume a Philippine origin. A comparable case is (dialectal) Malagasy *àntaka* "cultivated legume, pea (Dolichos lablab L.)": this is a reflex of Proto West-Malayo-Polynesian *hamətak "kind of legume." The nasal in the Malagasy reflex is due to assimilation of *m to following *t after syncope of the schwa in between. No reason for borrowing. Malagasy *tanantanàna* (Tanala and Ikongo Malagasy *taŋatàŋa* "pignon d'inde, Jatropha curcas L. [Euphorbiaceae family]") and

Malagasy *tanantàna-manga* "Ricinus communis L." agrees with Tagalog, Cebuano and Kapampangan *taŋantaŋan* "ricin." However, the name given to this plant is motivated by the fact that its leaf has the shape of a hand and must therefore be a metaphor for this body-part. However, *taŋan* with the default meaning "hand" only occurs in Malay, Javanese and Malagasy and a few other Austronesian languages: if it occurs with a metaphorically extended meaning in other languages, it is either borrowed from one of the languages having *tanan for "hand," or it is due to chance resemblance. Even if Malay and Javanese lack corresponding botanical terms of the *taŋantaŋan* type, they may have had one in the past, serving as a source of diffusion of cognate forms elsewhere. Note also Makassarese *taŋaŋ-taŋaŋ jara* "Ricinus communis" (Heyne 1927: 928). Malagasy *sàha*, (Sakalava dialect) *sàka* "cultivated field" agrees with Tagalog *saka* "field"; *mag-saka* "to cultivate." Although Cebuano has a corresponding form (Wolff 1972), *saka* generally has a limited spread in the Philippines. According to English (1986) it is borrowed from Spanish. As a matter of fact, South American Spanish has *chacra*, "agricultural field" which in turn derives from Qechua *chakra* (same meaning). If South American Spanish is indeed the source of Tagalog and Cebuano *saka*, the latter cannot have been adopted into Malagasy in precolonial times. In one other case, Malagasy seems to be in formal and semantic agreement with Tagalog, compare Malagasy (Vorimo dialect) *vayabàya*, *vazabàza* "to neglect" and Tagalog *baya*, *pa-bayâ* "to neglect." The agreement is striking, and there are no clear corresponding forms in Malay or Javanese to explain how this word ended up in both languages. However, as this word stands rather alone it is no strong evidence of Philippine lexical influence in Malagasy.

Finally, Beaujard argues that Madagascar used to be in direct contact with southern India. Ottino already claimed that Malagasy rice vocabulary owed much to Dravidian languages. Adelaar (1996) refutes his lexical evidence, except for *vàri* "rice" (in general), a word also found in other languages in South Borneo and therefore most likely due to pre-migratory contact in that part of the world. Beaujard (2003: 147) proposed two Dravidian loanwords allegedly introduced in the second millennium. One is

Malagasy *hùraka* “paddy field,” which he considered to be borrowed via Malay *kulam* “pond” but ultimately deriving from Tamil or Malayalam *kuḷam* “water reservoir.” This set is phonologically unjustified as the correspondences between *l* and *r* and between -*m* and -*kă* are highly irregular. Beaujard (2011: 176) proposes another source form, namely Malay *kulak*, which he found in Favre’s Malay-French dictionary (1875: 298). However, it does not occur in other Malay dictionaries,[22] and even if it did, it would still not match with *hùraka* because of the *r*: *l* correspondence. The other Dravidian loanword is Malagasy *amberìki* “Vignata radiata (L.) Wilczek,” which he derives from Malayalam *avarakka*, *amarakka* “Lablab pupureus (L.).” The ultimate source of *amberìki* is obviously Dravidian, its phonological development also shows unequivocally that it was borrowed directly via Réunion French, which has *ambérique* “Vignata radiata (L.) Wilczek” (Adelaar 2009: 157).[23] Beaujard (2003) also made a list of Sanskrit loanwords in Malagasy that were diagnosed by previous authors, and he added a few loanwords traced by himself. Useful as it is, this inventory only reinforces the impression that Sanskrit or Middle Indian loanwords in Malagasy are as a rule borrowed via Malay or Javanese. There is no clear lexical evidence for direct contacts between Madagascar and the Indian subcontinent in precolonial times (cf. Adelaar 1989).

11. Beaujard’s observations about taro in Madagascar are fascinating as some of its use is very reminiscent of the customs involving taro in East Indonesia and the Pacific. He attributes the introduction of the alocasia plant to migrants in the second millennium, but this does not tally with the linguistic evidence. The problematic analysis of *tàhu* as a loanword from a Timorese language was dealt with above. Beaujard traces -*kira*, the second part of the botanic term *saunju-kira* (“taro, Alocasia macrorhizos”), to Malay *birah* (same meaning), arguing that Malagasy *k* matches with a historical *b in various loanwords and compounds. In support of this rather unusual explanation he gives other examples with *k* for alleged *b such as *kintana* “star” (< Malay *bintaŋ* “id.”), *anak-àvi* and *anavàvi* (both meaning “daughter” and deriving from *ànaka* “offspring” + *vàvi* “female”), and the alleged etymology of *Madagascar* as derived from *Mogadishiu* (the city) + -*bar* (originally a Persian toponymic suffix found in city names like *Zanzi-bar*). Whatever

the histories of these words may be,[24] a change from *b to *k* is phonetically most unlikely, especially in the phonological history of Malagasy, in which non-final *k* derives from a aspirated, geminated or prenasalised *k or a prenasalised *g, and historical *b is reflected as *v* or *b*. The *-k-* in *anak-àvi* is not the result of a sound change but motivated by the phonotactic structure of this compound. The segment *saunju* in *saunju-kira* means "taro (Arum esculentum)" and is clearly a Bantu root. It refers to the small "Colocasia" variety of taro. A better historical explanation of the segment *-kira* is that it is nothing else than Malagasy *kira*, which by itself means "rib of a leaf, bone of a fish." The Alocasia taro (or "elephant-ear taro") has large leaves at the end of long stalks. Given its shape, the compound *saunju-kira* literally means "a taro with large ribs."

Concluding Remarks

Ottino's work has brought to our attention the historical impact of the Malays and Javanese on the traditional literature of the Merina and various ethnic groups in East Madagascar. The tale of Ibonia and its role in the establishment of a sociopolitical order among the Merina are the result of fairly direct Indianised Malay and Javanese influence. By pointing this out, Ottino has made an undeniable contribution to Malagasy culture history, even if it is somewhat eclipsed by a lack of historical and linguistic rigour and unverified statements about the nature of Islam in East Madagascar.

Beaujard's reconstruction of Madagascar's past on the basis of multidisciplinary evidence is an impressive endeavour and a major contribution to the history and anthropology of Madagascar. While indebted to him for this major contribution, I saw it as my task here to call attention to a number of problematic lexical inferences that he made and that do not meet the necessary requirements for a strong etymology. Although he is right in distinguishing the initial migration (in the seventh century) from later contacts (especially between the twelfth and sixteenth centuries) as two different strata in Madagascar's cultural heritage, he ascribes too much of the cultural and linguistic transfer from ISEA to influence during these later contacts. In all likelihood, Islam was introduced in Madagascar by Indianised Malays or Javanese after the initial migrations. However, that is no cause for various speculations concerning other cultural impulses from ISEA in the period between the twelfth and sixteenth centuries, as it is more than likely that the migrations in the seventh century already had a heavy Hindu-Malay and Javanese imprint. The various (Timorese, Philippine, South Indian) ethnic strands that Beaujard proposes in Malagasy culture are not supported by his own linguistic evidence, and he tends to overstate the role of Sulawesi and Sama Bajau peoples in the history of Madagascar. Finally, his belief in separate Austronesian and Bantu settlement histories does not seem to agree with the linguistic and human genetic evidence.

As a general observation, languages of the Philippines and Timor have had hardly any impact on Indonesian languages other than in the direct vicinity of the Philippines and Timor. On that count alone, the idea of contacts from the Philippines and Timor to Madagascar is difficult to maintain, considering that Indonesia is located in between and there is an enormous distance to cover. Furthermore, even if there were the occasional loanword from an ISEA language other than Malay or Javanese in Malagasy, the obvious pathway for having ended up there would have been via Malay or Javanese, the hegemonic languages in ISEA. Another important consideration in this debate is that Indonesian historiography is completely silent about Madagascar, and that Malagasy historical sources do not mention contacts with Indonesia. This silence further weakens Beaujard's case for multi-ethnic contacts. To bring it in as an argument may seem somewhat unfair in itself as history is rather silent about any form of post-migratory relations, whereas we know for a fact that relations persisted until well into the sixteenth century. However, it is not unfair if held against Beaujard's explicit speculations.

Accounting for the critical remarks in this chapter obviously requires an interpretation of the culture history of Madagascar that is considerably different from the one offered by Ottino and Beaujard. But this is certainly not to say that the contributions of both scholars have not had a very positive impact. In many ways, they have fundamentally changed our thinking about this culture history.

Notes

1. Sabaki is a division of East Coast Bantu: it includes Swahili and Comorian languages (Ngazije, Ndzuani, Male, Maore).
2. Today this is the dialect of the city of Banjarmasin, but historically this city had different names and was situated at various other places in more upriver direction along the Barito River (Ras 1968).

3. The adaptations in question are the fricativisation of stops and the spirantisation of semivowels. The conclusion that Malay loanwords not having undergone these changes postdate the migration to Madagascar is also supported by the fact that Bantu loanwords show the same distinction between early loanwords that have undergone this fricativisation and spirantisation, and more recent ones, that have not (Adelaar 2010).
4. Sea-going nations along the Strait of Malacca.
5. Also sometimes called "Sea gypsies," the Sama Bajau live in coastal areas in the southern Philippines, Malaysia (in Sabah, North Borneo) and Indonesia (in eastern Borneo, Sulawesi, the Lesser Sunda Islands, Kangean Island and West Timor).
6. In Ottino (1986) he expresses his preference for a phenomenological approach.
7. The Bajaus are also mentioned in the La Galigo, a Buginese epic text. It refers to Bajaus in the context of an event, which in Pelras' estimate possibly took place in the fourteenth century CE. However, this is speculative given that the La Galigo is not a historical text, and written versions of it are less than two centuries old; the mention in question could therefore also be an extrapolation (Sirtjo Koolhof p.c.).
8. "Une comparaison des langues sama de Sulu, de Sulawesi et de l'est indonésien avec les langues des Orang Laut du détroit de Malacca reste à approfondir" (Beaujard 2012: 549 fn.2146).
9. The different names of the Ma'anyan and Samihim are a minor issue in this discussion. In Bornean traditional societies ethnonyms tend to be determined by topography (such as the names of nearby rivers) and pronunciation shibboleths ("deviant" pronunciation of e.g. words for "not" or "what"). "Ma'anyan" is usually explained as a phrase meaning "towards swampy areas/wetlands," in reference to the area where many Ma'anyan speakers ended up after they moved away from the Sarunai River. "Samihim" is originally the name of a river running through current Samihim settlements.
10. This remains speculative: while it is likely that the Samihim also come from the Sarunai area, (Samihim or other) historical accounts to verify this are lacking.

11. Both derive from the same Sanskrit root meaning "friend, assistant, companion": Malay *sakay* (as well as Ma'anyan *hake* "foreigner; Muslim") derive from *sakhāy*, and Malagasy *sakaìza* derives from its accusative form *sakhāyam* (Gonda 1973: 418).
12. The Orang Asli are made up of various ethnic groups who already occupied the Malay peninsula long before the Malays. They speak Austro-Asiatic languages, although some have shifted to Malay. The Orang Laut may historically be an Orang Asli subdivision but their origins remain unclear (cf. Andaya and Andaya 2001: 9–15).
13. Sequences of the Polynesian motive in the mitochondrial DNA are admittedly much lower among groups like the Vezo and Mikea than among other Malagasy subgroups (Razafindrazaka 2010). However, that does not take away the fact that all Malagasy groups share Austronesian and Bantu DNA.
14. Martin van Bruinessen (p.c.).
15. Beaujard also mentions Merina Malagasy *farìa* "small lot of wet ricefield," *valamparìa* "embankment," and *Amparibè* (name of a neighbourhood in Antananarivo). However, these derivations are not relevant for the present argument as *farìa* and *valamparìa* derives from *farìhi* "ditch" (and not from *fàri*; see Webber [1853]), and the original meaning of the toponym *Amparibè* is not specified.
16. Note that my analysis of *fàri* and *làmbu* (see below) is essentially in agreement with Simon (2006), who calls these words "relics."
17. With special thanks to Dr. Tom Hoogervorst for pointing out this connection to me.
18. Also occurring in Vezo Malagasy *tai-dràti* "strong wind at sea" and *tai-tsùa* "gentle breeze, good for fishing" (Dahl 1951: 317).
19. Cf. Malay *kunci* "lock" versus *anak kunci* "key"; Malagasy *vùlana* "moon" versus *zana-bùlana* "satellite."
20. Note that the syllable *ta-* in *(I)tasihanaka* seems to be identical to the *ta-* prefix in many other ethnonyms such as Taimoro, Tankarana, Tanosy, and Tandroy.
21. Beaujard (2012: 540) has *muta'u* for both Makasae and Naueti; Saunders (2002–2003: 85) has Naueti *muto'u*.
22. *kulak* must be an erroneous spelling for *kulah* (originally a Javanese word meaning "pond" which was also borrowed into Malay).
23. While accepting borrowing via Réunion French as a possibility, Beaujard (2003:147) still maintains this word in his list of Dravidian

loanwords. However, with both *hùraka* and *ambèriki* eliminated, there is no such list.

24. On might speculate that in *kìntana* "star" originated as a plural counterpart of **vìntana* (< Malay *bintan) under the influence of Bantu languages (in which *ki- is a nominal singular prefix, and *vi- its plural counterpart), and that the substitution of *k- for *v- in the latter was motivated the by avoidance of a homonymic clash with *vìntana* "fish-hook, angle." Coincidentally, *vìntana* also survives with the meaning "fate, destiny" in Malagasy.

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CHAPTER 5

Early Greek and Latin Sources on the Indian Ocean and Eastern Africa

Ephraim Lytle

Introduction

The early Greek and Latin sources for exploration and trade in the Indian Ocean are relatively few (especially concerning East Africa), and they have long been subject to intense study by classical philologists. Furthermore, in recent decades an already extensive bibliography has grown exponentially as a number of trends in classical scholarship, ancient history, and the social sciences more generally have converged on the Indian Ocean world. One might be excused for suspecting that at this point our ancient sources are unlikely to repay much additional scrutiny. On the other hand, new data for ancient trade between the Mediterranean and the Indian Ocean world continue to emerge, much of which is owed to scientific excavations at sites stretching from the Red Sea and Southern Arabia to India and Sri Lanka (see, for instance, Sidebotham 2011). Equally important is a wealth of new data owed to a wide array of approaches that range from anthropological and linguistic investigations to archaeobotanical, zooarchaeological, and genetic studies (see, for instance, the recent attempts at synthesis by Boivin et al. 2013; Ekblom et al. this volume). If continued scrutiny of our ancient textual sources is to prove fruitful, it will probably

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owe less to traditional tools of classical philology than to the interdisciplinary recontextualization made possible by the kind of work attested to in this volume.

This chapter briefly surveys the history of Greco-Roman exploration in, and subsequent knowledge of, the Indian Ocean and the way our scant surviving evidence is filtered and refracted through the narrow interests of elite literary production and its generic conventions, before turning to examine a limited number of exceptional texts that chiefly date from the first and early second centuries CE and more directly reflect the increasing participation of Greco-Roman merchants in Indian Ocean trade. These Greek and Latin texts, together with a growing body of archaeological evidence, provide our most important evidence for ancient trade across the Western Indian Ocean and to Eastern Africa. Finally, we conclude by reexamining a few passages that potentially provide evidence for a much wider trans-Indian Ocean trade in the hands of Southeast Asians.

The Indian Ocean and Early Greek Sources

The Indian Ocean, however vaguely conceived, was a preoccupation of the earliest Greek prose authors such as Herodotos, who, in his *Histories*, collects various accounts of early exploration, including Egyptian, Phoenician, and Persian expeditions in the late seventh to the early fifth centuries BCE that allegedly explored the coast of the Indian Ocean between India and the Red Sea, and even attempted to circumnavigate Africa (Herodotos 4.42–4). There exist a host of later accounts (they were still being collected and manufactured under the Roman Empire), but for the most part they are not interested in trade in the Indian Ocean or the nature of economic interactions around its rim, but rather in the usual Greek cultural preoccupations: ethnography, paradoxography, and geography, namely debates about the shape of the continents, the nature of polar and equatorial regions, and, more generally, the size of the earth and the relative position of the inhabited world, the *oikoumenê* (Romm 1992; Dueck 2012). More reliable and detailed information begins to emerge only in the wake of Alexander the Great's conquests in the second half of the fourth century BCE, beginning with the accounts of Onesikritos (the first ancient author to mention *Taprobanê*—Sri Lanka) and Nearchos, who accompanied the fleet Alexander dispatched from the Indus to explore the coasts between there and the Persian Gulf (Salles 1996). Only a decade or two later, Megasthenes was sent as an ambassador by King Seleukos to India and later wrote an *Indika*, an account of the region and its customs (Stein 1931; Bosworth 1996). But these accounts survive primarily in the quotations and paraphrases of later authors and their information has to be considered, for our purposes, disappointing, as too perhaps is the degree to which later writers continued to rely on these same accounts. Even in the first century CE, Nearchos, Onesikritos, and Megasthenes still furnished the backbone of Pliny's account of India and the Indian Ocean in Book 6 of his *Natural History.*

Hellenistic Egypt proves a richer source of information, thanks in part to the work of Alexandrian geographers and scholars, but also to the role played by the Ptolemaic kings in actively promoting exploration of the Red Sea, and eventually direct trade with the larger Indian Ocean World (Desanges 1978; Salles 1996; Mueller 2006; Cohen 2006). Much of this Ptolemaic activity seems to have been motivated, initially at least, by the desire to acquire war elephants, for which purpose the Ptolemies organized large-scale hunting expeditions to sites well down the Red Sea and even beyond the straits of Bab el-Mandeb (Casson 1993; Burstein 1996, 2008; Sidebotham 2011: 39–54). Here our literary accounts are directly supported by epigraphic texts such as the famous Pithom Stele (*CGC* 22183; Thiers 2007) and an inscription Kosmas Indikopleustes reports having read at Adulis in the sixth century CE (*Christian Topography* 2.57–59; *OGIS* 54). Additional details for the organization of this trade are preserved in scattered graffiti inscriptions and a handful of Egyptian papyri. The best attested site was at Ptolemais Theron, probably near modern Aqiq on the coast of Sudan, but toponyms suggest that a string of such hunting stations were established as far as the northern coast of Somalia (Mueller 2006; Cohen 2006). Trade routes grew accordingly, as did the geographic horizons of such trade. An account preserved in Strabo credits the Greek discovery of the monsoon routes to India to a certain Eudoxus of Kyzikos in the late second century BCE (2.3.4–5). Whatever we think of that curious account, it is certain that by the middle of the first century BCE Greeks were actively engaged in trade directly with India. Further excavation at sites like Berenike on the Red Sea will no doubt continue to increase our understanding of the nature and extent of such exchange (Sidebotham 2011), but it remains the case that the Hellenistic textual evidence for this Indian Ocean trade is surprisingly scant. One exception is a fragment of Agatharchides of Knidos, a second-century BCE geographer and ethnographer, whose work *On the Erythraean Sea* survives in extended fragments that give an invaluable account of the customs of the peoples in regions bordering the Red Sea (Burstein 1989). Agatharchides also includes precious detail about the Ptolemaic Red Sea trade in elephants and ivory. For the most part, the extant fragments include precious little detail about trans-Indian Ocean trade, but Agatharchides does include a notice on what he calls the Fortunate Islands, which most likely include Socotra just east of Cape Guardafui (Burstein 1989: frs. 105a and 105b [= Photius Cod. 250.103 and Diodorus 3.47.8–9]):

> Here one can see riding at anchor vessels from neighboring countries. Most of those encountered there are from the port Alexander built by the Indus River. Not a few, however, come from Persia and Carmania and the whole nearby region.

Already in the second century BCE, trade routes with termini stretching from Northwest India to the Persian Gulf, the Arabian Peninsula, and the Red Sea intersected at, among other places, Socotra.

The circumstances of Indian Ocean trade changed dramatically in the Augustan period, in the late first century BCE. Strabo offers a reliable snapshot in his *Geography*, recounting an episode from 26 BCE when he accompanied the Roman general Gallus up the Nile and learned, probably in the region of Koptos, that there were some 120 merchant ships annually sailing out of Myos Hormos for India, whereas previously under the Ptolemies only a few had dared make the voyage (2.15.12). And again in a later passage he remarks that whereas in his day great fleets traded as far as India and East Africa (which he seems to refer to only rather vaguely as “the farthest points of Ethiopia”), bringing back the richest cargoes, under the Ptolemies not even twenty ships dared cross the length of the Red Sea and the Gulf of Aden and venture into the open Ocean beyond (17.1.13). Rome’s expansion unlocked massive amounts of wealth which became concentrated in the hands of an elite that in turn increasingly drove demand for a luxury trade with the East, from which a narrower subset of the population made spectacular profits (Tomber 2008; Fitzpatrick 2011; De Romanis 2012b). The evidence suggests that by the mid-first century CE, trade with India was conducted on such a scale that certain commodities such as black pepper were readily available across the Mediterranean and affordable in small quantities to a large segment of the population. This trade required substantial capital investments in terms of ships as well as cargoes that included, on the outbound trip, large quantities of high quality silver and gold coinage (De Romanis 2012b). Pliny suggests that by the mid-first century CE this trade resulted in an annual trade imbalance of at least 50,000,000 sesterces (*Natural History* 6.101; similarly 12.84). Roman elites invested in this trade, either through companies controlled by networks of freedmen, or, more indirectly, by providing loans of capital, including bottomry loans that were at high rates of interest but secured only by the cargo, thus acting for the merchants also as insurance policies. It so happens that evidence for just such a loan is preserved in an Egyptian papyrus document of the mid-second century CE published in 1985, the so-called Muziris Papyrus (Harrauer and Sijpesteijn 1985; Casson 1990; Rathbone 2000). This document restates, on the front, the conditions of the initial loan contract for a cargo acquired at Muziris on India's Malabar Coast, and on the back it details the contents, weights and measures of, and the payment of duties on, the cargo. A total value is reckoned for three-quarters of the cargo amounting to nearly 1152 talents, a sum equivalent to approximately seven million sesterces, or roughly the same number of grams of silver (De Romanis 2010–2011[2012]). Indian Ocean trade was big business, and its social and economic contexts gave rise to both heightened interest in geographical and other accounts of the Indian Ocean and also far more regular sources of information. This trade naturally involved the active participation of agents stationed abroad as members of trading diasporas or accompanying cargoes back to Egypt and from there to markets across the Mediterranean. Like the freedman of Annius Plocamus—allegedly blown off course to Sri Lanka, where he spent six months learning the local language and informing the king of Roman customs, resulting in the first embassy from that island to Rome (*Natural History* 6.84–91)—many of the participants in this Indian Ocean trade were well-connected and cosmopolitan. And although Strabo dismisses these traders as too uneducated to offer useful testimony (15.1.4), that claim tells us more about Strabo and the conventions of his genre than it does about Indian Ocean traders, many of whom were not only practical-minded but also literate.

Such merchants are explicitly acknowledged as sources for much of Pliny's account of the monsoon trade (*Natural History* 6.100–106), and likewise in the following century for Ptolemy's account, derived from Marinos of Tyre, of Azania, the coastal region of Eastern Africa from the Horn to as far south as Rhapta in modern Tanzania (*Geography* 1.9.1–7). Unfortunately, these filtered and refracted accounts are difficult to assess. Furthermore, honest accounts circulated together with fictional accounts, and even where accounts reported secondhand might appear genuine, like again the account Pliny gives of Annius Plocamus' freedman, they tend to accrete so much that is marvelous, paradoxographical, or otherwise seemingly invented that the wheat is often impossible to separate from the chaff.

Fortunately—the odds of survival are so remote that they are difficult to comprehend—there still exists a firsthand account of one Indian Ocean merchant. This is the anonymous Greek text best known by its conventional Latin title, the *Periplus Maris Erythraei* (= *PME*: Casson 1989; Belfiore 2004). It is the single most important source for ancient Indian Ocean trade, while for East Africa south of the Horn, about which earlier writers such as Strabo and even some later ones such as Pliny knew next to nothing, it is the only extant source dated earlier than the geographer Ptolemy in the mid-second century CE. By any measure it is one of the most unique texts to survive from all of antiquity. In 66 very short chapters the *Periplus* describes the sea routes, sailing times, distances, ports, and items of trade across a region stretching from Berenike on the Egyptian coast of the Red Sea, to East Africa as far as modern Tanzania, to Southern Arabia, to the Persian Gulf, and to India. This matter-of-fact account is written not in a literary Attic but in the *koinê*—the everyday spoken Greek—of the first century CE. Its only embellishments are an occasional poetic or literary turn of phrase and a few brief anecdotes owed to literary, sub-literary, or oral tradition. Most importantly, the author seems to have had firsthand experience of much of what he describes. Opinion diverges on whether he actually sailed the route down the east coast of Africa as far as Rhapta, but he most certainly sailed in the Red Sea and Gulf of Aden, along the Arabian coasts as far as Kane, and on the African coast as far as Opone below Cape Guardafui. He also sailed on the monsoon routes to both Northwest India—to Barbarikon at the mouth of the Indus and to Barygaza in Ariake—and to the Malabari coastal emporia of Muziris and Nelkynda in the adjacent South Indian kingdoms of Chera and Pandion. Along the way he collected information on, and compiled relatively careful accounts of, Eastern Arabia, the Persian Gulf, the coasts of Parthia, and India including the eastern littoral between Cape Comorin and the Ganges.

Accepting the basic inferences suggested by the text, the *Periplus* offers a vital trove of reliable and seemingly coherent data recorded probably in the period between 40 CE and 50 CE—the apparent height of the Roman India trade. No surprise then that there is a vast amount of scholarship dedicated specifically to the *Periplus* and an even greater amount that depends directly upon its evidence (see, for instance, Casson 1989; Belfiore 2004; Seland 2010; Boussac et al. 2012). Unfortunately, working with such a text involves potential pitfalls that are not always widely appreciated. For example, Jan Vansina observes that scholars have written accounts of East Africa in which key arguments hinge on the translation of individual words or phrases in the *Periplus* that in certain cases are absent from the text of the manuscript and are merely the conjectures of its modern editors (1997). This is unsurprising given that so many scholars interested in the *Periplus* are not classicists and necessarily work with translations. For the *Periplus*, we have no fewer than five English translations and paraphrases (Vincent 1807; McCrindle 1879; Schoff 1912; Huntingford 1980; Casson 1989). These are of differing degrees of reliability, and yet the best and most recent edition and translation is out of print, while a number of earlier translations are freely available online or as inexpensive reprints.

The *Periplus* survives thanks only to a unique tenth-century manuscript in the University Library, Heidelberg that is generally described as corrupt, lacunose, and error-ridden (Casson 1989: 5). In fact, although it is clear in a number of places that a scribe has attempted to correct the author of the *Periplus*' original Greek, the text fortunately seems not to have been distilled by generations of such editors improving and ultimately rendering irrecoverable the original text: Frisk plausibly suggests that the Heidelberg manuscript may even have been copied directly from a very ancient text written in cursive hand on papyrus. Furthermore, the primary Heidelberg scribe seems to have represented as faithfully as possible what was legible in his exemplar. By contrast, the earliest modern editors—unfamiliar with the author's *koinê*, and confronted with a text full of non-Greek terms, unfamiliar idioms, and occasional lacunae—attempted to improve the text, and in so doing produced the various discrepancies present in current English editions and translations. Schoff and McCrindle, for example, while in other respects contributing valuable knowledge, both worked from a nineteenth-century Greek text that, although praised by Schoff as having been edited with such "extreme care" that it "leaves little to be desired" (1912: 20), is described by Casson as capable of introducing deceptive good order into the text only because of its "total disregard for the readings of the manuscript" (1989: 6).

Hjalmar Frisk's 1927 edition, by contrast, deserves to be considered the first, modern scientific edition of the *Periplus*. It carefully preserves wherever possible the MS readings, only improving them based on an appreciation of the author's *koinê* and on sound paleographical grounds. Frisk's text has subsequently been improved in only a very few places, and these improvements, the majority owed to Giuseppe Giangrande (for instance, Giangrande 1975), are incorporated by Casson in his 1989 edition. Subsequent to Casson, a handful of plausible emendations have been suggested (for instance, De Romanis 2012a), but barring the discovery of an independent manuscript tradition, the text is unlikely to be radically improved. Unsurprisingly, then, Casson's translation is superior to all earlier translations merely because it relies on the soundest text.

Classical philology involves more than careful textual criticism alone, however, as a well-known case from chapter 16 of the *Periplus* shows. Schoff, and even more recently Huntingford, translates an emendation—*peiratai*—rather than the MS's *oratoi* (corrected with a rough breathing to *horatoi*): the native inhabitants of Rhapta are not only huge in stature but they are also pirates, *peiratai*. This emendation cannot be justified on paleographic grounds: a scribe could not have accidentally read or written *horatoi* for *peiratai*. Nor does that reading make sense in context: what shipping would these pirates prey upon, given their explicit ties by intermarriage to Arab merchants and the fact that Greeks were clearly willing to trade along their coasts, whereas elsewhere in the *Periplus* pirates are a danger to be avoided by holding far out to sea or avoiding ports where they pose a risk? *Peiratai* has to be rejected even if it means maintaining the seemingly ungrammatical and certainly banal corrected manuscript reading, *horatoi*, an adjective meaning "visible," from the verb *horaô*—"I see." Wrigley's more recent suggestion—*horatai*—requires emendation resulting in the plural of an extremely rare noun (*horates*) that is never attested in the sense he suggests, "overseer" (1997), but rather means "beholder" or "witness" (LSJ, s.v.). This solution offers no obvious improvement on a suggestion proposed already by Giangrande and translated by Casson: *oratoi* should be *arotai*, with a scribe likely misreading cursive alphas for omicron and vice-versa. Although the root of *arotai* is "plow" (the word means "those who plow"), a tool for which we have no evidence until much later in East Africa, this is not a serious objection. The term could and would here be used in the basic sense of farming, of sowing and reaping crops, by contrast with pastoralism, piracy, or hunting and gathering. Herodotos uses the term in that very sense in a passage that contrasts agricultural and pastoral modes (*Histories* 4.2): "They are not farmers (*arotai*) but nomads (*nomades*)." Archaeological evidence suggesting the introduction of agriculture in the region only at a much later date may well persuade us in time to rule out Giangrande's emendation (for recent discussions of this debate see, for instance, Boivin et al. 2013: 31–33; Ekblom et al. this volume), but purely on philological grounds Casson offers the best translation to date.

Casson's translation distinguishes itself in other regards too: like the author of the *Periplus*, Casson usually resists translating non-Greek terms for trade items. So in chapter 12, where earlier translations sometimes offer adventurous translations for the terms *gizeir*, *asyphe*, *magla*, and *moto*—which perhaps represent different kinds or grades of cassia, Casson follows more closely the text and avoids introducing potential error by simply giving the list of terms as presented in the manuscript and discussing possible meanings in the commentary. At other points where Casson gives novel translations of idiomatic or thinly attested Greek terms, he generally makes use of a wide range of evidence, including Greek papyri from Egypt, and in most cases his arguments are convincing. There are still occasions where a translator simply has to choose, and in a few places better translations have been suggested (see, for instance, De Romanis 2012a), but overall Casson's English translation is clearly the best available.

Equally sound are nearly all of Casson's fundamental arguments about the text, ranging from its date to the nature of the trade routes it describes and their relation to historically attested wind patterns and sailing times. It is remarkable how thoroughly subsequent research has adopted his basic conclusions. Virtually everything published specifically on the subject of the *Periplus* subsequent to 1989 is indebted to Casson's work. Very recently an important article by Pascal Arnaud, a noted scholar of ancient Greek geography, attempts to destabilize that understanding by reviving a theory that the *Periplus* is a second-century CE work by an anonymous compiler with no firsthand experience who drew on various merchant accounts and geographical texts (2012). Arnaud's long and detailed discussion offers a number of valuable contributions, especially by complicating the common but perhaps too simple claim that the author of the *Periplus* was a Greek-speaking Egyptian merchant. Arnaud shows that the author's terms for navigation and trade find few parallels for those used locally in Egypt, which are abundantly attested to in the papyri. Indeed, the author's apparent familiarity with Latin and with terminology derived from a wider Mediterranean context of taxation and trade suggests rather "un milieu latin hellénisé (ou grec latinisé)." Of course, that observation is not inconsistent with the possibility that the author of the *Periplus* was nevertheless an Egyptian merchant insofar as he may have been based in cosmopolitan Alexandria, which Strabo, for example, explicitly identifies as the key nexus of the Indian Ocean trade (2.15.12; 17.1.13). Alexandrian traders would have had cultural orientations that reflected both the Indian Ocean and wider Mediterranean commercial contexts.

At the same time, Arnaud's discussion of the *Periplus* does much to illuminate its author's view of the inhabited world, the *oikoumenê*, in the context of ancient geographical thought. Arnaud also offers a reasonable hypothesis as to why this particular text may have been of interest to Arrian and other literati with similar intellectual orientations. Nevertheless, the central argument that the text itself is a late compilation remains unconvincing, relying on a number of old assumptions about Northwest Indian chronologies. The Malichos named in chapter 19 can only be the Nabataean Malichos II, who ruled between 40 and 70 CE (Casson 1989: 6–7), while revised regional chronologies from Southern Arabia and Northwest India have tended to converge around the lower end of that date range, suggesting that the author of the *Periplus* collected the information in his account probably during the decade or so from 40 to approximately 50 CE (see, for instance, Seland 2010: 13).

The *Periplus*, Cinnamon and Cassia, and Trans-Indian Ocean Trade

This is not to suggest that there is nothing left to say about the *Periplus*. An abundance of new research proves the contrary. Nevertheless, future progress will likely arise less from any radical revision of the text's date, authorship, or basic content, than from understanding how the evidence that it so reliably preserves is best interpreted in light of emerging knowledge about local, regional, and even greater Indian Ocean world contexts. And certainly its data bear directly on important unanswered questions, none more mysterious than the that of the origin and nature of ancient cinnamon and cassia, which remains "one of the unsolved, and perhaps insolvable, problems of the ancient monsoon trade" (Seland 2010: 40).

The following is a brief summary of the evidence provided by the *Periplus*. The author of this work never refers to cinnamon (Ancient Greek *kinnamômon*), but only cassia (*kasia*). Today these terms usually refer to products derived from distinct but related species (*Cinnamomum verum* and *Cinnamomum cassia*), whereas in classical antiquity the distinction is not always clear. Some authors use the terms like synonyms or to distinguish varying qualities of products from the same plant, while others employ one or the other term exclusively (Casson 1984). The *Periplus* indicates the availability of cassia only in the "Far-Side Ports" (*ta peran emporia*) on the northern coast of Somalia and in the region of the Cape of Spices, modern Cape Guardafui (*PME* 8–13). The author nowhere indicates that cassia could be acquired in Indian or Arabian ports. Most of our early Greek sources suggest that cassia and cinnamon originated in Arabia, Somalia or Ethiopia, or some combination thereof. None have good information about their origins, however—while no species of the genus *Cinnamomum* has been shown to be indigenous to any of those locales (Casson 1984).

There exist four primary theories to explain the evidence. The first two presume that cinnamon and cassia originated in Somalia or Ethiopia (and also perhaps Arabia). The *Periplus*' cassia would thus have been a local product harvested in Somalia or traded there from points inland. According to these theories, cassia and cinnamon derived either from a plant identical, or nearly so, to the species that give us modern cinnamon and cassia, or from an entirely different plant or plants indigenous to Somalia, Ethiopia, or Arabia. In the latter case the terms cinnamon and cassia only much later than classical antiquity came to describe the products we know today. The first possibility was discussed in the nineteenth century but subsequently fell out of favor due to the botanical evidence, although it is still occasionally maintained (see, for instance, Huntingford 1980: 396, but without any new evidence), while the second continued to be argued forcefully into the early twentieth century (Laufer 1919: 541–543) and still finds proponents (Raschke 1978: 652–655; De Romanis 1996: 109–117; Crone 1987). Casson, however, shows in a fundamentally important article that the ancient sources for cinnamon and cassia seem to describe products similar or identical to those associated with modern cinnamon and cassia (1984). Moreover, a joint Israeli team of archaeologists and scientists recently published the results of tests that indicate the presence of cinnamaldehyde (C_9H_8O) in a number of Early Iron Age Phoenician unguent containers excavated from five sites in Israel and dating from the eleventh to the ninth centuries BCE (Namdar et al. 2013). Reports in the popular press suggest that evidence for cinnamon—probably again due to the presence of cinnamaldehyde—has been detected in Middle Bronze Age Canaanite wine jars excavated at Tel Kabri, Israel (for instance, Wilford 2013). As its name suggests, cinnamaldehyde is the organic compound that gives cinnamon its distinct taste and odor. Oil extracted from cinnamon bark is approximately 90 percent cinnamaldehyde, which is only known to be present in species of the genus

Cinnamomum. This evidence would seem to obviate the theory that the terms cinnamon and cassia attested in our ancient sources corresponded to different plants indigenous to Arabia or the Horn of Africa. The Greeks most likely borrowed their terms for cinnamon and cassia from Semitic speakers who already used them to describe products derived from plants in the genus *Cinnamomum* (see, for instance, Ezekiel 27.10; Proverbs 7.17).

That leaves the final two theories, both of which presume that ancient cinnamon and cassia were products from plants of the genus *Cinnamomum* and that they were traded long distances from China, Southeast Asia, India, or Sri Lanka, or some combination thereof. In his study of the Roman spice trade, Miller famously proposes that cinnamon and cassia were traded from Southeast Asia directly to Madagascar over a vast stretch of southern Indian Ocean. His argument relies in part on a passage of Pliny (*NH* 87–8, translation author):

> All these stories are false, as *cinnamomum*, which is identical to cinnamon, grows in Aethiopia, which has ties through marriage with the Trogodytes. These, purchasing it from their neighbors, carry it through vast seas on rafts, which no rudders steer, no oars draw, no sails propel, no other device aids: all that are present there are man and his daring. Furthermore, they choose to go to sea in winter, around the solstice, when the east winds blow strongly. These winds propel them on a straight course through the gulfs, and once they pass the cape the west-northwest winds push them over to the port of the Gebbanitae called Ocilia. Given the conditions, they seek out that port especially, and they say that it takes five years for the merchants to make the return trip and that many of them perish. They bring back with them glass and bronze, clothing, brooches, and bracelets and necklaces.

Miller describes this passage in the following terms (1969: 156–157):

> The operative words are "on rafts," *ratibus*, and what Pliny or his informant had in mind was obviously the double outrigger Indonesian canoe. The reference in the same passage to Cape Guardafui, Okelis, and the Gabbanites indicates probably the completion of the voyage from Rhapta by the southern Arabian merchants who, from Muza, controlled the coastwise cinnamon trade.

The problems with Miller's theory were immediately seized on by critics (for instance, Gray 1970: 222; Raschke 1978: 652–653): Pliny clearly states that this cinnamon grows in Aethiopia, and his description offers not a single detail to suggest Indonesian outrigger canoes. It is stated explicitly that the merchants made directly for Okelis with the northeast monsoon and were only carried into that port when the wind shifted west-northwest, the Greek *argestes*, after clearing a cape. This cannot be the Cape of Spices, modern Cape Guardafui, at the terminus of the Horn of Africa, but seems rather to refer to Bab el-Mandeb at the mouth of the Red Sea, just inside which lay Okelis. Moreover, if Arab traders at Rhapta monopolized the transport of cinnamon and cassia to their ports of Okelis and Muza, what is cassia doing in the ports of northern Somalia in the *Periplus*, which specifically notes that these regions were ruled by local, independent chieftains (*PME* 8–14)? Finally, why is cassia absent from the *Periplus*' account of the home ports of those same Arab traders? Miller's thesis justifiably failed to find traction among classicists and ancient historians. While his thesis was more widely retailed in other arenas and helped in part to fuel long-running debates about the date and nature of the settlement of Madagascar, here too many scholars have returned to the view that Austronesian settlement began only centuries later (see, for instance, Boivin et al. 2013), although it is again worth stressing that new evidence will continue to emerge, and that the origins of the Malagasy remains a major, ongoing debate (see, for instance, Ekblom et al. this volume).

On the other hand, Miller's interpretation of Pliny's account is at least as plausible as that of proponents of the view that cassia was produced in Somalia. These take Pliny's epic account as describing only local trade along the northern coast of Somalia and then across the Red Sea at its narrowest point (for instance, Gray 1970: 222). A perhaps more reasonable approach is simply to dismiss Pliny's account out of hand as another fantastic tradition, but one just plausible enough to have hoodwinked even the relatively sober-minded encyclopedist. That would seem to be the view of those scholars who argue for the last theory for the origin of ancient cinnamon and cassia—that Indian and Arab traders deliberately and effectively hid the origins of cassia in order to protect a monopoly on its trade (Casson 1984, 1989: 122–124). Although often repeated, this theory, as a number of subsequent scholars have noted, is no more convincing than the others (Seland 2010: 40–41). Rather obvious objections are that it ignores the practical impossibilities of maintaining such a conspiracy in crowded ports like those of India, where Greco-Roman merchants had established communities of traders and agents. Moreover, why should only cassia—and not other Indian goods—be available exclusively and in considerable quantities in the

Somalian ports mentioned? Casson suggests that his argument finds a parallel in mistaken ancient accounts about the origins of ginger and cardamom (1989: 123), both of which Pliny holds come from Arabia (*NH* 12.28 and 50). But of course, that fact can as easily be interpreted as undermining his case, since these spices could likewise have been traded not from India but together with cinnamon and cassia from Southeast Asia. In my opinion an even greater objection to Casson's argument is its lack of underlying economic logic. Why should Indian merchants have had any interest in monopolizing the risk of shipping cassia across the Indian Ocean to the Far-Side Ports when they could exchange the very same cassia, for similar margins, with Roman merchants in Indian ports? If the shipping were in the hands of Arab merchants, what interest would Indian wholesalers have had in protecting Arab trade secrets? And if there existed a regular trade in cinnamon and cassia from India, why, according to ancient testimony, were these products not only expensive, but apparently subject to steep fluctuations in price (*NH* 93)? The accounts invented by Arab merchants, for example that the south winds occasionally blew so hot that they set fire to the forests that produced cinnamon and cassia, are clearly fictitious (*NH* 93–4). Nevertheless, they suggest that these products, unlike otherwise comparable products that were actually produced in Somalia (such as frankincense or myrrh) or were regularly traded through Indian ports (such as black pepper), cinnamon and cassia were subject to unusual supply shocks.

None of the proposed solutions make good sense, and yet the facts would still seem to demand an explanation. I would argue that the best solution remains the existence of a long-distance trans-Indian Ocean trade that brought cinnamon, cassia, and likely a number of other spices from Southeast Asia to Africa. In the period described by the *Periplus*, however, this trade probably connected Southeast Asia to East Africa not via Madagascar or Rhapta, but rather directly to Somalia in the region of the Horn by way of the same monsoon route described more-or-less accurately—if somewhat confusingly—by Pliny.

An occasionally overlooked feature of Pliny's account is that he offers it explicitly in response to earlier, fantastic literary accounts holding that cinnamon and cassia originated in Arabia, Ethiopia, or Somalia (Hennig 1939; Casson 1984). Greeks traditionally held that Aethiopians inhabited the last two regions inland and Trogodytes the coast. The key to understanding Pliny's account is that he, or perhaps only his source, has in mind very different Trogodytes and Aethiopians from those Africans familiar to merchants of the first century CE and a subject of exotic interest already to Greeks in the Classical and Hellenistic periods. This clue has already been unraveled, at least in part, by Dalby (2000: 38):

> The answer is that to Pliny, as to the Greek geographer Ptolemy, the coastal people on the distant Far Eastern shore of the Indian Ocean were also called "Cave dwellers." Pliny (unlike Ptolemy) for symmetry's sake calls the inland people, on that side, "Ethiopians," just as the inland people in Africa were called Ethiopians. In other words, Pliny knew that cinnamon came from southeastern Asia and crossed the whole breadth of the Indian Ocean on its way to the West, but he confused the geographical names so effectively that no later writer saw what he was getting at.

Dalby's interpretation needs to be revised in a few key respects. In his *Geography*, Ptolemy does not refer to the inhabitants of the Far Eastern shore as "Cave dwellers," or Trogodytes, but rather as *Ichthuophagoi Aithiopes*, Fish-eater Aethiopians (7.3.1, 3), which, however, he perhaps presumes to be similar to the fish-eating Trogodytes of the Red Sea. On Ptolemy's map of the world, the east coast of Africa, at its southernmost extent, rather than curving to the west, bends to the east and eventually joins Asia. Africa thereby encloses an Indian Ocean that is imagined as a kind of vast inland sea analogous to the Mediterranean (Romm 1992). The *Periplus*' conception of Sri Lanka stretching to the west nearly as far as the Horn of Africa and Azania (*PME* 61) suggests that the notion of the Indian Ocean as a kind of Mediterranean Sea was attractive even to those who understood Africa as a distinct continent encircled to the south by the Indian and Atlantic Oceans (Arnaud 2012: 57). Ptolemy's model can be interpreted as perhaps suggesting that he viewed Fish-eater Aethiopians as inhabiting the whole, unexplored southern and southeastern shores of the Indian Ocean even as far as the port of Cattigara that he locates to the south of China (*Sinai*), at the far eastern horizon of the world. But the notion of Aethiopians living in the Far East did not require a Ptolemaic understanding of Africa and the Indian Ocean, and it was certainly much older than Pliny. Although already by the early fifth century BCE Hekataios had identified Aethiopians (Ancient Greek *Aithiopes*) with Africans (*FGrH* 1 fr. 326–327), other well-known traditions located Aethiopians on the far eastern and western horizons of the world. These *Aithiopes* appear in Homer (*Od.* 1.22–4; *Il.* 23.205–206) and in Archaic Greek lyric poetry (Mimnermus fr. 12 West). Writing not long after Hekataios, Herodotos likewise locates *Aithiopes* in Africa, but also acknowledges traditions relating to the existence of additional Aethiopian tribes far to both the east and the west (7.70 and 4.183), at the very ends (*eschata*) of the earth (3.25; for this "geographic germination," see Nakassis 2004).

In other words, Pliny's geographical names are not really "confused" but reflect a popular tradition attested to in Homer and no doubt still familiar to first- and second-century CE audiences. Naturally, on that distant horizon, relationships between inland "Aethiopians" and coastal, seafaring "Trogodytes" are imagined to obtain in similar fashion (through intermarriage) to those between Aethiopians and Trogodytes of the Red Sea, made familiar by Hellenistic ethnographers such as Agatharchides and by the experiences of merchants like the author of the *Periplus*. In my view, it is likely that Pliny's source already referred to the land where cinnamon grew as Aethiopia and to our long-distance traders as Trogodytes, and he understood that the latter crossed the entirety of the Indian Ocean.

Who, then, were these Trogodytes? The likeliest possibility, as Miller correctly saw, is that cassia and cinnamon traveled on trade routes separate from those goods produced in India or regularly traded through its ports. The reasons need not have been related to the existence of a far-removed southern trade route, but could have been simply political and economic. The large emporia of India were carefully regulated by the state and, as in the markets of Arabia or Rome, goods, even those in transit, would have been subject to duties of as much as 25 percent or more (Seland 2010). A similar logic could apply to the question of why during the time of the *Periplus* certain goods not tied to the usual trade routes between India and Arabia were marketed by our mysterious long-distance traders in the perhaps less-onerously regulated ports of Somalia, each subject to a local chieftain, and none described by the author of the *Periplus* with the terminology he uses for carefully controlled and taxed ports (*PME* 7–14; Casson 1989: 271–276). The very existence of the *Periplus* attests to the degree to which Greco-Roman traders were careful to collect information required to make rational economic choices, as does the constantly shifting landscape of favored ports implied by that text vis-à-vis subsequent descriptions of Pliny and Ptolemy. The multicultural nature of trade in the Indian Ocean, where traders and trade routes with different origins often overlapped or converged in distant ports, is acknowledged in passing by the author of the *Periplus*. These parties were all engaged in similar decision-making, and presumably even the invisible spice traders were economic actors every bit as rational as the author of the *Periplus*. The cinnamon trade would have shifted accordingly over time, with Pliny's account suggesting that only a few years before or after the period described by the *Periplus*, cinnamon merchants preferred to sail directly to Okelis rather than offload in Far-Side Ports, whereas over much longer time periods cinnamon could have arrived in the Mediterranean via overland silk and spice routes, by way of Indian markets, or by being carried directly across the Indian Ocean by Southeast Asians destined for ports in the Persian Gulf.

Who were these Southeast Asian traders? Scholars have been tempted to connect them to the distinct shipbuilding traditions attested to in the Bay of Bengal by the author of the *Periplus*, who briefly mentions what seem to be large, joined dugouts, termed *sangara*, as well as certain very large ships—*kolandiophônta ta megista*—making the trip between India's eastern coast and *Chrysê*, a region perhaps corresponding to the Malay peninsula and environs (*PME* 60). It is suggested that the *kolandiophônta* of the *Periplus* are related to the massive Southeast Asian ships termed *kunlun bo* in later Chinese sources (Christie 1957; Manguin 1993). That distinct tradition explains in part why some scholars interested in the early Indian Ocean world continue to dismiss Pliny's account as "dubious" because "Southeast Asian traders would almost certainly have arrived in large ships" (Boivin et al. 2013: 255). Yet other recent scholarship suggests "the participation of less traditionally hierarchical and centralized societies, and possibly also of more mobile, sea-oriented populations" in establishing early contacts between Southeast Asia and Africa (as acknowledged by Boivin et al. 2013: 267, citing, for instance, Andaya 2008 and Hall 2011). In fact, little is known for certain about the organization of Southeast Asian maritime states at such an early date, but what evidence exists suggests neither 'hierarchical' nor 'centralized' states but rather loosely associated coastal polities (for example, Manguin 2000 and 2004). There is little reason to believe that early trans-Indian Ocean trade required either centralized societies or large ships (or even that the two are in any way correlated). There are distinct Southeast Asian maritime and boatbuilding traditions that allow us to imagine early long-distance cinnamon traders employing neither massive ships like the *kunlun bo* nor even large outrigger canoes. It is possible, for example, that Pliny or his source conflated a Southeast Asian lashed lug construction technique, which archaeological evidence shows developed no later than the early first millenium AD (see, for example, Manguin forthcoming), with the lashed construction typical of much simpler rafts. Waruno Mahdi has argued that early Southeast Asian seafarers utilized joined, decked dugouts (1999), which would have been barely distinguishable from “rafts” to Greco-Roman merchants peering down from 600-ton sailing vessels (the cargo of the *Hermapollon* recorded in the Muziris papyrus amounts to perhaps 625 tons: De Romanis 2010-2011 [2012]: 89). Mahdi’s theory still lacks archaeological support, but the notion that Southeast Asians employed small ships capable of navigating from the Far East to the Horn of Africa by a direct route or series of routes holding south of Sri Lanka but well north of the equator is entirely credible (Mahdi 1999a). These routes, like those employed by premodern Malay traders, may have passed through the Maldives (Manguin 2011). The author of the *Periplus* occasionally notes in passing modest crafts, including, for example, the “rafts”—*schediai*—he describes in the small port of Aualites just outside the strait of Bab el-Mandeb, and which were involved also in carrying goods to Okelis and Muza (*PME* 7). The explicit mention of the absence of sails in Pliny’s account could be the result of merchants sometimes encountering these “rafts” while running with masts or sails dropped before the strongest winds of the monsoon, although it is perhaps better taken as poetic license. Pliny can surely be forgiven, however, for adding slight ornament to a truly epic tale—the story of early trans-Indian Ocean trade from Southeast Asia to East Africa, one that deserves to be told and retold, each time with perhaps less ornament, but with new and better evidence.

Conclusion

Mediterranean explorers and traders were relative latecomers to the Indian Ocean world, and the waters they ventured across were already crowded with sailors of different origins plying trade routes that frequently intersected and sometimes overlapped. Unfortunately, Mediterranean sources are largely indifferent to the nuances of this larger Indian Ocean world and its cultural and economic contexts. At the same time, Greco-Roman merchants and the trade they conducted seem in many respects to have been of limited and short-lived significance for the history and development of the region. If we are to imagine a kind of globalized Indian Ocean economy, the Roman Empire was in that larger context at most a kind of peripheral province (Fitzpatrick 2011). Yet for modern scholars interested in the early history of the region and especially the nature of long-distance trade and cultural exchange, thanks to extraordinary classical literary traditions and the histories of their reception, the Greek and Latin sources remain uniquely important, none more so than the anomalous firsthand account preserved by the *Periplus*. As is well illustrated by Casson's translation and commentary of the *Periplus*, traditionally trained classical philologists have done a tremendous service in making these ancient sources more widely available and better understood. But there are limits to the kinds of questions that traditional classicists and ancient historians are capable of answering. And there has perhaps been a tendency for classical scholarship to mirror too closely the attitudes and preoccupations of the Greek and Latin sources which it studies. If our ancient sources are going to continue to bear fruit, that progress is more likely to be owed to reexamining their evidence in an interdisciplinary context and against the backdrop of the kind of insights offered by the wide range of scholars included in a volume such as this. Here the question of the origin of ancient cinnamon and cassia offers an interesting example. While privileging the agency of Mediterranean traders and a handful of historically attested states that were similarly centralized and hierarchical, classicists have been reluctant to explore seriously the possibility that trade in these products lay largely in the hands of not Indians, Arabs, or Greeks and Romans but Southeast Asians crossing great expanses of open ocean on vessels that from the point of view of Greco-Roman merchants like the author of the *Periplus* appeared to be no more than rafts.

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CHAPTER 6

A GIS Approach to Finding the Metropolis of Rhapta

Carl Hughes and Ruben Post

The *Periplus of the Erythrean Sea* is a description of trade networks in the western Indian Ocean written as a guide for merchants (Casson 1989: 5). This text provides a description, varying in detail, of a multitude of regions, including the geographic features, settlements, ports, and peoples to be found in each. The original text, dating to approximately 30–40 CE, no longer survives, but a copy, believed to date to the tenth century, has been preserved and is currently housed in Heidelberg (Graf 1994: 143). The southernmost location mentioned in the text is the port of Rhapta, on the East African coast. This port is also mentioned in Ptolemy's *Geography*, a second-century CE geographical account, in which it is termed a *mētropolis* and located "a short distance from the sea" (*mikron apothen thalassēs*), that is, at the mouth of the Rhaptos river which flowed into the Indian Ocean (4.7.12). The exact location of Rhapta has been the subject of a lengthy historical debate owing to a lack in the text of any description of recognizable geographic features associated with, and the absence of any notable archaeological sites that can unequivocally be attributed to, the port (Hoyle 1967: 95; Horton 1990: 97; Kirwan 1986: 99).

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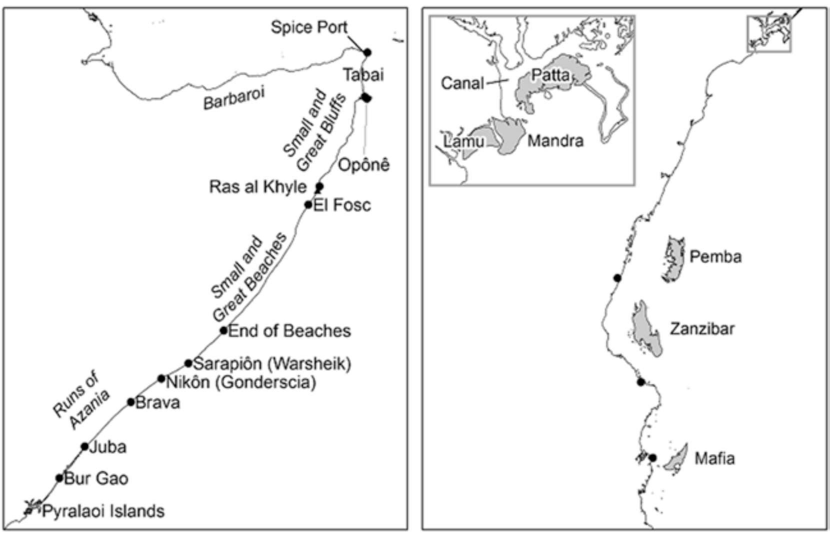
It is universally accepted that Rhapta was located somewhere on the Indian Ocean littoral of Azania (as East Africa is termed in the text) (Casson 1989: 141; Datoo 1970a: 66), a region corresponding to the southern extent of the modern Swahili coast, between the Somalia–Kenya border and northern Mozambique. It is also known that the name "Rhapta" comes from the ancient Greek *rhapta ploiaria*, meaning "sewn boats" (*Periplus* 16), the typical mode of transport employed at the time in this region (Casson 1989: 61). Moreover, it is apparent that Rhapta was a very important commercial port in the Indian Ocean World (IOW) in the first two centuries CE which the author notes was a major source of tortoise shell and soft ivory, as well as a lesser source of rhinoceros horn and nautilus shell (*Periplus* 17; Casson 1989: 61). The tortoise shell found in Rhapta was a popular commodity because, as the author notes, it was considered second in quality only to that obtained from India (*Periplus* 17), while a depletion of ivory sources available to Red Sea ports in the period the *Periplus* was written made this port a major source of soft ivory for IOW markets (Datoo 1970a: 73). The importance of this settlement as a center of trade is further indicated by Ptolemy's designation of it as a *mētropolis*, a term used to refer to the most important city in a region, and thus usually also to major commercial hubs (Liddell et al. 1940: s.v. *mētropolis,* A.III). The various modern commentaries on the *Periplus* have indicated three possible locations for Rhapta, all of them in modern Tanzania: the environs of Dar es Salaam; Pangani; and the Rufiji delta (Hoyle 1967: 95; Horton 1990: 97; Kirwan 1986: 99; Datoo 1970a: 66). By examining the information found in the *Periplus*, comparing it to that furnished by the later *Geography* of Ptolemy, and analyzing the resulting data in GIS, we will demonstrate the most likely modern site of Rhapta, as well as the locations of several nearby sites mentioned in both texts.

The *Periplus* is divided into 66 chapters, starting at the northern edge of the Red Sea. As the chapters progress, the author describes sites along the route heading south, reaching the Horn of Africa by chapter 12; in chapter 18, the description of the African coast is concluded with the region around Rhapta. From chapters 19 to 66, the author then describes his travels to and around India, beginning again from a port in the Red Sea. The description of the east coast of Africa begins at the tip of the Horn of Africa with a site referred to as the Spice Port (*to tōn Arōmatōn emporion*), corresponding to the last promontory of the north Somalia coast. The geography of the area fits the description of the text in that it is exposed to the north but protected from the south. The location of the so-called Spice Port was likely the modern village of Daamo on the Horn, at which pottery of eastern Mediterranean origin dating to the Roman period has been discovered (Chittick 1979: 275; Reade 2013: 449–450) (Map 6.1).

Chapter 13 begins with the village of Tabai, the author stating that after sailing a distance of 400 stades (a unit of distance to be discussed later in this chapter) along a peninsula one will reach a port of trade known as Opone. Tabai must be in the bay of Charo Hordio due to the distance mentioned to Opone (Casson 1986: 181). Excavations at the modern site of Ras Hafun have uncovered numerous fragments of pottery from Mesopotamia, Iran, Egypt, and the eastern Mediterranean dating to between the first century BCE and the first century CE, suggesting that this was the location of Opone (Chittick 1976: 133; Smith and Wright 1988; Reade 2013: 449). The unique geography of this site also supports this theory, as it matches the statement in the *Periplus* that along this route lies a peninsula "towards which the current sets" (*kath' hon topon kai ho rhous helkei*; Casson 1986: 181), while the journey around it roughly equates to 400 stades.



Map 6.1 The East African Coast according to the *Periplus* (drawn by Carl Hughes of the Indian Ocean World Centre (IOWC), McGill University)

In Chapter 15, after Opone, the coast is said to trend to the south, marking the beginning of the Small and Great Bluffs of Azania (*mikra Apokopa kai megala tēs Azanias*). Based on modern satellite images and digital elevation models, it is clear that these bluffs are almost certainly those marking the Somali coastline from approximately 10 degrees down to 7.5 degrees north. At the end of these bluffs begin a series of sandy beaches, almost certainly the Small and Great Beaches, which according to the *Periplus* extend for another six "runs." According to Guillain (1856: 103 in Casson 1989: 139), the beaches stretch a total distance of 607 km, from Ras al Khyle to a location just short of short of Washeikh, Somalia. Chittick (1976: 120) asserts, however, that the distance to Washeikh is 704 km. Each figure is a little too high to correspond to the most accurate measure for a run, 1000 stades; nonetheless, if we add the length of the Beaches and the Bluffs, their combined distance should be between 900 and 1110 km (Guillain 1856: 103 estimates 1007 km; Chittick 1976: 120 estimates 1178 km). It is likely that the beaches actually begin at a latitude of about 7.5 degrees north and end at a latitude of about 2.4 degrees, thus corresponding to a distance of 1020 km, similar to Guillan's estimate. After the beaches come the Runs of Azania, seven in total, starting with the Sarapion Run, then the Nikon Run, and continuing on, separated by daily stops up to the Pyralaoi Islands.

The Pyralaoi Islands are the farthest southern geographic feature mentioned by the *Periplus* along the East African coast that can be identified with relative certainty. These islands are Pate, Lamu, and Mandra. The author then notes the existence of a feature associated with these islands known as the Canal, which is almost certainly the bay that forms a natural canal around Pate. From here, the text states that "a little more towards the west after two night-and-day runs, lying due west … comes Menouthias Island, about 300 stades from the mainland" (*Periplus* 15) "a little more towards the west after two night-and-day runs, lying due west … comes Menouthias Island, about 300 stades from the mainland." It is from this vague passage, unfortunately corrupt, that confusion arises. In order to identify Menouthias Island, we can only rely on a calculation of the distance provided by this text, and thus we must ascertain the correct measures for a run and stade.

Kirwan (1986: 101) argues that it is impossible to quantify the distance of a night-and-day run without knowing the weather or sea conditions at the time when the trip was undertaken, because a run is simply a measurement of the distance traveled within a specific time period. Casson (1989: 278), however, referring to Bunbury (1879: 455), argues that it is possible to quantify these units based on distances calculated by Eratosthenes and Marinos. The texts of these ancient geographers mention distances in runs and stades, which had become standard geographic units of measurement by the time the *Periplus* was written. Casson (1989: 278) uses these texts to hypothesize the length of a night-and-day run as 1000 stades.

But in order to understand this measurement, we must know the length of a stade, which itself has been the subject of debate. Estimates for the length of this unit range from 157 to 185 m. Gulbekian (1987: 363), relying on Eratosthenes, argues that the length was 166 m. Casson (1989: 278) cites Engels (1985: 298) for a length of 185 m, a figure which Pothecary (1995: 67) supports based on a reanalysis of the work of Strabo, who makes use of the Polybian stade. It is Hoyle's (1962: 84) conclusion that the length of the stade is 157 m, however, that holds the most credibility. This figure is derived from Dutka's (1993: 64) recalculation of Eratosthenes' attempts around the year 230 BCE to measure the circumference of the Earth by calculating the angle of the sun at two different locations. Hultsch (1971: 60), studying the evidence from a philological perspective, also arrives at this figure. Finally, the most recent attempt by Brown and Kumar to determine the value of this unit, based on known errors in Eratosthenes' measurement of the circumference of the Earth, confirms Hoyle's (1962) value of 157 m (Brown and Kumar 2011: 445).

Eratosthenes' work on the circumference of the Earth served as the basis for the calculations of distances in geographical works of later writers, including Pliny, Strabo, Ptolemy, and, most likely, the author of the *Periplus* (Dutka 1993: 55). Little is known about Eratosthenes' methods, means of measurement, or actual results, however, as his works are no longer extant. There is only one known reference in major ancient geographic texts to the length of the unit of measurement employed by Eratosthenes: a statement in Pliny that "by the calculation of Eratosthenes, a schoenus measures 40 stades" (*Natural History* 12.53). Since the schoenus was an architectural measure, Hultsch, working with archeological evidence for the length of this smaller unit, was able to calculate the stade of Eratosthenes as 157 m (1971: 60). The astronomical writings of Kleomedes of the first century BCE, which provide the most detailed account of Eratosthenes' experimentation (Dutka 1993: 60), have also been used to reproduce his experiment several times, with the resulting length of a stade each time falling within 1 meter of Hultsch's original estimate (Brown and Kumar 2011; Dutka 1993; Hoyle 1962).

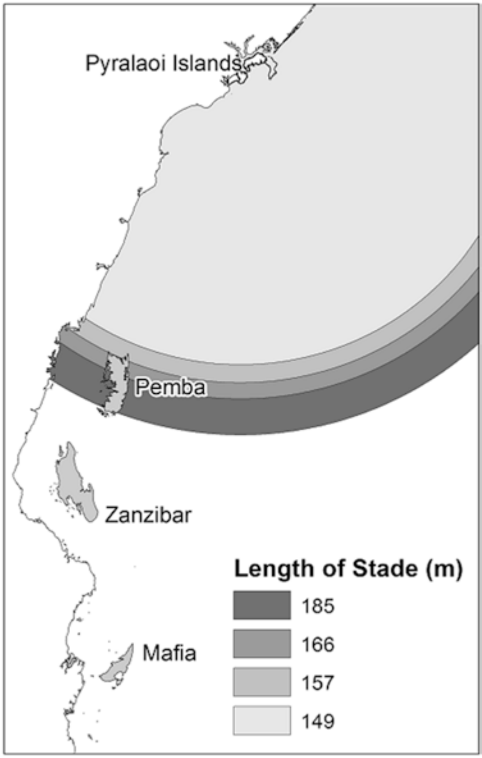
Dutka (1993: 55) convincingly discredits the longer distance of 185 m, argued for by Rawlins (1982: 218), as based on an incorrect attempt by

Pliny to convert the Eratosthenic stade to a homonymous Roman measure, despite the latter unit only coming into use several centuries after Eratosthenes' day. The best estimate of the length of the stade employed by the author of the *Periplus* is therefore 157 m. For the purposes of this study the entire range of values for a stade will be considered, though this value will be considered the most credible, and thus most likely to provide the highest accuracy in measuring distances.

As noted above, the *Periplus* states that Menouthias lies two night-and-day runs away from the Pyralaoi Islands, the equivalent of 2000 stades. This suggests a maximum distance of 370 and a minimum distance of 296 km, with the most likely distance being 315 km. It is evident that the northern tip of Pemba is approximately 315 km from the Pyralaoi Islands and the southern tip 370 km. As is common in the case of geographic accounts from this era, it is entirely plausible that the author measured the distance from the Pyralaoi Islands to the very first sighting of Menouthias; this distance would, then, given the southerly direction of travel, refer to the northern tip of the island, or a point roughly perpendicular to this part of the island along the coast. The distances to Zanzibar and Mafia are much greater than the estimated calculations, with even the less accurate values of a stade touching Pemba Island (with the exception of the minimum value, which falls slightly short). Based on this observation, and given that a multiple of the most reliable length of a stade best fits the distance stated to reach Menouthias, it appears that Pemba is most likely the island called Menouthias by the author of the *Periplus* (Maps 6.2 and 6.3).

Next, we are told that Menouthias lies about 300 stades from the mainland. Calculations of this distance based on different values for the stade arrive at figures ranging from 44.6 to 55 km, while a calculation based on the 157 m stade would suggest a distance of 47 km. The case for Pemba being Menouthias is thus the strongest of the three islands considering the distance measured from the northern tip of the island, which would have been the first point of contact for a merchant heading south and also corresponds to the most likely distance from the Pyralaoi Islands. It must be noted, however, that the author would have had to ignore the presence of Mafia and Zanzibar during his journey in order to produce the itinerary preserved.

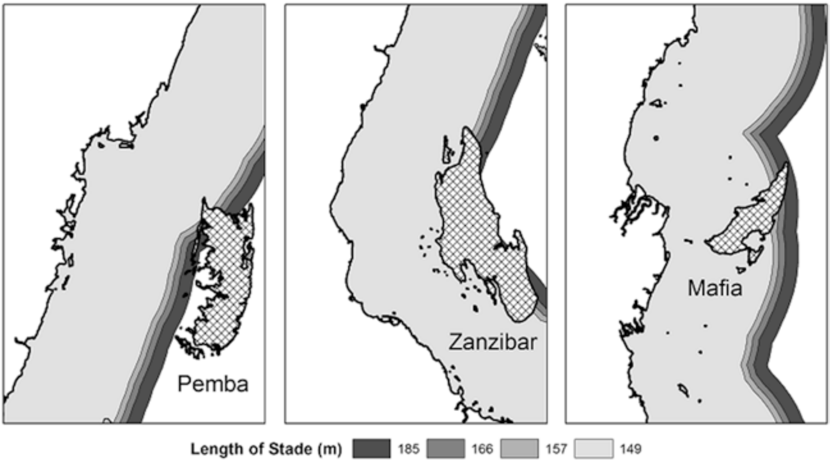
The *Periplus* also importantly provides a brief description of the physical attributes of Menouthias. This island is firstly said to be low (*tapeinē*), presumably referring to its elevation profile. A high resolution (30 m) Digital Elevation Model of the region makes it clear that all three islands could be



Map 6.2 Estimated maritime distances off the East African Coast in stades (Carl Hughes, IOWC)

considered low lying. The average elevations of the islands lie between 25 and 26 m, with the highest elevation on Zanzibar being 126 m, on Pemba 92 m, and on Mafia 53 m. Thus, because early explorers of the region could have described each of these islands as low lying, this criterion cannot be used with much certainty to locate Menouthias.

Further describing the physical features of the island, the author states that “on it there are rivers” (*en hēi kai potamoi*). Based on calculations of the angle and direction of the slopes of the terrain from an elevation model, it is possible to extract river outlines from the topography of the islands. This method can, assuming the terrain has not changed much within the past two thousand years (however unlikely this may be), provide a more reliable overview of rivers. A GIS river extraction provides a better fluvial map than hand-drawn attempts, which are prone to exclude artificially created hindrances for water flows and seasonal flows that may



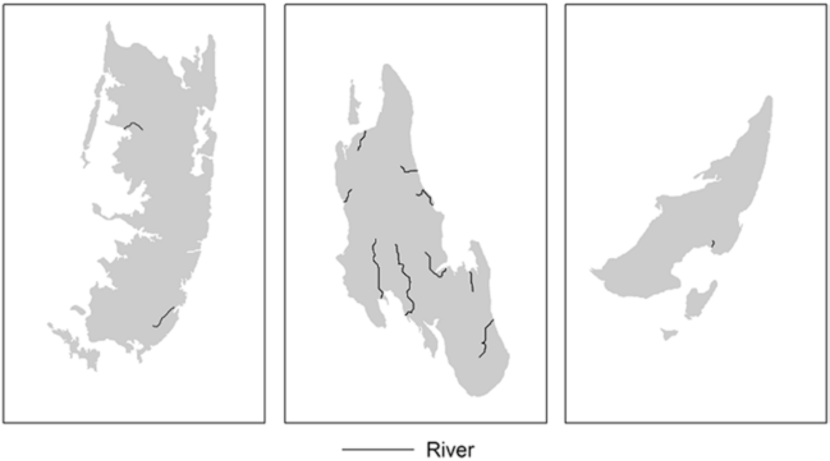
Map 6.3 Estimated maritime distances between the East African Coast and the Islands of Pemba, Zanzibar, and Mafia in stades (Carl Hughes, IOWC)

have altered original river paths. This is why nineteenth-century maps of the islands, which show a lack of rivers (Hoyle 1967: 98), should not be used.

It is obvious that Mafia has the fewest rivers, while Zanzibar and Pemba are both covered with rivers that could have been visible to a sailor traveling along the coasts of either island. But while Pemba has the most rivers and fits this description the best, it is not clear which vantage point the author had in mind when he made this vague observation; as such, the reference to rivers cannot properly identify one island or another (Map 6.4).

The *Periplus* also states that Menouthias is forested (*katadendros*). All three islands were probably heavily wooded two thousand years ago, and it is very likely that Pemba and Zanzibar were at least covered by coastal forests (Moreau and Pakenham 1941: 98). Though this description does not help to identify one island or another, it does somewhat help make the case for these two islands. Moreau and Pakenham (1941: 98) conclude that all three islands' predominant vegetation type in the past, given rainfall levels, would have been evergreen forest.

The text asserts that while the island is populated by "many kinds of birds" (*orneōn genē pleista*), there are no other kinds of animals on Menouthias except tortoises and crocodiles, the latter of which "do not harm any human" (*oudena de anthrōpon adikousi*) (*Periplus* 15). This



Map 6.4 River courses on Pemba, Zanzibar and Mafia (Carl Hughes, IOWC)

statement may indicate that the author never actually went ashore on the island. Moreau and Pakenham (1941: 110) assert that crocodiles as well as pythons and hippopotami could possibly have reached one or more of the islands, though they have not been attested in any fauna inventories carried out in modern times. Crocodiles are also not presently considered native to the three islands in any capacity, while no remains of any species have been discovered. It is more likely that these "crocodiles" were in fact monitor lizards (Moreau and Pakenham 1941: 108; Casson 1989: 140). These lizards, which are harmless, can grow up to 2 m in length, and from a distance could have been mistaken for crocodiles. Since this part of the world was largely unexplored in the first century CE, the author probably simply identified these animals as some species with which he was familiar, which in Egypt would have been the Nile crocodile. More significant, however, is the author's claim that the island was barren of other kinds of animals. In fact, all three islands are home to native animals including primates, bats, cats, rodents, and ungulates; Zanzibar is home to 39 types of mammals, Pemba to 17, and Mafia to 12 (Moreau and Pakenham 1941: 116).

As was noted, the *Periplus* also mentions that the island is home to mountain tortoises. It is not clear what is meant by the term "mountain tortoise" (*chelōnē oreinē*), and there is no species of mountain tortoise, in the modern sense of the term, native to the island today. The islands are home to smaller species of tortoise, however, including the Bell's hinge back tortoise (Moreau and Pakenham 1941: 109). The author could perhaps be referring mistakenly to a type of turtle, though there is no evidence for the historical distribution of turtle species found in the western Indian Ocean, including green turtle, hawksbill, loggerhead, olive ridley, and leatherback (Pharaoh et al. 2003), in the vicinity of the islands. Since Rhapta was known for its export of tortoise shell (*Periplus* 16), it is entirely plausible that whatever species were on the island were hunted to extinction in the past with no trace yet discovered.

To return to Rhapta and its position vis-à-vis Menouthias, the text does not state anywhere that the former is located directly opposite the latter, so it is not possible to consider the pairings of Zanzibar and Dar es Salaam; Mafia and Rufiji; or Pemba and Pangani for Rhapta and Menouthias, respectively. The distances given from the mainland to the island and from the island to Rhapta are different, indicating that the locations on the mainland from or to which the distances were calculated lay at different latitudes. When calculating the position of Rhapta based on the *Periplus*' description, we can automatically ignore the area to the north of each island, since the itinerary always heads south and Rhapta is said to lie beyond Menouthias. This leaves Dar es Salaam, Rufiji, or present-day Rushungi, Tanzania as the possible locations for this settlement. The author either begins his reckoning of distance from the tip of Menouthias or the coast on the mainland at the same latitude as the tip of the island to measure the distance from this island to Rhapta; either reference could work for the journey from Pemba to Dar es Salaam, depending on the most direct route from each starting point. It is possible that Rhapta was located in the area around the Rufiji delta, but this would depend on Zanzibar being Menouthias, and, as we have seen, there is no reason to suspect this based on the other distances mentioned in the *Periplus*. It is also certain that Menouthias was not Madagascar, or at least the Menouthias mentioned in the *Periplus*. In his *Geography*, Ptolemy is almost certainly referring to Madagascar when he discusses Menouthias (4.8.2; Blench 2007: 70). The Menouthias of the *Periplus*, however, is too close to the shore (only a distance of two day-runs) to be Madagascar, which, moreover, is mountainous and is home to a plethora of wildlife that should have been visible and noted by the author.

It thus becomes apparent when using GIS to analyze the distances and descriptions in the *Periplus* that a location for Rhapta in the proximity of Dar es Salaam seems most probable. By turning to Ptolemy's *Geography*, we will attempt to cross-reference locations mentioned in both texts, and thus provide more evidence for the location of this settlement.

The *Geography* is another ancient itinerary, though unlike the *Periplus*, this ambitious work mapped the entire world as it was known to the author. It consists of theoretical chapters providing a guide for creating a world map and locating sites based on the use of coordinates. Ptolemy's geographical grid system is based on the work of his predecessor, Marinos, though, where possible, improved or corrected based on his own work (Berggren and Jones 2001: 23). He provides coordinates for about 8000 locations across Africa, Europe, and Asia, as well as captions or descriptive labels accompanying many. Ptolemy, a Greek based in Alexandria whose geographic work developed from his research into astronomy, was likely born around 100 CE and completed his *Geography* in the 150s CE (Berggren and Jones 2001: 3).

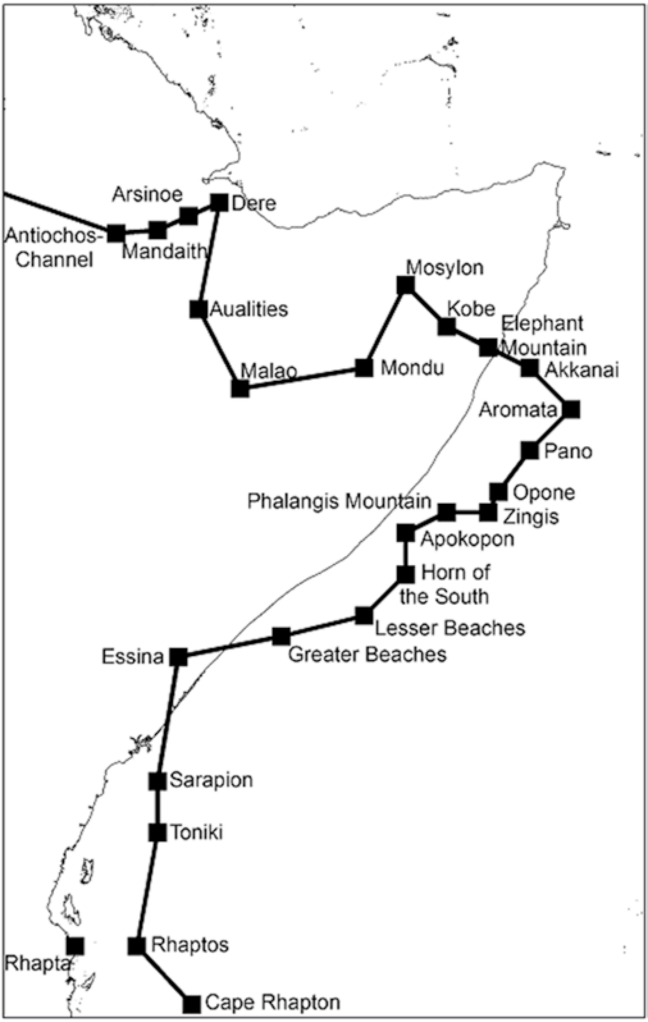
More than 53 manuscripts of the text survive, though none older than the thirteenth century (Diller 1949). Based on errors in transmission, it appears that one archetype was edited before the tenth century, but many centuries after Ptolemy's day, which became the source for all subsequent manuscripts (Berggren and Jones 2001: 42). It is likely that the maps included in many of the extant manuscripts are copies of that drawn by Maximos Planudes in the thirteenth century and not of that created by Ptolemy himself (Berggren and Jones 2001: 49).

In his theoretical chapters, written as a critique of Marinos' projection, Ptolemy presents two methods for drawing a world map, one on a spherical and the other on a planar projection (*Geography* 1.18–24). The spherical approach is similar to a modern simple conical projection, which incorporates straight meridians with circular parallels about the poles to keep the spherical look; proportionality of bounding arcs (parallel of Thule and the equator); and longitude and latitude relative about Rhodes (exaggerated further north or south). The second approach is similar to a pseudoconical projection which was designed to view hemispheres about a central meridian and the Summer Tropic with arcs reflecting on either side; preserves the proportionality of the parallels; features meridians that are not converging straight lines but parallels that are still circles; and distorted distances along non-central meridians. The comprehensive coordinate list provided breaks the world into 80 districts grouped into three continents, with locations ordered west to east and north to south. Coordinates are recorded in degrees, minutes, and seconds, with a resolution of five minutes, or 1/12th of a degree. Ptolemy used the Blessed Islands, likely the modern day Canary Islands, as the prime meridian.

Some of the locations mentioned in both the *Periplus* and the *Geography* texts include the Spice Port (*Periplus*: *to tōn Arōmatōn emporion*, 12; *Geography*: *Arōmata emporion*, 4.7.10), Opone (*Periplus*: *emporion Opōnē*, 13; *Geography*: *Opōnē emporion*, 4.7.11), the Small and Great Beaches (*Periplus*: *Aigialos kai mikros kai megas*, 15; *Geography*: *Mikros aigialos, Megas aigialos*, 4.7.11), Sarapion (*Periplus*: *[ho dromos] Sarapiōnos*, 15; *Geography*: *Sarapiōnos hormos*, 4.7.11), Menouthias (*Periplus*: *Menouthias… nēsos*, 15; *Geography*: *nēsos… Menouthias*, 4.8.2), Rhapta (*Periplus*: *ta Rhapta*, 16; *Geography*: *Rhapta mētropolis tēs Barbarias*, 4.7.12), and perhaps Nikon (*Periplus*: *[ho dromos] Nikōnos*, 15; *Geography*: *Toniki[a] emporion*, 4.7.11; see Casson 1989: 134). Ptolemy's coordinates for these locations have been plotted in order to compare them with the locations predicted from the account of the *Periplus* in the hope of narrowing down the search for Rhapta. Map 6.5 presents the raw coordinates of these locations from the *Geography*. From this map, it is obvious that the coordinates are representative of the described locations. What is quite notable is the geometry of points, clearly delineating the Horn of Africa, while many of the location names also overlap or are proximate to the predicted *Periplus* locations.

Several attempts have been made to map the coordinates provided by Ptolemy for other regions of the world using modern mapping techniques. For locations in Europe, Livieratos (2006) performed an n-order transformation on the coordinates, yielding quite accurate results. Filatova et al. (2009) employed a two-dimensional regression model to locate sites in West Africa, a method which produced fairly good results in that region as well. Marx (2011) analyzed the spatial accuracy of the coordinates and concluded, based on the distribution of the minute value measurements of the coordinates, that it is necessary to accept a much lower resolution for any map based on the *Geography* than is stated in the text. He found that a higher distribution of values could be expressed with multiple denominators; using this method, he calculated the relative resolution of the points and concluded that in East Africa the resolution was on average actually only 33 km. Before proceeding, previous attempts at locating the sites mentioned in the *Geography* are considered. For this purpose, the lower resolution of 33 km is utilized in a GIS transformation of the points provided.

To date, only one attempt at locating Rhapta using the coordinates provided in the *Geography* has been made, by Horton (1990). The results of this analysis are rendered invalid, however, by the author's confusion of the order of ports along the coastline. Additionally, Horton does not mention

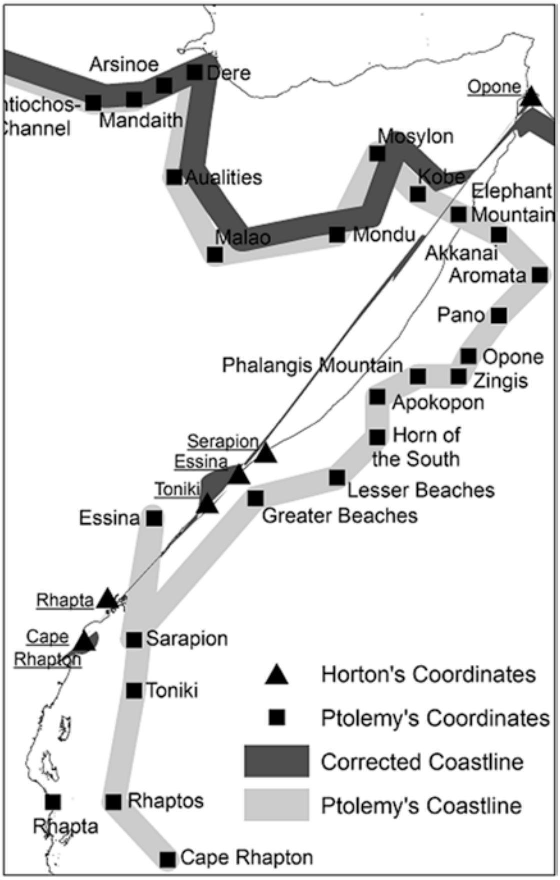


Map 6.5 Raw geographical coordinates for the East African Coast from Ptolemy's *Geography* (Carl Hughes, IOWC)

what edition of the *Geography* he used; it is likely that he worked with the only modern English translation of Ptolemy's work, by Stevenson (1932), which has been extensively critiqued for its numerous errors. Horton firstly assigns the Cape of Sarapion to a location without a cape or promontory and confuses the order of the same cape with Essinia (1990: 97). Secondly, he correctly identifies Menouthias with Madagascar in Ptolemy's account, but then claims that this discredits the accuracy of the *Periplus*, and that its author at the first sight of sewn boats along the coast simply stopped and claimed that location to be Rhapta (1990: 98). He then asserts that it is possible that there are multiple Rhaptas, and that the name of the location is meaningless, despite the fact that Ptolemy states that Rhapta was a *mētropolis* (4.7.12)—hardly a frivolous designation. It is unlikely that Ptolemy would have assigned the same name to a *mētropolis*, and also the final port along the route he was traveling, as he did to other minor ports without recording these other Rhaptas. Finally, Horton claims that Cape Rhapton (*Rhapton akron*) lies south and west of the mouth of the river Rhaptos (1990: 98), but, based on Ptolemy's coordinates, this cannot be possible, even employing coarser spatial resolution with the rubber sheeting geometric correction of the coordinates (discussed below).

In order to identify the modern locations of Ptolemy's points, a geometric correction must be applied that compensates for the imprecision of his coordinates. Until now, most approaches to correcting Ptolemy's coordinates were done by hand, an incredibly inefficient method that often produces errors. To retain the historical value of Ptolemy and allow for comparison with modern maps, a more suitable conflation technique is required. Doytsher (2000) proposed the piecewise rubber sheeting method as an effective technique, which has been used by Shimizu and Fuse (2003). This method utilizes control points matching a historical point with a known modern day location. A mathematical algorithm, related to the n-dimensional transformation, is then applied to the entire historical spatial dataset such that the control points align perfectly while the unmatched portions are stretched, rotated, and compressed to fulfill this condition (Map 6.6).

This method is usually used to match historical maps with modern maps. It would not be productive, however, to use any of the illustrated maps included in manuscripts of the *Geography* for two reasons. Firstly, as already noted, Ptolemy's own map no longer survives. Secondly, all premodern renditions of his geographic description are fairly rudimentary and do not accurately represent his given coordinates. Instead, a map created by running his original coordinates through a modern GIS will be used. Due to the fact that in the area we are concerned with the text plots locations along the smooth African coastline, errors in the actual shape of the coast should be minimal, and once the transformation is applied, curved coastline features will be accounted for. Features such as beaches and bluffs do not require any control points, since these are not point features, though their position is described in both texts with a great degree of certainty; as such, attempting simply to recreate the shape of these features in the rubber sheet transformation would be inaccurate for the geometry of that part of the coast.

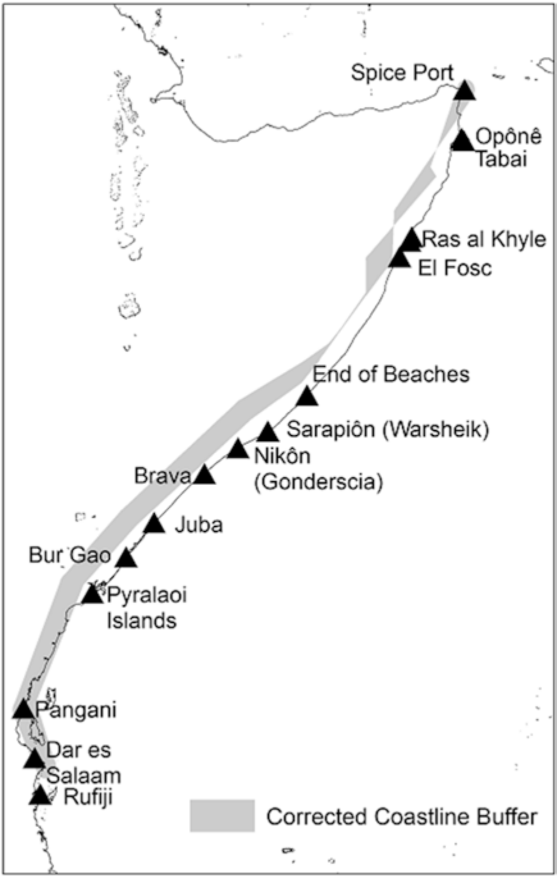


Map 6.6 Geometric correction of Ptolemy's geographical coordinates for the East African Coast (Carl Hughes, IOWC)

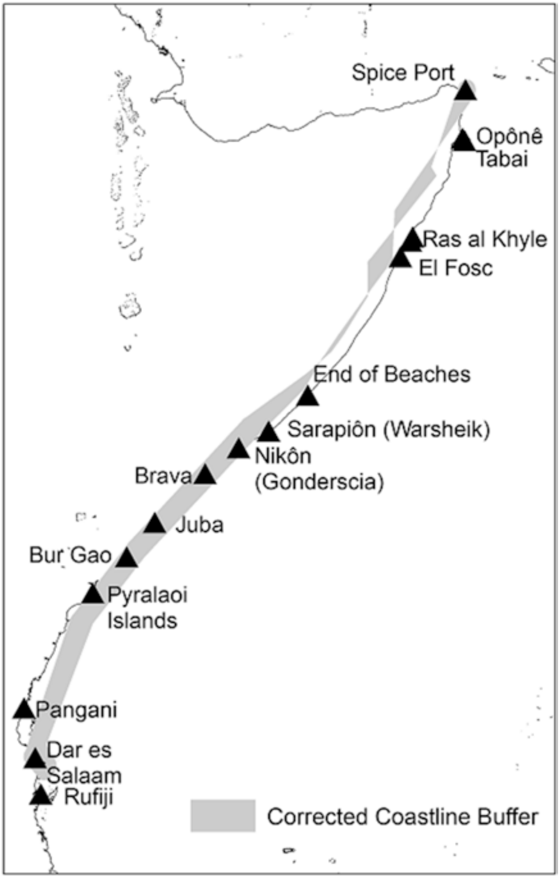
To perform an accurate transformation, the control points need to be known modern point locations. An emphasis on the precision of the results at these locations will ensure that point locations lying between these points are most accurate after the transformation. At the Horn of Africa, Ptolemy's Aromata must refer to the *Periplus'* Spice Port on Cape Guardafui. Next, the location of Pano sits somewhere between Aromata and Opone, though it is not necessary to know exactly where since both texts refer to the same Opone, providing the next known control point. The following identifiable feature is a cape known as the Horn of the South (*Notou keras*), located after two unknown locations (Zinge and Phalangis Mountain) between the Bluffs (*Apokopon*) and Small and Great Beaches (*Mikros aigialos* and *Megas aigialos*). As for the Beaches, although the coordinates provided for these are not accurate, it does not matter since, as already mentioned, such features should not be identified with one set of points anyway. From here, three locations are listed before Rhapta, namely Essina, Sarapion, and Toniki, of which the latter two are listed as promontories. These three locations must be the ports along the Runs of Azania in the *Periplus*, though each reference does not necessarily refer to the same location (Casson 1989: 134). After this, the point for Menouthias will be excluded because it refers to Madagascar. Next, instead of using the site of Rhapta as a control point, the mouth of the Rhaptos river will be used; while, however, we know Rhapta is only a short sail up from the mouth of the river, we do not know on which side of the river it lay or the course of the river at the time. In order to determine which of the three possible sites of Rhapta (Dar es Salaam, Pangani, and the Rufiji delta) is most likely this ancient site, the head of the Dar es Salaam natural harbor, Pangani River, and Rufiji River, respectively, will be tested as the river Rhaptos. Finally, the *Geography* describes a Cape Rhapton located just south of the mouth of the river. This cape must be a notable promontory due to its designation as such by Ptolemy and will be tested both with Rhapta as Dar es Salaam and Pangani at Buunyi village at −7.1 degrees south, and with Rhapta in the Rufiji delta as the tip of an unnamed peninsula at −7.9 degrees south.

In ArcGIS, these known control points were plotted and joined with a 33 km-wide buffer line. The control points were then transformed to their known coordinates. The transformation adjusts the entire polygon as one object, stretching, rotating, and compressing in sections to ensure the control points lie in their proper location. If the transformation is a good fit, the width of the polygon representing the coastline should remain fairly constant and similar to the original width between control points. In regions where the fit is not as good, we would expect for the polygon to be distorted geometrically and for its width to become very narrow. The transformation was performed three times for each pairing of the river Rhaptos and Cape Rhapton based on the predicted locations of Rhapta (Maps 6.7 and 6.8).

The port of Sarapion is situated in close proximity to the same location from the *Periplus*. Toniki also appears to lie close to the Pyralaoi Islands

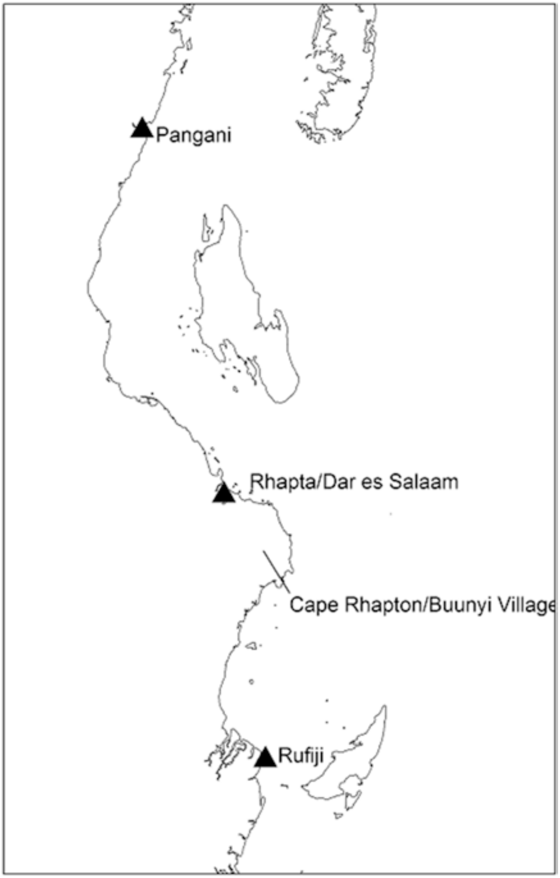


Map 6.7 The East African Coast: ArcGIS corrected coastline buffer version A (Carl Hughes, IOWC)



Map 6.8 The East African Coast: ArcGIS corrected coastline buffer version B (Carl Hughes, IOWC)

and not in the same area as Nikon, as mentioned in the *Periplus*. This makes sense because Toniki is supposed to be a market place (it is called an *emporion* in *Geography* 4.7.11), and this location would have provided a good supply of freshwater and a reasonably good harbor. The area south of Dar es Salaam is the only part of the Azanian coast which matches the description in the *Periplus* of the coastline after Rhapta, said to bend to the west. The coast around modern Buunyi village extends out, turns south, and then bends back to the west; as this is the first section of this coast to



Map 6.9 The probable location of Rhapta (Carl Hughes, IOWC)

display such a drastic change, it could easily have appeared to the author of the *Periplus* to mark the end of the African coast (Map 6.9).

Based on a cross-reference of the distances and geographic description of the *Periplus* with the coordinates of locations furnished by the *Geography*, it is thus most likely that Rhapta was located in the proximity of present-day Dar es Salaam. This conclusion is derived primarily from the fact that the island of Pemba best matches the description of the island of Menouthias, but also from the geographic description of the *Periplus* that the coast beyond Rhapta bends to the west, in a location that could only be the Cape Rhapton mentioned in the *Geography*.

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CHAPTER 7

Contact between East Africa and India in the First Millennium CE

Sunil Gupta

East African participation in the maritime exchange networks of the Indian Ocean may have occurred as early as the second millennium BCE, the estimated date of a copal pendant, found at the site of Tell Asrar in Mesopotamia, which may have been sourced from the Mozambique coast (Meyer et al. 1991: 289–297). Again, studies on African flora indicate that three food plants, the banana, taro and yam, were introduced from Southeast Asia—the banana by possibly 500 BCE (Boivin et al. 2013: 215; Blench 1996: 417–436; Mbida et al. 2000: 151–162). References in historical literature to East Africa contact with the Indian Ocean world appear from the latter part of the first millennium BCE. The sources, primarily western, include the writings of Agatharcides (third century BCE), Strabo's *Geographia* (first century CE), Pliny's *Natural History* (first century CE), the *Periplus Maris Erythraei* (first century CE) and Ptolemy's *Geographia* (second century CE). The Indian Sanskritic text, *Dasakumaracarita* (seventh century CE), alludes to one of the offshore islands of East Africa, in all likelihood Zanzibar (see discussion below). Collectively, these sources provide critical information about harbours, trading settlements, commodities, landforms, offshore islands, maritime

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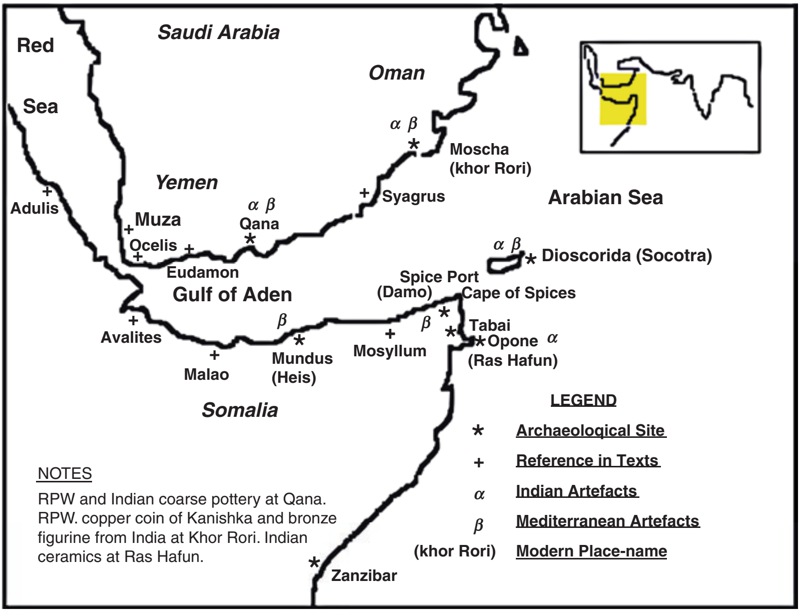
conditions and coastal communities in the Somali–Swahili region during the BCE–CE transition.

The East African littoral also forged early exchange relations with the continental interior, as is indicated by marine shell deposits in pastoral Neolithic sites deep inland. For example, several cowrie shells, which could only have come from the coast or even as far afield as the Maldives, have been recovered from Neolithic contexts of the Ngorongoro Crater burials in the Rift Valley (Leakey 1966: 123–136). Similarly, beads made of the marine shell *Strigatella paupercula*, dating to 4000 BP, have been found in pastoral Neolithic burial sites on the shores of Lake Turkana (Nelson 2002). Shell beads also exist in Late Pastoral ossuaries at Lake Turkana dating to between 2000 and 1600 BP (Nelson 2002)—broadly the period of the *Periplus* which mentions the "far side" ports of the Somali Indian Ocean coast. Other pastoral Neolithic burial finds in the Somali–Masai region that are regarded as potent indicators of exchange between the East African Rift Valley and the Indian Ocean coast include obsidian and semi-precious stones. Agate, carnelian and amazonite beads have been found in association with marine shell beads in the Pastoral Neolithic ossuary of Jarigole near Lake Turkana (Nelson 2002); while obsidian, from the central Rift Valley has been found in the same context as marine shells in the Lukenya Hill area near Nairobi (Nelson 2002). Stone beads recovered from pastoral Neolithic sites may similarly signify external contact. Leakey (1966: 123–136) recovered a cache of stone beads from the Njoro Cave site in Kenya dated to 1000 BCE, while Amazonite beads from Jarigole have been attributed an Ethiopian provenance (Nelson 2002). Felix Chami (2002: 40–41) considers that some of the Rift Valley agate/carnelian beads came from the Indian Subcontinent.

Much more archaeological research is required, but before and during the BCE/CE changeover there indubitably existed durable and wide-reaching exchange networks that linked Somali ports, such as those mentioned in the *Periplus*, with the deep interior, at least as far as the Rift Valley (Maps 7.1 and 7.2). C.M. Nelson (2002) makes the point succinctly: "Although the evidence is scanty, it is clear that, once established, pastoral exchange networks endured and were available for development as trading ports emerged along the coast of eastern Africa" (Nelson 2002: 7). The sections of the *Periplus* relating to the Somali "far side" ports and Azania have therefore been used as "bench marks" for writing the early history of the East African littoral. Mark Horton (1990: 95) calls the *Periplus* a "document of unparalleled importance for the early history of

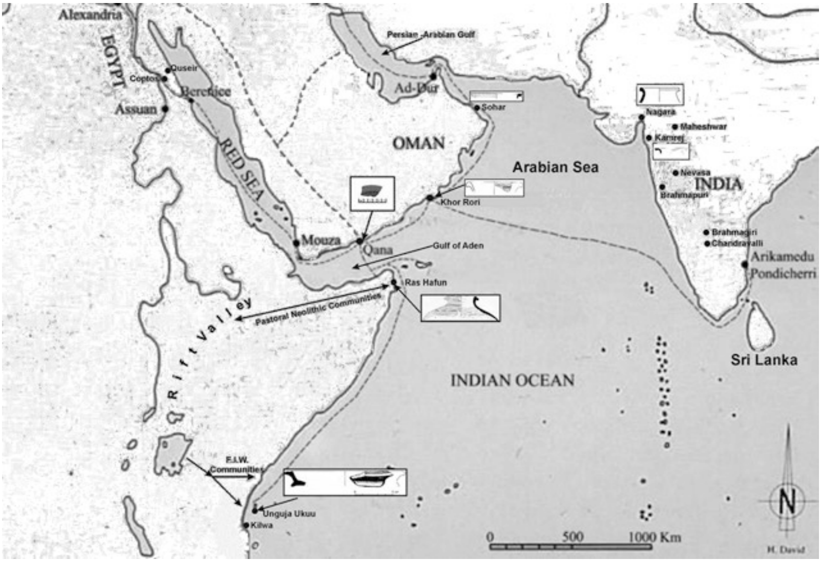


Map 7.1 Map showing "Periplus" port sites in the Gulf of Aden (map: Sunil Gupta)

the east African coast." By contrast, D.W. Phillipson (1977: 155) alludes to "several centuries of silence following the *Periplus*"—a reference to the apparent lack of evidence for trading activity on the Swahili coast in the middle centuries of the first millennium CE.

This chapter re-evaluates East African–Indian ocean exchange in the first millennium CE through a review of trade ceramics, especially those of possibly Indian provenance. The focus will be on pottery discovered on sites in Ras Hafun on the Somali coast, northern Tanzania, the Rufiji Delta, and the offshore islands of Kilwa, Mafia and Zanzibar. Perhaps the most celebrated early trade ceramics are those H. Neville Chittick discovered at Ras Hafun, on a promontory 160 km south of Cape Gaurdafui, on the Indian Ocean coast of Somalia. There he excavated two sites, representing small settlements, dating to the time of the *Periplus* (Maps 7.1 and 7.3). One designated Hafun West Site (HWS) covers 0.12 hectares and the other designated Hafun Main Site (HMS) covers 1.3 hectares. The final results from excavations remain unpublished,[1] but M.C. Smith

Map 7.2 Map showing important ports in the Western Indian Ocean in the first millennium AD together with distribution of grooved rim Red Polished Ware ceramics (map: After Chittick 1976)



Map 7.3 Map showing coastal settlements and ports on the Swahili Coast in the first millennium AD (Sunil Gupta/Syncrotek)

and H.T. Wright (1990: 106–114) wrote brief summaries that, together with a catalogue of pottery from the sites (here referred to as the "Hafun Catalogue") offer insights into the nature of the "far side" ports and their trans-oceanic contacts.[2] From the information available, the two sites are revealed as small settlements, one designated Hafun West Site (HWS) covering 0.12 hectares and the other designated Hafun Main Site (HMS) covering 1.3 hectares. On the basis of their ceramic review, Smith and Wright date HWS to between the first century BCE and the first century CE, and HMS to between the second and fifth centuries CE. The chronologies they impute to HWS and HMS trade wares show considerable overlap during the first and second centuries CE, indicating that both settlements flourished in this period.

Smith and Wright (1990: 112–113) describe HWS and HMS as "little more than campsites where meals were prepared and some trade with local people occurred." However, L. Casson (1986: 179–182) identifies HWS, on the northern side of the Ras Hafun peninsula, with the "far side" port of Tabai, and HMS, on the southern side, with the port of Opone (Schoff 1912/95: 87; Huntingford 1980: 26, 94; Casson 1986:

179–182; 1989: 130–132). If this is the case, the Hafun ports were much more than encampments and their rudimentary nature did not necessarily imply a dearth of trade. The premier Roman Egyptian harbours on the Red Sea coast were also structurally simple but handled heavy commercial traffic from Arabia and India.

The *Periplus* (sections 7–14) informs us of an impressive range of goods traded at Tabai and Opone, notably with Roman Egypt, and with India from where ships brought foodstuffs and cloth from western India or *Ariaca* (*Periplus* 14).[3] The chief exports from Tabai and Opone were myrrh, frankincense and cassia, but they also exported tortoise shell, slaves, spices, ivory, Indian copal and macir, an incense called "mocrutu" and fragrant gums (*PME* 7–13). Tabai, according to the *Periplus* (section 12), exported five varieties of cassia as well as frankincense, while Opone exported large amounts of cassia. According to Casson (1989: 122–124), the text of the *Periplus* only mentions cassia, although Schoff (1912/95: 82–85) also refers to cinnamon in his translation of the sections of the *Periplus* dealing with exports of the Far Side ports (PME 7–13). Pliny (NH VI, 29) informs us that cinnamon/cassia transhipped only through the "far side" ports. Opone also exported substantial quantities of tortoise shell and slaves. Indeed, it was the main "far side" port supplying slaves to Egypt: Casson's translation of the *Periplus* (1989: 59) noting "better-quality slaves, the greater number of which go to Egypt."

The trade potteries excavated at Ras Hafun further indicate that the "far side" ports were commercially significant, linking the Hafun "campsites" to the Red Sea region, the Arab-Persian Gulf, south Arabian coast and the Indian subcontinent. The Hafun Catalogue notes amphorae fragments found in HMS that came from the Mediterranean, and which the reviewers relate to amphorae excavated at sites in Egypt and India in levels dated to the first century CE. Associated with the amphorae fragments are glazed wares of probably Persian Gulf origin, and cooking vessels from Egypt and India. The Indian potteries from Hafun are similar to those excavated at major Early Historic sites in western and southern India, at Nevasa, Maheshwar, Brahmapuri, Brahmagiri, Chandravalli and Arikamedu. Excavations at Nevasa, in western India, and at Arikamedu, in southern India, demonstrate Indian trading connections with the Mediterranean world. Similarities have also been noted between the Dressel 2–4 amphora forms from Hafun and amphorae from both Coptos and Quseir, in Egypt, and Arikamedu, in southern India. These ceramic signatures corroborate the information in the *Periplus* that Tabai and Opone, and indeed other "far side" ports, were part of the long distance maritime networks of the western Indian Ocean.

There is considerable debate as to the nature of Indian Ocean trading connections with the Azanian littoral (the present-day Swahili coast) during the BCE/CE changeover. The English archaeologist John Sutton (1990: 91) pointed to a lack of archaeological evidence for trade in that region in the early centuries CE. Referring to this as a period of "discontinuity," Sutton pointed out that "the effective and sustained opening up of this coast and of the southwest Indian Ocean sea-routes was not until the Abbasid Period, c. 800 AD."[4] This is backed by Phillipson who wrote (Phillipson 1993: 221):

> Mention was made of the written evidence, contained in the *Periplus of the Erythraean Sea*, for trading voyages along the east African coast as early as the first centuries of the Christian Era. No convincing archaeological evidence for such trade has yet been found. Indeed, it is not until the eighth century A.D. that we have clear traces of coastal settlements that were frequented by the Indian Ocean traders.

However, Chami, who draws heavily from the *Periplus*, argues that between 200 BCE and 400 CE the Early Iron Working (EIW) and early Azanian maritime culture of the East African coast were linked. Chami develops his thesis in a series of interrelated articles that focus upon the issue of Rhapta's location, the ethnic makeup of the "Periplus communities," relations between the Swahili Coast and the Rift Valley, and long distance trade contacts of Azania/Swahili seaboard with the Mediterranean, and the Perso-Arabian, Indian and Southeast Asian regions (Chami 1994, 1999a: 205–215, 2002: 33–44).

At the heart of Chami's endeavour was the search for the elusive port of Rhapta. In the early 1990s, he launched intensive field investigations in the Rufiji Delta where he discovered numerous EIW sites, some of which yielded artefactual indicators of external contact. His research since 1993 has focused on the district of Rufiji and the offshore islands including Mafia, where two interesting things were discovered. The first was the discovery of 20 Early Iron Working sites, suggesting abundant settlements in this area around the first to the fifth century CE. The second was the recovery of the remains of objects imported to East Africa from the Mediterranean and Middle East in the first five centuries CE (Chami 1999b: 237–241). Though Chami does not identify any of the EIW sites with Rhapta, he is clear in his belief that the concentration of such sites in the Rufiji Delta indicates that it would have been in that general location (Chami and Msemwa 1997: 673–676).

Most archaeologists working in East Africa agree that iron-working cultures in the vicinity of Lake Victoria/Nyasa formed the epicentre of rapid dispersal of similar cultural strains across large parts of eastern Africa during the BCE/CE transition. Evidence of early iron making (Sinclair 1990: 1–40) includes sites at Nkese (first century BCE to third century CE), the Lake Nyaza area of Tanzania (late first century BCE to the early first millennium CE), and Matola in Mozambique (second to sixth centuries CE). The earliest facies of the Urewe inspired tradition in the Rufiji Delta is the Limbo Ware culture, dated to between 100 BCE and 200 CE (Chami 1999b: 240). This was followed from 200 to 400 CE by the Kwale Ware tradition which spread along the Swahili coast, and from 400 to 600 CE by the Early Triangular Incised Ware tradition found from the Lamu Archipelago of Kenya in the north to Vilanculos Bay in Mozambique in the south (Chami 1999b: 240–241; Phillipson 1993: 221).

The Urewe Complex iron-working complex, in the central Rift Valley, has been identified as the progenitor of iron-working cultures that spread to the Swahili coast, as part of a "substantial and rapid movement of population" Phillipson (1993: 201). Chami (1999a: 208–213) attributes the spread of EIW wares to small groups of traders who forged commercial relations between the East African interior and the coast, and along the Swahili seaboard. Certainly the diffusion of the Urewe Ware and its successor traditions is paralleled by rising intensity in coastal trading networks in East Africa. The surge of East African trade in the Abbasid period may have grown out of this. The faint but perceptive spread of foreign artefacts on the Swahili coast between the first and seventh centuries CE hint at trading connections with the Red Sea, the Persian Gulf and India. The detailed accounts of the "far side" and Azanian trade ports given in the *Periplus* and *Geographia*, the growing artefactual evidence of external contact with the Somali–Swahili coast and the emergence of coast-hinterland networks linking the Rift Valley to the east African sea board thus suggest that the period of "discontinuity" was in fact, one of activity.

However, evidence is currently weak for strong Azania—wider Indian Ocean trading relations throughout the first half of the first millennium CE. By contrast, such connections became increasingly evident in the latter part of the first millennium. I examined a cache of pottery from the Juani limestone cave site on the island of Mafia which revealed grey-black wares of the type which J.-F. Salles (1984: 246–247) discovered in the Persian Gulf region.[5] They have also been found at Ras Hafun (Smith and Wright 1990: fig. 7 l,m), at Kane on the south Arabian coast (Sedov 1992: 196–127), and Elephanta Island in western India (Fig. 7.1). Chami discovered other ceramics of probably Indian origin at Kilwa and in Machaga Cave on Zanzibar. Chami (2004: 93–103) also indicated that I had identified some pottery from Mafia as being of probably Indian dating to the early centuries CE. One cannot rule out the possibility of such a date, but the core deposit appears to date from around the mid-first millennium CE, and came from the Arabian Sea rim and possibly the Indian Subcontinent.

Fig. 7.1 Grey ware pottery from Elephanta Island, Mumbai, India, sixth–seventh century AD (photo: Sunil Gupta)

Additionally, Juma discovered two red ware fragments of potherds at the port site of Unguja Uku on Zanzibar Island (Fig. 7.2) which he identified as Late Roman, dating to between the fifth and sixth centuries CE (Juma 1996: 148–154). D.M. Bailey of the British Museum and Henry Wright of the University of Michigan, who confirm the dating, consider that they represent the red ware tradition of North Africa or Egypt. However, a red ware fragment from EIW contexts at Kivinja site may be either of Roman or Indian provenance, another from Unguja Uku is similar to Indian Red Polished ceramics found around the Arabian Sea rim (Map 7.2), and one of the two potsherd fragments found (Juma 1996: fig. 2/Pot A), comprising the rim and neck of a vase, has an outward grooved rim similar to the staple Red Polished Ware types excavated in western India. Chami (2002: 41) has compared the potsherd with a pottery type reported from Hafun (see Wright and Smith 1990: fig. 5h). By contrast, ceramic experts from Uppsala University identify it as Roman vase (Chami 2002: 41), although Marie Boussac of the University of Lyons considers it to be an Indian imitation of a Roman vase (Chami 2002: 41).

Chami (personal communication) has also recently recovered red ware from the Bay of Tanga in northern Tanzania which closely resemble coarse red ware from the island of Elephanta near Mumbai. These include a grooved ledge rim jar. Elephanta flourished under the western Indian

Fig. 7.2 View of the beach from the archaeological site of Unguja Uku, Zanzibar (photo: Sunil Gupta)

Chalukyan Dynasty in the sixth and seventh centuries CE. Apart from the Sassano-Islamic and coarse red and black wares, the discovery of a range of Late Roman amphorae and Red Sea Ayla-Aksum type amphorae from Elephanta attest to its status as a major long distance trade port in that period. Further, the seventh-century Sanskrit text, *Dasakumaracharita*, alludes to Indian sailors voyaging to the "Island of the Black Yavanas." Basham interprets this to indicate Indian maritime contact with Zanzibar (Basham 1954: 227). If true, this would buttress the argument that the trading stations along the coast of present-day Tanzania were then part of a pan-western Indian Ocean trading network that included Elephanta.

In all events, it is highly probable that the red and grey-black wares from Azania belong to the Indian Historic tradition dating to between the fifth and seventh centuries CE. Chittick, in his excavations at Manda, in northern Tanzania, firmly established the occurrence of Indian trade potteries from the eighth century (Chittick 1984). Moreover, as some ceramics from the earliest period at Manda, from the (mid-ninth to early eleventh centuries CE) (Fig. 7.3) are similar to the grooved rim fragment dated to between the sixth and seventh centuries CE recovered from Unguja Uku (see drawing for Unguja Uku in Map 7.2), this may indicate that Indic pottery was imported into East Africa from at least the latter part of the first millennium to the early second millennium CE.

Summary

The evidence suggests that the "surge" of foreign trade impacting eastern Africa in the Abbasid period (eighth century CE) had its antecedents in the period of the Periplus and the centuries leading up to the eighth century. It is to be noted that paucity of "tangible" and "striking" evidence for an event or historical episode does not necessarily mean non-occurrence of the episode. An appropriate analogy in this regard is the Indianizaton phenomenon observed in Southeast Asian history. The "sudden" appearance of Brahmanical and Buddhist sculptures in Southeast Asia in the mid-first millennium CE created a notion among scholars that the Indianization of Southeast Asia happened suddenly and rapidly from the middle of this millennium. However, I have argued elsewhere that the Indianization of Southeast Asia was a long drawn process indicated in the archaeological record by ritual beads and pendants from the subcontinent circulating in Southeast Asia from the fourth to third century BCE (Gupta 2003: 391–404). Similarly, the faint but perceptive spread of foreign artefacts on

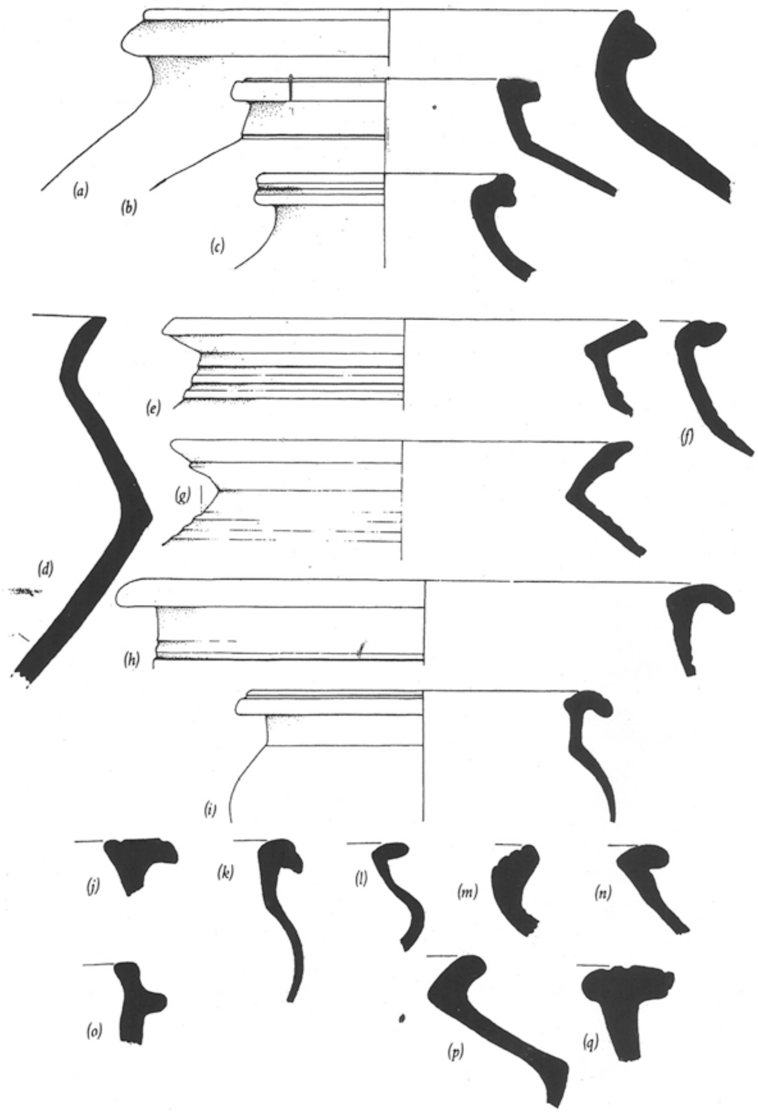


Fig. 7.3 Indian pottery from Manda, north Tanzania (after Chittick 1984)

the Swahili coast between the first and seventh centuries CE hint at the arrival of traders from the Red Sea, the Persian Gulf and India to the Swahili coast through the first millennium CE. The detailed accounts of the "far side" and Azanian trade ports given in the Periplus and Geographia, the growing artefactual evidence of external contact with the Somali–Swahili coast and the emergence of coast-hinterland networks linking the Rift Valley to the east African sea board suggest that the period of "discontinuity" was in fact, one of activity. The Indian connection needs to be situated within his paradigm.

Notes

1. The report was being prepared by Chittick when he tragically passed away. Chittick himself prepared the final copies of various maps, plans and sections. These with the original field notes and photographs, various correspondences and a sample comprising a quarter of the excavated diagnostic ceramics are conserved at the British Institute in Eastern Africa at Nairobi.
2. The catalogue is deposited in the British Institute of Archaeology at Nairobi.
3. The *Periplus* lists similar goods imported into the Hadhrami harbour of Moscha Limen.
4. Personal communication, 9 August 1995.
5. A batch of pottery from Chami's excavations at Mafia were shown to Dr. Pradeep Mohanty (Deccan College, Pune) and me by Prof. Paul Sinclair at Uppsala University in May 2002.

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CHAPTER 8

Eastern Africa and the Indian Ocean World in the First Millennium CE: The Glass Bead Evidence

Marilee Wood

Introduction

The glass beads that were imported into eastern Africa in the first millennium CE have the potential to add significant detail to our understanding of eastern Africa's interaction with the Indian Ocean World. This study will show that proposed evidence for interaction with Rome in the first half of the first millennium that is based on the presence of glass beads is inconclusive. However, a good deal of insight about East African trade with the Indian Ocean in the second half of the first millennium has come to light based on glass beads recently found at Unguja Ukuu in Zanzibar. Beads of two main glass types were recovered and, based on glass chemistry and method of manufacture, it appears likely that one type was made in Sri Lanka (or possibly South India) while the other was made of Near Eastern glass that was probably traded to Southeast Asia where it was made into beads before arriving in Zanzibar via Sri Lanka. Meanwhile the glass beads traded into southern Africa in this period appear to have been

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made in the general region of the Persian Gulf and were brought to the south by ships from Oman and the Gulf.

Does Credible Evidence Exist of Roman Trade with East Africa in the First Half of the First Millennium CE?

Was East Africa actively involved in the Indian Ocean world (IOW) in the first half of the first millennium CE? Many attempts have been made to find concrete evidence of early first millennium Indian Ocean contact with the African coast and, more specifically, the city of Rhapta, which is mentioned in the *Periplus* and Ptolemy's *Geographia*, and which was possibly situated near present-day Dar es Salaam (see Chap. 6 in this volume). Felix Chami (1999, 2002) has cited glass bead finds as evidence of early contact between East Africa and the wider IOW, but close examination of the finds has cast doubt on Chami's conclusions. The four beads used as evidence came from an excavation at Mkukutu in the Rufiji Delta, Tanzania (Chami 1999: 239). One is a type of bead known as "gold-glass" which was made by wrapping a clear glass tube in gold (or silver) foil and then slipping a slightly larger clear tube over top to protect the foil. The resulting double tube is then heated and rolled across a ridged stone "mould," creating a series of interconnected beads that can then be cut into individual or multiple beads. The other three beads offered as evidence are blue—one is wound and the others drawn; morphologically they are undiagnostic of any period or place. Three of the beads were reportedly found in a "sealed Early Iron Working [EIW] cultural horizon" with Limbo tradition pottery (first century BCE to fourth century CE). The fourth—one of the blue beads—was found near the surface (perhaps deposited by a bulldozer) but is similar to the others so was included in the evidence (ibid.). On the basis of their position in the deposits, Chami determined the beads to be of third-century Roman origin, arguing they could not be younger because no foreign objects were found in the younger overlying layers.

Essentially one bead, a gold-glass bead, is being used here as proof of Roman trade with East Africa. Although this type of bead was made in Roman times, a problem arises when it is realized that Islamic beadmakers copied this bead and that it was particularly popular from the second half of the eighth to the mid-ninth century CE (Callmer 1995: 50–53). Chemical analysis can help resolve the issues of origin and date because

Roman/Egyptian/Byzantine glass made before the eighth to ninth century CE was made with natron as a flux, while plant-ash was used after that (Henderson et al. 2004). Subsequent to Chami's discovery, Edward Pollard found two similar gold-glass beads in excavations at Kaole, near Bagamoyo in Tanzania (Pollard 2007). Based on their position in the deposits and associations with other artefacts, including imported pottery, Pollard believes they date to the eighth century (pers. comm. July 2011; Wood 2011b: 25). Recently, as part of her doctoral research concerning corrosion in ancient glass, Serena Panighello[1] used Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS) to analyse Pollard's beads and determined that they are not fluxed with natron (pers. comm. Nov. 10, 2013) and therefore are not "Roman." Thus, to date, no glass bead has been found on the eastern coast of Africa that can unequivocally be attributed to in the first half of the first millennium CE.

However, this does not mean such evidence will not be found. Knowledge about Africa's east coast as described in the *Periplus* and *Geographia* makes it clear contact did occur. When such evidence is found, if it be in the form of glass beads, what are the possible sources and routes that could have been involved?

After annexing Egypt in 30 BCE, Rome had direct access to the Red Sea and subsequently seems to have been the first entity to have developed a southern sea route to India, Sri Lanka and perhaps lands further east. Her purpose was twofold—to benefit economically from the trade and to limit access to it by her rivals, the Parthians and later the Sasanian Persians. By the end of the second century CE, Rome had been in touch with South Arabia, the Persian Gulf, coastal sub-Saharan Africa, India and Sri Lanka (Sidebotham 1996: 288). However, from the third century changing economic and political circumstances in Rome led to a decline in direct participation in this trade, a role that was taken up by merchants from the Levant, South Arabia and Axum. Thus, from the third or fourth century, activities beyond the Red Sea were conducted by non-Romans. Finally, in the first half of the seventh century, the Muslim Arab conquests of Egypt and the Near East completely blocked Rome's access to the Red Sea and Indian Ocean and ended any participation she still might have had in the trade (Sidebotham 1996: 300).

Thus, in the first two to three centuries CE, Roman merchants might have carried glass beads to the east African coast. Two different routes could have been likely candidates (although others could be considered). The first would entail ships coming to the African coast more or less directly after leaving the Red Sea. In this case it would seem likely that beads made in the Middle East would have been brought for trade. A second possibility would envisage Roman ships stopping in East Africa on their way home after trading in South Asia. In this case they would likely carry beads they had purchased in India or Sri Lanka for the Africa trade. Economically the second scenario might make more sense in that glass beads in South Asia were mass produced using the drawing process, so would have been far less expensive than the individually produced wound and often decorated Middle Eastern beads. In addition, if both South Asia and East Africa were destinations of a trading expedition, it would be better to take on board ivory and other African goods after leaving the Asian ports, since those ports charged customs duties on cargoes. Thus, in the early period we could expect to find either Middle Eastern or South Asian beads, or both, in excavations and they in turn could provide clues as to the direction from which the ships that brought them had sailed.

Once Rome no longer participated directly in this trade (and perhaps also when she did), ships from Ethiopia, South Arabia, India and Sri Lanka might have traded with East Africa, but evidence for this is lacking. Evidence of Sasanian participation in Indian Ocean trade, particularly with India and Sri Lanka, began in the fourth century and peaked in the sixth century, by which time Sasanians dominated trade with Sri Lanka and India. Reports detailing this dominance appeared early in the sixth century when Cosmas Indicopleustes, an Alexandrian merchant and traveller who visited South Asia, recorded in *The Christian Topography* that Sri Lanka played a central role in East–West trade acting as an entrepôt connecting the two regions. Of interest here he noted that ships from around India, Iran and Ethiopia traded with Sri Lanka which also sent out ships. In addition, he reported that African ivory was one of the imports (Whitehouse 1996: 345).

By the sixth century, Sasanians dominated the northern waters of the Western Indian Ocean, from the Indus in the east to Yemen in the west. In consequence, they controlled the entrance to the Red Sea and blocked access to both the Byzantines and Axumites. Thus, from the late sixth century up to the rise of the Fatimids in the eleventh century, “merchants from the Red Sea played only a minor role in the trade of the Indian Ocean” (Whitehouse 1996: 346). It seems unlikely therefore that we should find large numbers of glass beads from the Middle East in that period.

New Insights Into Indian Ocean Trade with East Africa in the Second Half of the First Millennium CE

Moving on to the second half of the first millennium, it will be seen that changes in political and economic conditions in the western Indian Ocean brought changes in trade dynamics and the glass beads that formed part of that trade. Until recently, finds of glass beads in first millennium archaeological sites in East Africa have been modest, and it was generally believed that the region was only sporadically involved in Indian Ocean trade. For example, Mark Horton and John Middleton consider that coastal towns traded only occasionally with Indian Ocean merchants and that few exotic goods reached the interior: "There were not specialized trading communities, but villages content to trade whenever the opportunity presented itself" (Horton and Middleton 2000: 46). However, recent excavations by members of the Sealinks Project (www.sealinksproject.com) at Unguja Ukuu, a first millennium CE port site in southwest Zanzibar, have produced large numbers of glass beads that are currently being studied by the author.[2] In the 2011 season excavations, Unguja Ukuu, the provisional radiocarbon dates for which range from 631 ± 17 to 1046 ± 49 CE calibrated, produced 864 glass beads. Panighello (Wood et al. 2016) has analysed 69 of those beads using LA-ICP-MS. Two significant glass types were identified (both are soda-lime-silica glasses): one is made with a mineral soda flux (m-Na-Al 1) and the other with a plant-ash soda flux (v-Na-Ca).

m-Na-Al

Five sub-groups of mineral soda-alumina glass (m-Na-Al), which is recognized to have been made in South and probably Southeast Asia beginning in about the fifth century BCE, have been identified (Dussubieux et al. 2010). By far the most numerous glass beads found in Indian Ocean commerce, the so-called Indo-Pacific beads (sometimes referred to as Trade Wind beads), are made of two of these sub-groups: m-Na-Al 1 and m-Na-Al 2. Beads of m-Na-Al 1 dominate the Unguja Ukuu assemblage (Fig. 8.1A) but a few others are ambiguous and may belong to the m-Na-Al 2 group.

M-Na-Al 1 glass and beads are known to have been made in Sri Lanka from about the fifth century BCE to the tenth century CE (Dussubieux et al. 2009: 159). It is possible the glass and/or beads were also made in southern India, but this has not been confirmed. Laure Dussubieux (2001) found direct evidence of m-Na-Al 1 glassmaking at the Sri Lankan site of Giribawa, but as it dates from the third century BCE to the second century CE, it is too early to have produced the beads found at Unguja Ukuu. The entrepôt of Mantai, which sits at one end of Adam's Bridge—the string of shoals and small islands that reach across the Palk Straits to India, thus blocking passage of large ships from east to west—was the most important first millennium CE port in Sri Lanka up to the Chola invasion in 993. Peter Francis Jr., who catalogued many of the glass beads from John Carswell's excavations at Mantai, found evidence of beadmaking, especially of Indo-Pacific beads (Francis 2013: 368), beginning in the first centuries CE (Hannibal-Deraniyagala 2013: 370). Thus, Mantai is a potential source of the Zanzibari m-Na-Al 1 beads.

Current research has identified only two other m-Na-Al 1 beads in the east African region—one at Ungwana, a ninth to sixteenth century site on the Kenyan coast (Dussubieux et al. 2008: 814), and the other at Mahilaka, a ninth to fifteenth century site in northwest Madagascar (Robertshaw et al. 2006). Neither of these beads is related to the Indo-Pacific series morphologically, so they are unrelated to the Zanzibari beads under discussion.

Only a small number of possible m-Na-Al 2 beads were recovered at Unguja Ukuu. This type of glass and bead are known to have been made in India (and possibly Sri Lanka) from the ninth or tenth century (Dussubieux et al. 2008, 2009, 2010) and were actively traded to Africa up to at least the seventeenth century (Wood 2011a: 77). There is likely to be only a small overlap in the temporal parameters of these two m-Na-Al series.

v-Na-Ca

The plant-ash glass used to make many of the Unguja Ukuu beads, v-Na-Ca, is a type that was made in Iraq/Iran from the third century BCE (Lankton et al. 2008: 355; Lankton and Dussubieux 2006: 135, 2013: 431). It appeared in South and Southeast Asia around the same time but is found more frequently after Sasanian control of Indian Ocean trade increased between the fourth and sixth centuries CE (Lankton and Dussubieux 2006: 135). This glass type is found in significant amounts at Asian sites in the form of raw glass, broken vessels and beads, but most of the beads are made by drawing, a technology that is recognized as

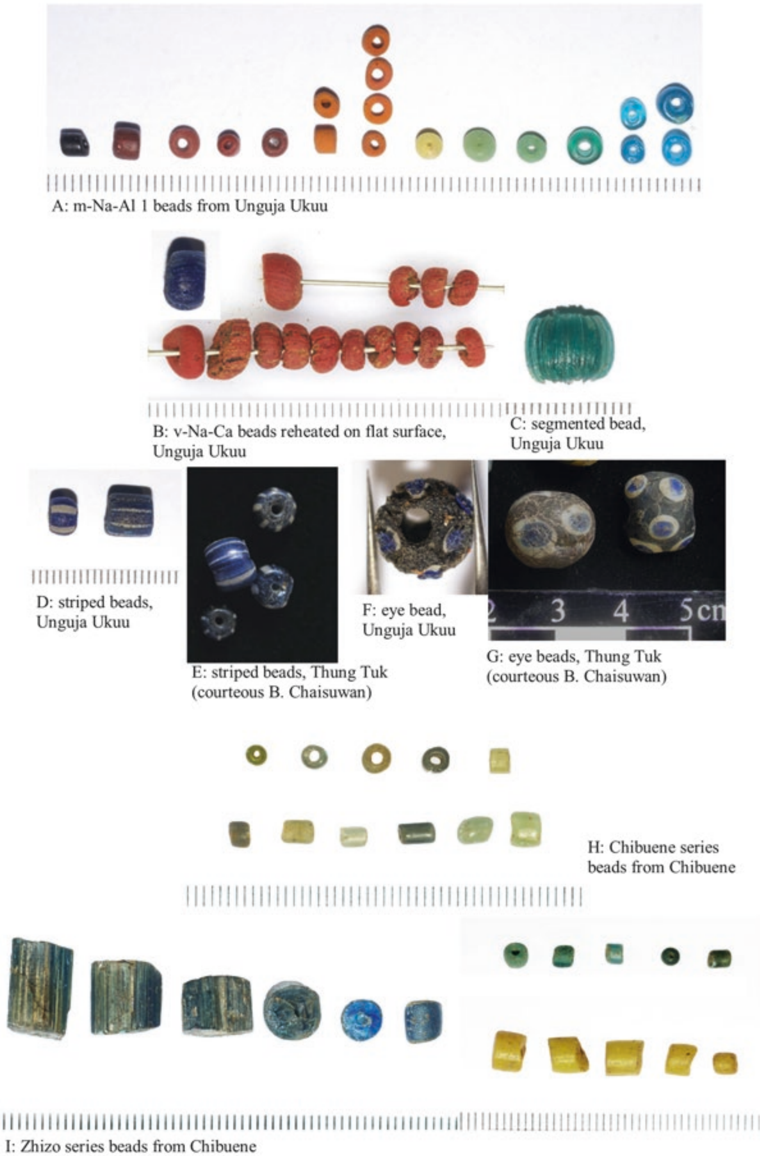

Fig 8.1 Glass beads discussed in text

South Asian in origin. Thus, many researchers believe it likely that the beads were made in South and Southeast Asia by local beadmakers from imported glass (Lankton and Dussubieux 2006: 135, 2013: 43; Carboni 2013: 347–348). Beads of this glass were traded into Africa up to about the mid-tenth century (Wood 2011a: 73; Dussubieux pers. comm. 2014), about the time that the Persian Gulf lost control of western Indian Ocean trade.

Four percent of the Unguja Ukuu 2011 glass bead assemblage is made of v-Na-Ca glass. In this glass, cobalt blue, blue-green and brick-red are the most common colours; green and colourless/white are rare. Most of these beads are made from cut segments of drawn tubes, the sharp ends of which have been rounded or softened by briefly reheating the beads. This is normally done by packing the tube segments in ash or some other medium to prevent them sticking together, after which they are stirred or tumbled while being reheated. The result is a bead more-or-less uniformly rounded at both ends. The Zanzibari v-Na-Ca beads, however, were processed in a very unusual manner. They were placed on a flat surface, cut side down, then briefly reheated. This resulted in beads that are rather flat at one end and slightly rounded at the other (Fig. 8.1B). I have seen a similar technique used in West Africa but never with Asian-made beads. This suggests that all of the Asian-made beads reheated in this manner were produced by the same workshop or related ones.

Two other v-Na-Ca beads, which are translucent blue-green, are known as segmented beads (Fig. 8.1C). They were formed by rolling a large reheated tube of glass over a ridged "mould." This resulted in a row of conjoined beads that were then cut into individual or multiple beads. It is believed this type of bead was made in Fustat, Egypt (Francis 2002a: 90), but other possible sources include Mantai (Francis 1989: 89) and Thung Tuk (Takua Pa) in Thailand (Francis 2002a: 90).

The three remaining v-Na-Ca beads are the only decorated beads in the assemblage. Two are cobalt blue drawn beads with white stripes that run parallel to the perforation (Fig. 8.1D). Of interest, both were reheated on a flat surface so are likely to have been made by bead workshops related to the other beads treated in this fashion. The final bead is wound with a dark blue body and stratified eyes made up of a layer of white glass followed by a blue "pupil" (Fig. 8.1F). Eye beads of various styles were made over many centuries in a variety of regions, especially the Middle East, and were copied in Southeast Asia. The type present at Unguja Ukuu closely resembles a style found in a small number of sites in Southeast Asia and

Sri Lanka. Thung Tuk (sometimes known as Takua Pa[3]), an eighth-to-eleventh century port site in southern Thailand (Chaisuwan 2011), produced so many of these beads (Fig. 8.1G)—along with debris from their manufacture—that it is believed they were possibly made there (Frances 2002a: 97; Hannibal-Deraniyagala 2013: 373). It is notable that cobalt blue beads with white stripes, like those in the Unguja Ukuu assemblage, are also proposed to have been made at Thung Tuk (Fig. 8.1E). Although I have not directly studied the Thung Tuk beads, the photos of these beads (kindly provided by Capt. Boonyarit Chaisuwan who excavated the site) depict a number of other beads that are similar to the Unguja Ukuu beads, especially ones with one flat end. Thus, the possibility exists that many of the v-Na-Ca beads from Unguja Ukuu were made in Thailand from glass imported from the Near East. If so, it is likely that they reached Zanzibar via Mantai, the main entrepôt for east–west trade in this period, where small numbers of the same beads have been found.

Other First Millennium Sites in East Africa

Unfortunately, many other first millennium sites on the African east coast were excavated before retrieval of very small objects, such as glass beads, was considered important, so deposits were seldom sieved and few beads were found (e.g., Chittick 1974: 468). In other cases deposits may have been sieved but the retrieved bead assemblages have not been studied by a specialist and published,[4] rendering them of little comparative value (e.g., Juma 2004). Thus, the set of comparable assemblages to work with is limited (Wood 2005: 182, 195).

Shanga

In extensive excavations at Shanga, in the Lamu archipelago, (where some deposits were sieved with 5 mm mesh—which is too large to recover small beads), Horton noted that "Glass beads are very rare before the eleventh century" (1996: 323). He lists 41 beads from pre-eleventh century contexts of which 29 are drawn, 10 wound, 1 moulded and 1 folded. Shapes listed include oblate, melon, sphere and bicone; 19 beads are yellow, 10 blue, 6 black, 3 white, 2 polychrome and 1 green-blue. This assemblage is quite different from that of Unguja Ukuu, beginning with the disparity in numbers of beads recovered (and this disparity would be far greater if volume of deposit removed were taken into consideration). For example, 24 percent of the Shanga beads are wound compared to only one of the 864 Zanzibar beads. Bead colour proportions differ as well in that blue-green beads account for 61 percent of the Zanzibari assemblage but only 2 percent at Shanga; inversely 46 percent of the Shanga beads are yellow yet only 17 percent of those from Zanzibar. But these comparisons are somewhat superficial in that the Shanga sample size is rather small and, of greater importance, we do not know what types of glass were used to make the Shanga beads.

Manda

Helen Morrison (1984) studied the beads from the excavations at Manda, also in the Lamu archipelago, conducted by Neville Chittick in the 1970s. Period I, corresponding to the mid-ninth to early eleventh centuries, produced 79 beads; 55 are drawn and 24 wound. The wound beads include shapes such as barrel, bicone, cylinder, ellipsoid, gadrooned, oblate and spheroid; and their colours include black, purple, blue, blue-green and light green. The drawn beads are found in the same colours as the wound beads (apart from purple), but include in addition yellow, orange, brick-red and colourless. The most popular colour in the drawn beads is blue-green, followed by light green, black and blue (Morrison 1984: 188).

The wound beads from Manda have nothing in common with the Unguja Ukuu assemblage (which produced only one wound bead—an eye bead) but the drawn beads could be related to those from Unguja Ukuu. Blue-green is the most common colour in both assemblages and all of the other colours are found in both. Most of these colours were used over long periods of time so can hardly be considered diagnostic, but one bead colour—orange (5YR 5/10)—is exceptional. In this early period, orange beads may have been made exclusively in Sri Lanka—at Mantai (Francis 1989: 89, 2002b: 222) and possibly at other locations on the island. They do not occur in South Asia after the tenth century and, as far as I am aware, the only other specimens found in eastern Africa are those at Unguja Ukuu. They also occur in the late (fourth to sixth century) deposits at Berenike, an Egyptian port on the Red Sea (Francis 2002b: 222). Another unusual bead common to both Manda and Unguja Ukuu is the colourless bead. Although similar beads occur much later in east African assemblages, they are rare in early ones; the same is possibly true of brick-red beads. Finally, pale green beads, which are not common in post–eleventh-century assemblages, are present in reasonable quantities at both

Manda and Unguja Ukuu. Based on the presence of these unusual colours at Manda, it is likely that the early drawn beads there are m-Na-Al 1 glass.

Tumbe

I have examined only a small selection of the beads excavated at Tumbe, a seventh to tenth century port site on Pemba Island (LaViolette and Fleisher 2009; Fleisher 2010), but one—a drawn cobalt blue bead with white stripes—is both morphologically and chemically like one from Unguja Ukuu (Peter Robertshaw pers. comm. 2013). An additional 11 beads belong to the Zhizo series, as found in southern Africa (see below). Although this is a very small sample on which to form conclusions, it appears to indicate that Tumbe had links both to the northern and southern trade circuits.

Kilwa

Kilwa, in southern Tanzania, was the main port for trade between the northern and southern sections of the east African coast from the mid-thirteenth to the fourteenth century, but played a less significant role in the late first millennium CE. In Chittick's excavations only eight beads were recovered from first millennium contexts: one wound, one moulded and six drawn (Chittick 1974: 485). Few were from well-stratified contexts and colours were generally not listed (the exceptions being two yellow and two blue-green) so it is difficult to interpret them, or compare them to other assemblages.

The Comoros

Fewer than 20 glass beads have been recovered from excavations in the Comoros from first millennium CE contexts, although large numbers of exotic ceramics are present (Wright 1984). This would suggest that the inhabitants did not value beads or had limited access to them.

Madagascar

Few sites in Madagascar dating to the first millennium CE have produced glass beads. In the northwest, it was initially claimed that Phase Ia at Mahilaka, which is dated from the late ninth to early tenth century, produced 157 glass beads (Radimilahy 1998: 183). However, later examination of the beads, along with chemical analysis (Robertshaw et al. 2006: 106) suggested that none of the beads pre-date the end of the tenth century. It has recently been recognized that one bead appears to be made of m-Na-Al 1 glass (Robertshaw pers. comm. Feb. 2014), but as it does not fit morphologically into the early Indo-Pacific group, its origins are enigmatic. In northeast Madagascar 37 drawn yellow beads were found in an undated pit at the eighth to fourteenth century site of Sandrakatsy (Wright and Fanony 1992: 32–33). Results of chemical analysis, along with associated non-glass beads, suggest that these beads most likely belong to the end, rather than beginning, of the site's temporal parameters (Robertshaw et al. 2006: 93).

Wright, in his contemplation of the possible effects of long-distance trade on hierarchical societies in East Africa, the Comoros and Madagascar, concluded that there is no evidence it played a significant role before the eleventh century. He observed that the communities were self-sufficient, using exotic objects only for social display, as is evidenced by the fact that changes in the social organization and ideological structure of communities did not occur before the eleventh century (Wright 1990: 14).

Southern Africa in the First Millennium CE

The earliest known bead type traded into Southern Africa has been named the Chibuene series (Fig. 8.1H) (Wood et al. 2012: 71) after the southern Mozambican port of Chibuene (Sinclair 1982, 1987; Ekblom 2004) where it was first recognized. The beads are made of v-Na-Ca glass and probably arrived there in the seventh century CE. Subsequent research has identified beads of this series at several sites in Botswana: Nqoma, in the Tsodilo Hills 1500 km west of Chibuene (Wilmsen 2013); Kaitshàa, overlooking the Makgadikgadi saltpans of central Botswana (Denbow et al. 2015); and two neighbouring sites on the south rim of the Sowa Pan excavated by Adrianne Daggett (in press). A closely related type, the Zhizo series (Fig. 8.1I), was the next to arrive in about the eighth century, and from then until the mid-tenth century was the only type of bead brought into Southern Africa (Wood 2000, 2005, 2011a). Beads of this type have been found at over 25 sites in Zimbabwe, Botswana and northern South Africa with the largest assemblage coming from Chibuene (Wood 2005: 41). Although the Chibuene and Zhizo series beads are both made of v-Na-Ca glass, they can be distinguished from one another by constituent levels of magnesia and potash, as well as by several trace elements (Wood et al. 2012: 62). The v-Na-Ca glass used to make the beads found at Unguja Ukuu is similar to that of the Zhizo series, they both have been given the sub-group designation v-Na-Ca 1 while the Chibuene series glass is called v-Na-Ca 3 (ibid.). No v-Na-Ca 3 glass has been recognized in the Zanzibari assemblage or elsewhere in East Africa.

Southern African Beads Compared to v-Na-Ca Zanzibari Beads

Although chemically the glass used for Zhizo beads and v-Na-Ca beads from Zanzibar is similar, morphologically there are a number of differences. Zhizo beads are made from drawn tube segments that are normally not reheated, so they are left with sharply cut ends. By contrast, most of the Zanzibari examples have been reheated (most on a flat surface), so have rounded or smoothed ends. Also, Zhizo beads appear in only four colours—cobalt blue, yellow and more rarely blue-green or green—while the Unguja Ukuu beads include brick-red and colourless/white glass as well. Additionally, decorated, segmented, pinched and wound beads, as found in the Unguja Ukuu assemblage, are absent from the Zhizo series. Although two of the Unguja Ukuu blue-green beads look like possible Zhizo candidates, close inspection shows that they have been reheated on a flat surface so fail to qualify.

It appears possible that the v-Na-Ca beads from Zanzibar were made in Southeast Asia, perhaps Thailand, and that they were traded through Sri Lanka. Zhizo beads, on the other hand, are more likely to have been made in the Persian Gulf region. Evidence for this begins with Al-Mas'udi, who in 916 CE visited Qanbalu on a return voyage from China and India. He reported that Sofala (which then referred to the coast of Mozambique, not to a single port) was the "furthest limit of the land and the end of the voyages made from Oman and Siraf on the sea of Zanj" (Freeman-Grenville 1962: 14–16). Al-Mas'udi states that ships sailed directly from the Gulf region to Qanbalu before heading for Sofala. If Qanbalu was indeed on Pemba Island, as is widely believed (Trimingham 1975a: 122, 135; Chittick 1977: 192; Hourani 1995: 148; Horton and Middleton 2000: 66), this could help explain the presence of Zhizo beads at Tumbe and their absence at other sites on the east African coast. Moira Tampoe (1989: 102) also cites al-Mas'udi as saying that a growth in demand for luxury goods at the Buyid court in Shiraz encouraged Sirafi traders to undertake an increasing number of voyages to Sofala. Finally, al-Mas'udi states that, in addition to enormous ivory tusks, Sofala provided gold. This is the first mention of trade in the precious metal from the south and could partially account for the great Persian Gulf interest in trade with the region.

Because only one type of bead at a time was being traded into southern Africa (and these beads are rare in East Africa), it is reasonable to assume that they all originated from the same region, if not from the same workshop or series of workshops. Al-Mas'udi indicates that merchant ships from Oman and Siraf sailed directly to Sofala, and it is believed that the glass used to make the Chibuene and Zhizo series beads was made in the Iraq/Iran region. Thus, although this type of glass was traded widely as cullet, the case here seems to favour a regional production for the beads since the ships carrying them appear to have come from the same region that produced the glass. In addition, if these beads were being made in South or Southeast Asia, they would have entered trading circuits there so one would expect to find them at numerous east coast sites along with the other beads they received from that region. Thus, it seems reasonable to look for the origins of Zhizo and Chibuene series beads in the greater Persian Gulf region.

Possible manufacturing sites include Sohar, in Oman, which was the dominant trading port in the Gulf from the eighth to the mid-ninth century. Although Siraf became the pre-dominant port in the region after that time, Sohar continued to be a busy entrepôt up to about 965–971 when it was attacked by the Buyids (Pouwels 2002: 393). Of significance here is Tampoe's (1989: 106) claim to have found evidence of glassmaking at Sohar. This, and the time frame—Sohar's dates as an important Indian Ocean port coincide with the existence of Zhizo beads—makes Sohar a potential source for this bead series (Wood 2011b: 28) in contrast to Siraf which was inactive at the time that glass beads began to arrive in southern Africa. Indeed, Tampoe (1989: 101–102) has suggested that Siraf may have been a relative late comer to the Persian Gulf-Africa trade since pre-tenth century literary sources mention only Oman in this role. In addition, David Whitehouse, who excavated Siraf, does not believe that Zhizo type beads have been found there (pers. comm. 2004).

The port of Banbhore (also identified as Daybul, Daibal or Debal) could be another possible beadmaking site. Situated at the mouth of the Indus River, it was the main early Islamic entrepôt in western India up to the eleventh century, and formed part of the trading circuit that included Siraf and Mantai (Tampoe 1989: 106). In addition historically it was part of the Sasanian Empire, having been part of the dowry presented to Bahram V when he married an Indian princess in the fifth century (Whitehouse 1996: 344). According to the Daybul excavation report (Khan 1963: 18), possible evidence of glassmaking was found.

Wherever the place of manufacture of the Chibuene and Zhizo series beads, the beadmakers were most likely either Indian or Sri Lankan. The method by which these beads were drawn is a South Asian technology known as the *lada* method (Francis 1989; Kock and Sode 1994). It is technically a very complicated process that the beadmakers would have kept a closely guarded secret.

Political and Historical Background in the Second Half of the First Millennium CE

This is not the place to review the history of the IOW during this period but looking at events that may have affected the bead trade to eastern Africa could help understand what we have learned so far about the beads we find there.

Trade in the western Indian Ocean in the second half of the first millennium CE was largely dominated by the Persian Gulf, but no longer by the Sasanians. Muslim Arab rule of the region began in 636 when the Umayyad Caliphate seized power from the Persians. The caliphate, however, was based in Damascus and not focused on the Gulf or Indian Ocean trade. Tampoe (1989: 101) notes that a period of political instability ensued and proposes that this caused a temporary disruption of the long-established trade patterns in the Western Indian Ocean that had been put in place by the Sasanians. She then concludes that these trade patterns were not re-established until after the beginning of the eighth century. Looking at the beads at both the northern and southern ends of the African coast, it does seem clear that trade which included beads increased substantially after the beginning of the eighth century. However, there is evidence of trade, although far more limited, in the century or so before that. In the south, the Chibuene series appears to pre-date the eighth century, but only limited numbers have been found to date. At Unguja Ukuu, radiocarbon dates suggest that beads were arriving before the eighth century, but the beads that are most likely to have been the earliest, those made of m-Na-Al 1 glass, have such a long life span that it is difficult to use them to determine when this trade began. If Gulf traders were relatively inactive in this period could Sri Lankan and/or Indian merchants have brought the beads to East Africa?

In 750, the Abbasids ousted the Umayyads and transferred the capital to Baghdad. This shift in the seat of Muslim authority concentrated power in the Persian Gulf region once again, and trade in the western Indian Ocean flourished with the Persian Gulf as the fulcrum. The Abbasid Caliphate continued in name up to 1258 but lost political control in 934 when the Buyid Dynasty came to power and moved the capital to Shiraz. This was the last period during which the Gulf enjoyed supremacy in western Indian Ocean trade. Between 965 and 971 the Buyids attacked Sohar, ending its position as a pre-eminent port.

The decline in the Persian Gulf economy, which appears to have included the dissolution of beadmaking and glassmaking industries, was probably responsible for the disappearance of v-Na-Ca beads, including the Zhizo series, in eastern Africa in the mid- to late-tenth century. At roughly the same time, Chibuene, Tumbe and Unguja Ukuu were abandoned. Other events to affect east African-Indian Ocean trade during this period include the Chola invasion of Sri Lanka in 993 CE. This disrupted the trade of m-Na-Al 1 Indo-Pacific beads, as found at Unguja Ukuu, which were then replaced by m-Na-Al 2 Indo-Pacific beads which were probably made in India. In addition, an incident recorded by Buzurg ibn Shahriyar, a Persian sea captain, in about 953 could have had a pivotal impact on coastal eastern Africa. It recounts a series of attacks made by Far Eastern Waq-Waq (Indonesians) (Trimingham 1975b: 279) between 945 and 946 in which they "pillaged" and "conquered" the towns and villages of Sofala, and staged a failed attack on the town of Qanbalu (Trimingham 1975a: 133).

Conclusion

Thus, it is possible that most of the glass beads (those made of m-Na-Al 1 glass) from the Sealinks Project excavations on Zanzibar were made in Sri Lanka, perhaps at Mantai, sometime between the seventh and tenth centuries. The only other first millennium CE beads from these excavations were made of v-Na-Ca glass, which was made in Iraq/Iran, while the beads were possibly made in Southeast Asia, perhaps in Thailand. The glass beads traded into southern Africa at this time were also made of v-Na-Ca glass, but were probably made in the Persian Gulf region. From present evidence it seems that two major and separate trade circuits were involved in carrying these beads to eastern Africa. The northern one involved two branches: the main one transported beads (those made of m-Na-Al 1 glass) originating in Sri Lanka, while the smaller branch comprised beads made of v-Na-Ca glass from Iraq/Iran that was possibly shipped to Thailand to be made into beads which were exported to Mantai from where they eventually reached East Africa, perhaps brought by the same merchants that carried the m-Na-Al 1 beads. The second circuit to the south was more direct, carrying beads (Chibuene and Zhizo series) from the Persian Gulf region to southern Africa via Qanbalu (on Pemba Island). However, these beads would have been made by South Asian artisans, possibly at a location in the vicinity of the Gulf, such as Sohar or Banbhore, although a more distant location cannot be ruled out.

It seems fairly clear that ships from Sohar and eventually Siraf carried glass beads to southern Africa, but who carried the Sri Lankan and Southeast Asian beads to Zanzibar? If it were ships coming from Sohar and eventually Siraf why didn't they bring Zhizo beads as well? Could Sri Lankan or Indian ships have carried them? Further possibilities could be imagined, including Omani or other Gulf ships and traders that were different from those plying the southern Africa route, or perhaps others sailing from different ports along the Arabian coast. One might propose that temporal differences are involved here but radiocarbon dates for the Zanzibari site and those in southern Africa are roughly comparable. Although this picture is necessarily conjectural it is based on evidence available at the moment. Hopefully new archaeological finds along with expanded understanding of glass technology will help clarify the picture in the future.

Notes

1. Panighello is working with the National Institute of Chemistry, Ljubljana, Slovenia and Department of Molecular Sciences and Nanosystems, University Ca' Foscari of Venice, Italy.
2. Abdurahman Juma also recovered glass beads from earlier excavations at Unguja Ukuu (Juma 2004). Using a series of radiocarbon dates, and the presence of imported ceramics, he divided occupation at Unguja Ukuu into four periods beginning with Ia, which he dated to around 500–700 CE (Juma 2004: 84–85). The Ia context produced 178 glass beads, the vast bulk of them (145) drawn and made of translucent blue-green glass (Juma 2004: 128). A few mul-

ticoloured beads which, unlike the blue-green ones might be diagnostic, were also found but descriptions and photos of them are insufficiently detailed to allow identification.
3. Thung Tuk is located at Koh Kho Khao in Takua Pa district. These eye beads have been named Takua Pa eye beads (Francis 2002a: 9 and Colour Plate 24; 2013: 357).
4. Dussubieux et al. (2008) analysed 138 beads from four sites in Kenya but no details were given of the individual assemblages so the sites cannot be used for comparison.

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CHAPTER 9

Migration and Interaction between Madagascar and Eastern Africa, 500 BCE–1000 CE: An Archaeological Perspective

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Introduction

The debate on the peopling of Madagascar has long been dominated by historical linguistics and the observed similarities between Malagasy and Austronesian languages. It is clear from the linguistic evidence that there have been several periods of human contact with, or migration to, Madagascar—and that these also brought different domesticates to the island (Allibert 1998, 2007; Beaujard 2011a,b; Boivin et al. 2013).

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Genetics is currently the main tool being used to understand the peopling of Madagascar (Hurles et al. 2005; Tofanelli et al. 2009; Cox et al. 2012; Pierron et al. 2014). However, despite recent advances in the field of genetic studies we still know very little about either the first colonisation on Madagascar or about the contacts between the populations of Madagascar, the Austronesian influence zone, and the African mainland. Moreover, Vérin and Wright (1999) have warned that inferences from linguistic and genetic studies can be misleading, and that there is often a disjuncture between language and human biology on the one hand and material culture and identity on the other.

This chapter is structured around two key issues concerning the first human settlement of Madagascar. The first relates to claims that archaeological evidence for stone tool using foraging groups, dating from 2400 BCE, have been recovered at Lakaton'i Anja in northern Madagascar (Dewar et al. 2013)—claims that might necessitate not only a revision of the origins of human settlement of Madagascar but also of the early interactions between Madagascar and the African mainland. As no other archaeological data supports such an early human presence in Madagascar, there is a lack of secure archaeological contexts to establish the new claims which is thus regarded as tenuous. However, the new claims make it important to review reported widespread occurrences of animal bone with cut marks dated before 2000 years ago, and other early archaeological finds (Bloch and Vérin 1966; Kellum-Ottino 1972; Radimilahy 2011a). Here we critically review the archaeological and palaeoecological evidence for early BCE settlement and briefly discuss such findings in relation to other, linguistic, genetic, and historical, strands of evidence.

The other issue reviewed here is the degree of interaction between Madagascar and the African mainland in the first and early second millennium CE. Historical linguists, for example, have argued that proto-Malagasy was likely influenced by Sabaki, the proto-Bantu language of the East African coast, as indicated by the presence of a large number of proto-Bantu loan words for animals in Malagasy (e.g. Adelaar 2006). Aspects of the island's palaeozoogeography have also been said to indicate early contacts with the African mainland, while others are likely to be of Austronesian origin (Blench 2007). One of the problems in understanding the dynamics of migration to, and interactions with, Madagascar in the first millennium (and before) has been the lack of archaeological data. Few archaeological sites dated before 1000 CE have been recovered, while evidence of material culture, such as ceramics, is too anonymous to make any clear geographical correlations. Moreover, because of the traditional focus on linguistics, there has also been a drive to establish similarities with Indonesian material culture. This, in turn, is a problem, as the archaeology of early Indonesia is similarly not well known. In many respects the interactions between Madagascar, the east African coast, and the offshore islands continue to be overlooked, as does the possibility of direct trade between Indonesia and commercial entities in the western part of the Indian Ocean. Shepherd (1982), who suggested that Madagascar, Comoros, and the southern African coast formed a southern route of trade directly with Indonesia that was organised locally from the Comoros, had little evidence to back up her hypothesis, but we here revisit her argument on the basis of new archaeological evidence from the East African coast.

Early BCE settlement?

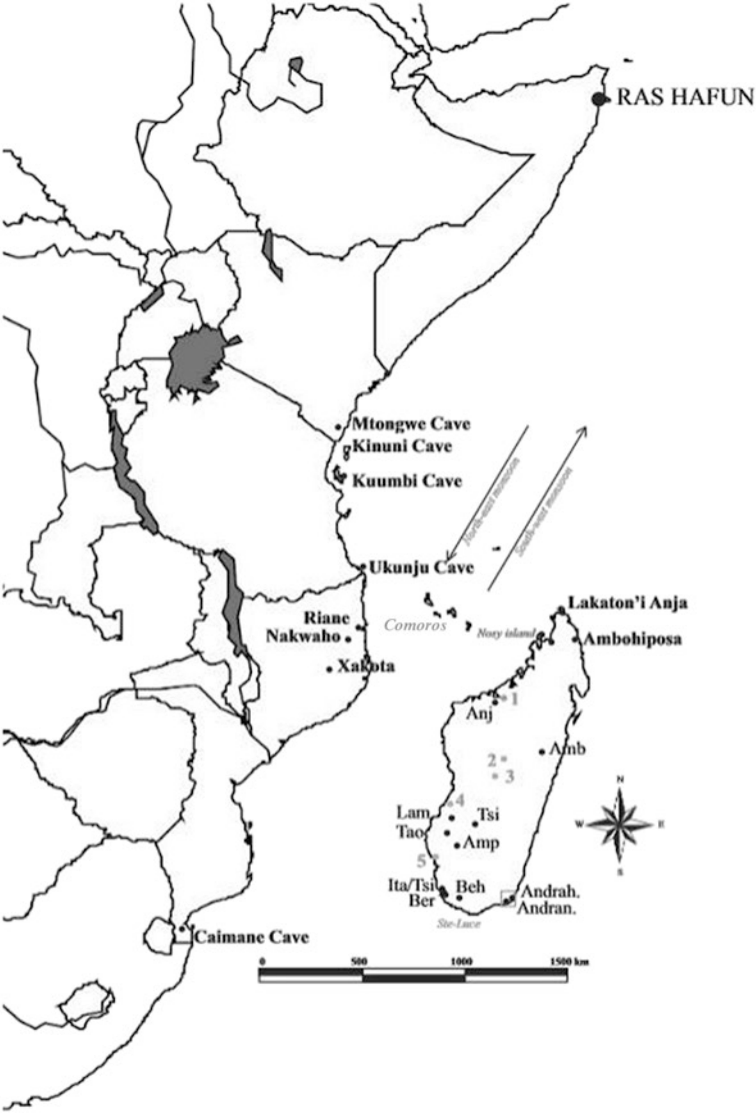
For more than 100 years, evidence of early or pre-first millennium CE occupation of Madagascar was restricted to a few finds of animal bones with what were were interpreted as cut marks from the south-western part of the island. Until now, these indices of a possible early colonisation have been regarded with scepticism as there has been no other archaeological data to support them. The new claims for an early human presence revolve around archaeological investigation of Lakaton'i Anja cave, situated in the Montagne des Français, on the northern tip of Madagascar. In the 1980s, when Robert Dewar first surveyed the site, he found charcoal and bone which indicated a possible early human presence in the cave. However, at that time no other archaeological finds were recovered. Re-excavations of Lakaton'i Anja, and additional excavations in the nearby Ambohiposa Rockshelter, have revealed retouched lithics, while the number of bones with cut marks dated to either the BCE or early first millennium CE eras have increased. Existing faunal assemblages have also been re-analysed and cut marks positively identified at several sites. We here review these different strands of evidence and reassess the findings.

Archaeological Evidence

Cut Marks on Faunal Bones

The possibility that sites revealing sub-fossil bone also contain bones with evidence of butchery—that is, human-produced cut marks—was first raised by Grandidier at the turn of the twentieth century (see MacPhee and Burney 1991). Many of these early find sites have since been re-analysed and the presence of cut marks confirmed by Perez et al. (2005) though they have also been questioned by Andersson (2014, see below). The majority of bones with possible cut marks were found in cave or rock shelter deposits in the southern and south-western region of Madagascar, both on the coast and inland (Map 9.1). Hippopotamus bones with possible cut marks supposedly produced while the bone was still green have been recovered from Lamboharana and Ambolisatra with dates of 805 BCE–640 CE, 155–415 CE, 230–410 CE (2020 ± 300, 1740 ± 50, 1970 ± 90 bp) (MacPhee and Burney 1991; Burney et al. 2004; Perez et al. 2005). At Itampolo a reworked leg of the bird *Aepyornis* has been dated to 30 BCE–320 CE (1880 ± 70 bp in Burney et al. 2004; Perez et al. 2005). Perez et al. (2005) also confirmed possible cut marks on additional bones from several other sites (Ampoza, Bemafandry, Behavoha, Tsiandroina, Taolambiby, and Tsirave). These collections have not been dated and the stratigraphic associations are not well known, except for Taolambiby where other bones found in association with the cut-marked bone were dated to 417–257 BCE (Perez et al. 2005). Recently Gommery et al. (2011), Gommery and Ramanivosoa (2013), also reported several hippopotamus bones with cut marks from Anjohibe Cave, in northwest Madagascar (see Fig. 9.1), with an associative date (from other bones in the vicinity) ranging between 2343–2141 BCE and 1623–1461 BCE.

Before accepting BCE dates on cut marks at face value, we must remember the difficulty of identifying cut marks from trampling and abrasion marks. Andersson (2014), referring to (Dominguez-Rodrigo et al. 2009) points out the difficulty of differentiating between actual cut marks and accidental markings originating from trampling and resulting abrasion from quartz rocks. Andersson (2014) has argued recently that much of the supposed cut marks his team have re-examined from museum collections were likely produced by secondary trampling and that this is the case also with bones with markings found in their recent re-excavations of Taolambiby. As these data are so far unpublished, we cannot assess this proposition. However, the methodology of Perez et al. (2005) follows that prescribed by Dominguez-Rodrigo et al. (2009), that is, for markings to be interpreted as cut marks they have to fulfil a number of different criteria namely: being placed at a location on the bone that is associated with butchery, being repeated in signature and being v-shaped. The possible cut marks presented by Gommery et al. (2011) have also been assessed



Map 9.1 Map of BC to first millennium AD sites in Madagascar. Archaeological lithic assemblage sites are written out and shown in bold, sites where bones with possible cut marks have been found are abbreviated: *Amb* Ambatovy, *Andrah* Anadrahome, *Andran* Andranosoa, *Beh* Behova, *Ber* Bernafandy, *Ita/Tsi* Itampalo/Tsiandroina, *Tao* Taolambiby, *Lam* Lamboharana, *Anj* Anjohibe. Palaeoecological sampling sites in grey circles and numbers (1) Mitsinjo, (2) Kaviataha, (3) Tritrivakely, (4) Belo, (5) Ambolisatra

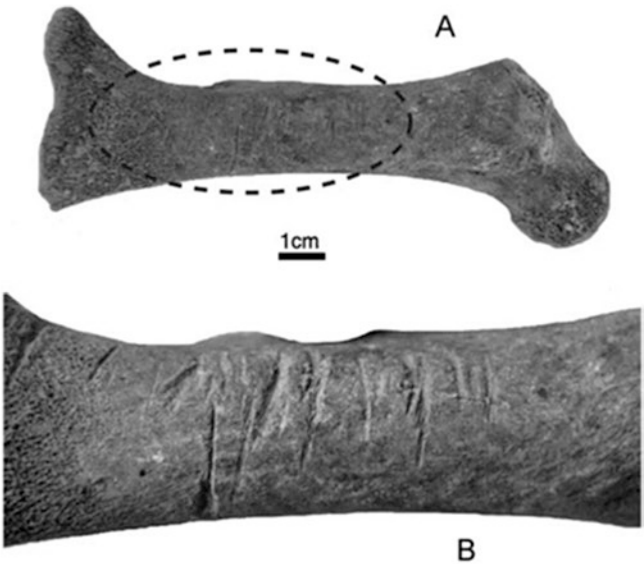


Fig. 9.1 Example of a femur bone with clear cut marks from Anjohibe Cave (reprinted from Gommery et al. (2011). Copyright 2011, reproduced with permission from Elsevier)

on the basis of the same criteria. In other words, the marks both sets of researchers identify as being cut marks have been identified using the recognition criteria proposed by Dominguez-Rodrigo and his co-authors.

Apart from the difficulty of identifying cut marks from accidental trampling there is also great difficulty in obtaining reliable dates from these deposits. Direct dating of bone may be problematic due to diagenetic alteration of the bone after deposition, possible influence of hard-water effects, and post-excavation contamination (pers. comm. Dewar). Nevertheless, direct dating of bone is a methodology that is in wide use in archaeology and thus a method regarded as reliable in other areas. Consequently, we find that the arguments that markings are indeed cut marks are plausible and also that the range of BCE dates on bones with cut marks, originating from many different sites, makes a convincing argument for an early human presence in Madagascar, though this needs to be confirmed by more data.

Extended excavations and fine sieving of Lakaton'i Anja Cave have revealed a number of small flakes with retouch produced on red-brown silicates probably acquired from a few kilometres away (Dewar et al. 2013). These small flakes are probably the result of intentional flaking of tabular cores. Flakes occur throughout the layers and the earliest layers have been dated to between c. 1460 and 2370 BCE using optically stimulated luminescence (OSL) though these dates have been contested by Andersson (2014). The bone assemblage of the site is still being analysed but so far all animal bones identified are likely to have been available in the local environment (e.g. birds, tortoise, medium-sized lemurs, and tenrecs). Marine shell has also been recovered. In Ambohiposa Rockshelter, situated close to Lakaton'i Anja, in Iharana Bay, a number of flakes, together with a few blade fragments were recovered (Dewar et al. 2013). The flakes, produced using bipolar reduction, were made out of locally available material, cryptocrystalline silicates and volcanic glass. As flakes were encountered in several stratigraphic layers, this could indicate usage over different time periods or be the result of mixing by various bioturbation processes, or a combination of these scenarios. The bulk of material is found in association with one layer (layer 5), charcoal from which has been dated to 870–1010 CE and 1210–1290 CE. In both localities ceramics were encountered in the upper layers mixed with flakes. Dewar et al. (2013) discount the possibility that this is the result of two separate assemblages being mixed owing to secondary transport in the profile; thus stone tool production seems to have been continued by ceramic producing groups also into the first millennium CE (Fig. 9.2).

The flakes encountered on the northeast tip of Madagascar cannot easily be linked with material assemblages in other regions, as few formal tool types have been recovered. As will be discussed below, the lack of formal types is common also in Late Stone Age (LSA) lithic assemblages on the African mainland as, for instance, in southern Mozambique and Zanzibar. By contrast, Dewar et al. (2013) stress that the Lakaton'i Anja lithics are very dissimilar from lithic assemblages in Southeast Asia. Possible similarities with the lithic assemblages on the African mainland must therefore be explored in the future.

The span of dates from the two sites suggest the presence of stone tool producing forager groups in this area from ca. 2000 BCE until between 1000 and 1200 CE. However, the finds of lithics from Lakaton'i Anja Cave and Ambohiposa Rockshelter have been received with some scepticism. One reason for this scepticism could be that cave deposits are notoriously difficult to date as there may have been considerably movement of the soil profile. The 1460–2370 BCE dates from Lakaton'i Anja Cave are

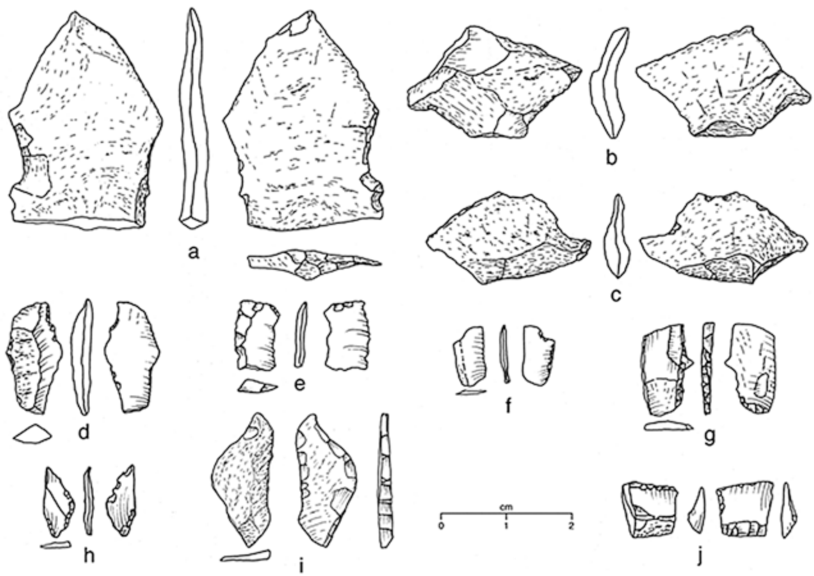


Fig. 9.2 Flakes and blades from Lakaton'i Anja Cave (reprinted from Dewar et al. (2013). Copyright 2013, reproduced with permission from PNAS)

based on OSL dates of single quartz grains from layer 5a, thus it is not a direct date of the artefact itself but the sediment in which it is embedded (Dewar et al. 2013). Charcoal fragments from the layer just above it have been ^{14}C dated with much earlier dates 970–1135 and 1045–1220 CE (Table 9.1) but Dewar et al. (2013) discount these dates as the result of later bioturbation. Meanwhile, Andersson (2014) regards the OSL dating method as unreliable and has therefore criticised the early BCE date, he instead prefers the later ^{14}C date of charcoal as he argues that charcoal is more directly linked to human activity. In effect, both methods are equally susceptible to secondary reworking and bioturbation, particularly in cases such as Lakaton'i Anja Cave where there is evidence of termite burrowing. However, the OSL method used in Lakaton'i Anja (e.g. OSL dating of individual grains of quartz) involves measurements of many quartz grains, enabling an assessment of the secondary movement of quartz grains up and down the profile (Jacobs and Roberts 2007). In Lakaton'i Anja, only 5–8 percent of the grains fall outside of the normal distribution, which can be regarded as very low. Thus the contemporaneity of the dated quartz grains

Table 9.1 Comparison of OSL and ^{14}C dates from Lakaton'i Anja Cave from Dewar et al. (2013) (OSL dates are from the OSL Dating Laboratory at the University of Wollongong)

Lakaton'i Anja Cave dates			
Layer	*OSL age*	*^{14}C date uncal bp and cal CE*	*Other*
2a/3	930 ± 90		Imported ceramics from the eleventh to fourteenth centuries
3a	1330 ± 130		
3/4		1460 ± 40 bp (Beta 305633), cal 565–680 CE	
4a	2210 ± 190		
4b	2700 ± 230		
5a		1070 ± 40 bp (Beta 305634), cal 970–1135 CE 930 ± 30 bp (Beta 305635), cal 1045–1220 CE	
5a/5b	3470 ± 370 4380 ± 400		
5b/5c	4380 ± 400		

Additional ^{14}C dates from Lakaton'i Anja Cave were reported by Dewar and Wright in 1993 (1680 ± 65 bp and 1300 ± 80 bp) but are have not been linked to the stratigraphy presented in 2013

and the lithics that were extracted from the same layer can be regarded as highly probable (see supplement S1 in Dewar et al. 2013). OSL dating has been used to date sediments and associated artefacts in rock shelters reliably elsewhere (see for instance Quicker et al. 2003; Jacobs et al. 2006; Pienaar 2007; Jacobs et al. 2011 for examples from Africa) and numerous other archaeological types of contexts globally (see for instance Robert 1997; Murray and Olley 2002; Bowler et al. 2003; Jacobs and Roberts 2007).

A revision of the early human history of Madagascar is not likely to be accepted unless the Lakaton'i Anja BCE dates and lithics are replicated at other archaeological sites. Despite relatively extensive surveys in northern and eastern Madagascar, no similar sites have been found so far (Dewar and Rakotovololona 1992; Wright and Dewar 2000; Dewar et al. 2011; Schreurs and Rakotoarisoa 2012; Schreurs et al. 2012; Griffin 2012). Extensive surveys have also been carried out in the southern Androy and the southwest region (Radimilahy 1981; Radimilahy et al. 2006; Parker Pearson et al. 2010; Radimilahy 2011a), and also the highlands (see below) without revealing material similar to that of Lakaton'i Anja (see also reviews in Radimilahy 2009, 2013; Rafolo 2000, 2008; Radimilahy and Crossland 2015).

However, as the archaeological evidence from Lakaton'i Anja and Ambohiposa is supported by findings of possible cut marks that are very plausible (reviewed above), we argue that claims for an early human presence are strongly supported. The idea of an early migration from the African mainland to Madagascar most recently expressed and elaborated by Blench (2010) is therefore potentially supported by the archaeological data. The present, admittedly very limited, archaeological data indicates that this settlement would have been on a small scale, perhaps concentrated mostly in the far north but, judging from evidence found elsewhere of bone cut marks, also occurring occasionally and on a small scale in other parts of Madagascar.

Connections with Late Stone Age Communities on the East African Coast

The evidence from Lakaton'i Anja Cave and Ambohiposa Rockshelter, in combination with the many finds of possible bone cut marks of BCE and early CE date, raises further issues concerning early human contacts and exchanges on the East African coast as a whole. Relative to the Rift Valley there has been limited research to date on LSA sites in the coastal regions of Kenya and Tanzania. Reviews by Chami (2006) and by Boivin et al. (2013), nonetheless, indicate considerable variability. Thus for example, systematic survey work on the southern Kenya coast has generated very limited evidence for LSA material on the coastal lowlands, with only two sites (Mtongwe and Kinuni Cave) currently known (Helm 2000; Helm et al. 2012). This contrasts with the coastal uplands further inland, especially the Dzitsoni region where several rock shelters and cave sites appear to have been intensively occupied well into the late first millennium CE, by which time domesticated livestock and crops had been incorporated into local subsistence practices (Helm et al. 2012; Shipton et al. 2013). On current evidence, no settlements with ceramics, iron, or domesticates earlier than the eight century CE are known on the coastal littoral (Helm et al. 2012) which is a further contrast with the situation in Tanzania and Mozambique where ceramics thought to be diagnostic of early farming communities are present by the last few centuries BCE (Chami 1992, 2006; Kohtamäki 2014).

As with Madagascar, a key recent debate has centred on the evidence for the earliest human occupation of the offshore islands, especially Zanzibar (Unguja) and the Mafia archipelago, and the earliest dated evidence for the presence of domesticated crops and livestock. The archaeological record of Kuumbi Cave, on Zanzibar (Map 9.1) provides some of the best evidence for an early, pre-farming occupation of the nearest islands, such as those of Zanzibar and Mafia. The deposits here contain three superimposed assemblages of limestone flakes, quartz microliths and coral rock heavy-duty flakes and tools (Sinclair et al. 2006), associated with deposits now known to extend more than 20,000 years (Shipton et al. 2016) with lithics and faunal remains from some lower levels that are still being analysed (Ekman, Sinclair and Knutson, in prep.). Another key site, Ukunju Cave on Jioni Island, Mafia also has LSA lithic material containing Mode 4 (i.e., blade-based) and Mode 5 (i.e., microlith-based) types (as per Clark 1978) in association with ceramics assigned by the excavators to the "Neolithic." Two radiocarbon dates on marine shell associated with these lithics yielded calibrated dates in the range c. 800–400 BCE (Chami 2004: 88–89). However, the results from new excavations at the site undermine some of these interpretations. In particular, the new evidence suggests that the lithic material, although similar to the expedient technologies that characterise the LSA of eastern and southern Africa, occurs exclusively with local mid- to late first millennium CE ceramics and imports (Crowther et al. 2014: 36), and these authors argue that there is no evidence for any earlier occupation of the cave.

In Mozambique, more detailed surveys have been carried out in only a few areas, such as Cabo Delgado, Niassa, Nampula, the middle Limpopo Valley, and Changalane (Adamowicz, 1990; Sinclair et al. 1993; Madiquida 2007, 2015; Bennett 2011; Mercader et al. 2012; Ekblom et al. 2011; Sillén 2013; Kohtamäki 2014). In northern Mozambique, microlithic bearing rockhelter sites such as Riane, Nakwaho and Xakota have been dated to between the sixth millennium BCE and fifth century CE and a number of LSA sites have been identified in the Nampula province by Adamowicz (1990) and Sinclair et al. (1993). An important record comes from the interior Caimane Cave, in southern Mozambique, dating from before 8045 BP (Sillén 2011; Kohtamäki 2014). It has been pointed out previously (Breen and Lane 2003: 273) that findings of micolithic assemblages on the offshore islands of Tanzania suggest that during the

LSA people not only had boats but also were able to navigate currents and a complex and shifting shoreline.

Given the Lakaton'i Anja Cave findings, this idea now seems even more plausible, especially if, as is suggested by the limited data concerning changes in regional sea level during the Holocene (for South Africa see Ramsay and Cooper 2002; Compton 2001; for Mauritius, Mayotte and Reunion, see Camoin et al. 1997, 2004; Zinke et al. 2003), average mean sea levels were up to 5 m lower than today during the last c. 4000 years as this would have likely reduced the distances of open sea between mainland Africa and Madagascar. The production of a reliable and well dated sea level curve for the region may add further light on these issues. Additionally, possible early migrations between the African mainland and Madagascar are not incompatible with genetic studies, even if these interactions are difficult to pinpoint in time. Hurles et al. (2005) have suggested a contribution of ancestry from both Africa and Southeast Asia based on both the female mtDNA and the male Y-chromosomes of Malagasy individuals. Tofanelli et al. (2009), analysed a larger sample with the same methods, and came to a similar conclusion. Preliminary analysis and results of the MAGE (Madagascar Génétique, Ethno-Linguistique) project confirm the existence of the three genetic components (South East Asian, Arabic-Persian, and African) among the Malagasy population (Capredon 2010; Pierron et al. 2014). Tofanelli et al. (2009) in support of earlier work by Soodyall et al. (1996), came to the conclusion that the African component is similar to that found in East Africa and there is a 33 percent similarity to Mozambique test subjects. Tofanelli et al. (2009) argued that the Mozambique similarities were due to population mixing in the recent historic period and they also favoured the explanation that Austronesian populations mixed with African populations on the African mainland before settling in Madagascar, but again this might, perhaps, be reconsidered in light of the new archaeological evidence. Firstly, the time line of specific Malagasy genetic transformations can now be moved back in time. The influence of the pre-existing hunter-gatherer populations in the genetic pool of Malagasy people must also be seriously assessed in genetics.

Transformations of the Madagascar Landscape

In comparative terms, the arrival of humans in Madagascar was relatively late. In contrast to most other parts of the world the co-adaptation of humans, plants, and animals, has, as far as we now know, occurred over a time period that in evolutionary terms is very short. The "recent" inclusion of humans in the Madagascar ecosystem may therefore have affected both flora and fauna dramatically. There has been a long ongoing debate on the issue of extinction of megafauna in Madagascar and its possible linkages with anthropogenically induced landscape transformations. However, before summarising this debate, we review vegetation and land use history more broadly. Analyses of pollen, charcoal, and spores in sedimentary cores from lakes and wetlands (here referred to as paleoecology) are an accepted means of understanding landscape transformations. Summaries of such analyses are available in Burney et al. (2004) and Virah-Sawmy et al. (2010) but, as we now have additional evidence in support of a BCE occupation of humans, the palaeoecological evidence needs to be revisited.

Vegetation and Land Use Change

The longest continuous record of landscape changes comes from Lake Tritrivakely, in the Malagasy highlands (Burney 1987a,b; Gasse and Van Campo 2001). As it dates back 150,000 years, the Tritrivakely record provides a baseline of landscape changes prior to human occupation. Today this region is covered by highland grassland with forest islands but during the glacial period, when climate there was colder and drier, the landscape was dominated by ericoid scrublands. With warmer and wetter conditions in the postglacial period forests expanded taking over the ericaceous scrubland in the highlands (Burney et al. 2004). The first possible indication of human presence in the landscape in the Tritrivakely record is the presence of *Cannabis/Humulus* pollen, either a cultigen or a plant introduced to Madagascar, dated by approximation to c. 150 BCE. However, there are no increases in charcoal which would be expected if people were using fire as a tool for managing the landscape. Indeed, despite relatively extensive archaeological surveys (Mille 1970; Rakotovololona 1990, 1994; Rasamuel 2007; Rafolo 1989/1990; Wright 2007), there is also no evidence of settlement in the highlands prior to the second millennium CE. It is important to remember nonetheless, that the lack of evidence for human presence in the palaeoecological record is not per se evidence of a lack of human presence. In the Tritrivakely record, land use and fire management is only apparent from c. 1250 CE, when peaks of charcoal in combination with expansion of grasslands indicate that people probably used fire to transform the wooded landscape to a grassland dominated one (Burney et al. 2004, see further discussion below). At this moment it can only be speculated whether these landscape transformations are linked with a first settlement of people in the region, a new wave of settlement of cattle herders, or simply a transformation of economy and land use by already resident communities. This issue can be resolved only by further analyses of archaeological data, additional archaeological surveys and more palaeoecological studies in the highlands region.

The palaeoecological record indicates that in the mid-Holocene the semiarid south west, currently dominated by spiny forests, experienced more rainfall than today which led to the expansion of dry forests, with palms (Burney et al. 2004). Sedimentary cores from Ambolisatra, close to the sub-fossil bone site where cut marks have been found, show marked peaks in charcoal concentrations and a shift from palm-studded grassland to conditions similar to today (mosaic of grasslands and arid bushland) just before BCE 60–350 CE (1890 ± 90 bp, Burney et al. 2004). Burney (1993) interpreted these changes as induced by land use and fire management. This date has been widely cited, together with *Cannabis/Humulus* pollen in Lake Tritrivakely, in support of an early human occupation in Madagascar. Subsequently, however, Burney et al. (2003) redated the Ambolisatra core (using plant macrofossils, rather than, as previously, the bulk organic sediment) and suggested a more recent charcoal peak at 1200 cal yr BP. Similarly, analysis of another core from the same site suggests that human-induced landscape transformations can only be inferred for after 1200 cal yr BP, with large fire peaks and a shift from a wet palm-studded grassland to a mosaic of grasslands and arid bushland occurring prior to the fire peaks (Virah-Sawmy et al. in preparation). Thus the palaeoecological records from the semiarid south, and those of highland Lake Tritrivakely, suggest with confidence landscape transformations linked to human land use and fire management only after the first millennium CE. Meanwhile, the record from Lake Mitsinjo, further north, also shows evidence of possible human settlement only from c. 1000 CE when there occurs an increase in fire peaks. A marked change in vegetation took place only 500 years ago when there was a shift in vegetation patterns and a linked increase in ruderate taxa interpreted as anthropogenic in origin (Matsumoto and Burney 1994).

The early dates of arrival of humans to Madagascar as initially suggested by Burney's work in Ambolisatra and Lake Tritrivakely have been widely used and somewhat misconstrued as a marker date, not only for human arrival, but also for the onset of environmental degradation owing to human impact (see review in Virah-Sawmy et al. 2010). At present, our knowledge of the scale and mode of historical landscape transformations in Madagascar is limited due to the paucity of palaeoecological records. Furthermore, processes such as climate change and human activities operate at different scales and cannot be easily disentangled. From the few records that do exist it is clear that large scale transformations in vegetation patterns have occurred prior to the arrival of humans. It has been speculated that forests existed only as refugia along the east coast and in the northwest in the glacial period, and that forests expanded with the warmer and wetter conditions in the postglacial period (Burney et al. 2004). In other regions, such as the west coast, despite considerable climatic variability and human presence, vegetation appears to have been quite stable—the Anjohibe Cave area has had a *Medemia* palm savanna vegetation, similar to that of today over the last 40,000 years (Burney et al. 2004). The palaeorecords discussed above reflect site-specific changes that cannot confidently be used to infer landscape transformations. By contrast, Virah-Sawmy et al. (2009a,b, 2010) analysed several sedimentary cores from different environments across a relatively small area of the Ste-Luce region on the southeast coast. In general, even though the archaeological record shows permanent human habitation within 50 km from before 900 BP, they found no evidence for significant anthropogenic effects until after 500 BP and that climate variability was the most influential determinant when it comes to vegetation and landscape dynamics.

In summary, there are no clear indications of transformation of vegetation through land use before c. 1250 CE. Even though fire may have been used for clearing vegetation or for creating grazing areas for wild animals and/or cattle before that, our current state of knowledge indicates that this was on a small and local scale that might not be reflected in the pollen diagrams. The possibility that humans may have been present in the Madagascar ecosystem for several millennia also introduces the possibility that human-induced landscape changes were much more gradual than previously assumed.

The Issue of Megafaunal Extinctions

Sub-fossil bone sites such as Ambolisatra provide an important record for analysing faunal changes. Many of the mammal remains found in these caves are from extinct species. The causal mechanisms and the date of these extinctions have been widely debated. For some time is has been suggested that the extinctions are related to the inclusion of humans in the landscape, although large scale climatic-environmental causes have also been invoked (Dewar 1984; Martin 1984; MacPhee et al. 1985; also see recent review in Crowley 2010). Thus the debate about timing, of the first settlement of humans on the one hand, and of the different faunal extinctions (which was not uniform) on the other, have been linked. Crowley's recent effort to redate sub-fossil bones (2010) provides the most comprehensive evidence for dating megafauna decline on the island: her results indicate that there was a significant decline in large megafauna (>150 kg) prior to c. 450 BCE, but not in medium bodied animals (10–150 kg) until c. 950 CE. Crowley suggests that the extinction of megafauna supports the presence of early BCE hunter-gatherer communities, and that these communities may have had an enormous impact on faunal diversity, even if their presence is imperceptible in the palaeoecological record. In the central highlands, where small- to medium-sized mammals declined prior to c. 450 BCE, the number of very large taxa was low but remained relatively stable until c. 950 CE. After this date faunal decline increased—an event that Crowley links with widespread human settlement, cattle herding and agriculture throughout the island, including the highlands.

Notwithstanding the danger of circular reasoning in this debate, the Lakaton'i Anja Cave does now seem to fill an important gap in our understanding of landscape transformation in the centuries around the BCE/CE transition. The confirmation of cut marks on some of the sub-fossil faunal remains also makes highly plausible the link between hunting and megafauna. However, this is not evidence per se that megafaunal population decline and/or extinction dynamics were anthropogenically induced, and we should not discount the potentially dramatic influence of larger scale climatic changes during the Holocene (Virah-Sawmy et al. 2009a) (Fig. 9.3).

Madagascar, East Africa and its Off Shore Islands in the First Millennium and Beginning of the Second Millennium CE

First Millennium Contacts

East African Mainland

On the East African mainland, the centuries before and after the BCE/CE transition were characterised by a shift in material assemblages, with the presence of early *Chifumbadze* type ceramics (which includes the Kwale, Matola, and Silver Leaves traditions) and evidence of iron production (Chami 2006; Huffman 2007). Ceramics, iron and domesticates were likely introduced through a combination of population movements and contacts, exchange and trade. The dating of the onset of ceramic production is also

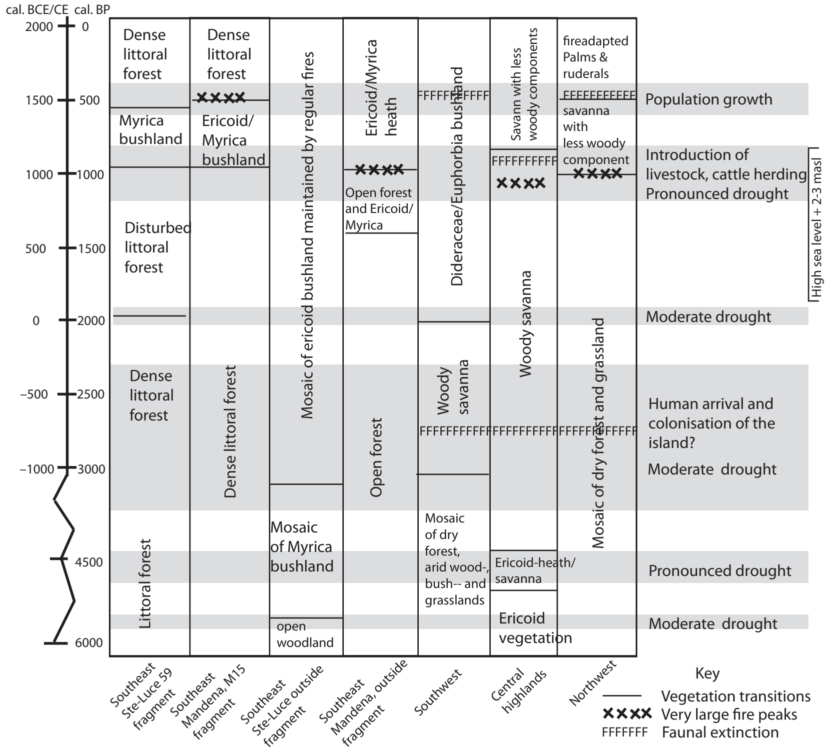


Fig. 9.3 Summary of vegetation changes and some social transformations (modified from Virah-Sawmy et al. 2010)

not entirely clear. Chami (2006) has argued that the presence of Kwale ware in the Rufijii River delta region dates back to 200 BCE. Similar BCE dates have been obtained in association with Kwale (Matola) ware from southern Mozambique (Sinclair et al. 1993). So far these dates have been discounted by most academics, but recently further BCE dates on Kwale/Matola pottery have been confirmed from southern Mozambique (Kohtamäki 2014). What appears clear is that the spread of new innovations on the coast was remarkably rapid. Given the early settlement by microlithic-producing communities of the coastal offshore islands and Madagascar, in combination with the rapid spread of innovations, we may have to rethink the eastern African coast in the early centuries BCE/CE as a region of high *connectedness*, with a long tradition of marine crafts and oceanic voyaging.

Early trade contacts across the Indian Ocean in the first millennium BCE has also been suggested by possible evidence in early archaeological layers of red slipped pottery, atypical of the local Chifumbadze type. This pottery has been correlated with Indian pottery dated to the first millennium BCE (Chami et al. 2003). So far this finding has been regarded with scepticism (Sinclair 2007), while reports of Greek–Roman beads (cf. Chami 1999c) have been rejected through the re-analysis by Wood (2012). However, trade with the east African coast is mentioned in both *Periplus Maris Erythraei* (mid-first century CE) and *Ptolemy's Geographia* (second century CE), sources that also describe there the presence of sewn boats and dugout canoes (Freeman-Grenville 1962; Blench 2010). These Greek–Roman sources, in combination with linguistics, have been drawn upon to suggest that Austronesians may have been present both on the east African coast and Madagascar at the beginning of the first millennium Beaujard 2007a,b, 2012)[1]. However, there is as yet no direct archaeological evidence to support this contention. Such hypotheses need to be contextualised by more finds.

While this review underscores the need to reconsider contacts between the east African coast, Madagascar and the Indian Ocean in the first centuries BCE, it confirms such linkages for the first millennium CE. For example, around 700 CE there emerged from the Kwale ceramics tradition to Tana Tradition (TT) or Triangular Incised Ware (TIW) (Chami 1998), a development evident throughout the coastal region, although classification criteria and definitions are somewhat elusive (Pawlowicz 2013; Fleisher and Wynne-Jones 2011). Long distance trade imports, such as glass beads, Sassanian green glazed ware and other glazed ware and earthen ware (Sirafi water-jars) with an origin from the Near East and, probably, the Persian Gulf, have been found at several sites dated from the seventh to tenth centuries CE, and in association with TT/TIW as far south as Chibuene, in southern Mozambique (Smith and Wright 1988; Horton 1996; Juma 1996, 2004; Chami 1998; Spear 2000; Chami et al. 2003; Sinclair 2007; Sinclair et al. 2012; Wood 2012). In late first millennium, trading centres such as Shanga (and nearby Manda), Unguja Ukuu, and Kilwa, developed from previous farming and fishing villages (Horton 1996; Kusimba 1999; Sinclair and Håkansson 2000; Spear 2000). Some of these gradually became Islamised while also maintaining close contacts with communities on the mainland. Kilwa, Shanga, and Manda, developed eventually into large urban centres with elite buildings and mosques built in coral stone masonry. The available material evidence also suggests that over the course of the eleventh century foreign trade at such centres increased significantly (Chittick 1974; Horton 1996), especially with the Red Sea, and most significantly, at least in the case of glass beads, with India (Wood 2012, this volume). Several smaller towns, also with stone architecture, emerged for the first time around this time—such as Kaole just south of modern-day Bagamoyo (Tanzania) which was first settled around CE 1100 (Chami 2002c), and Chwaka on Pemba Island (Laviolette and Fleisher 2009). However, other important early settlements—such as Chibuene in southern Mozambique, Unguka Ukuu on Zanzibar, and Tumbe on Pemba—were either abandoned or depopulated by c. CE 1000, roughly coinciding with the beginnings of greater regionality in ceramic styles (Fleisher and Wynne-Jones 2011).

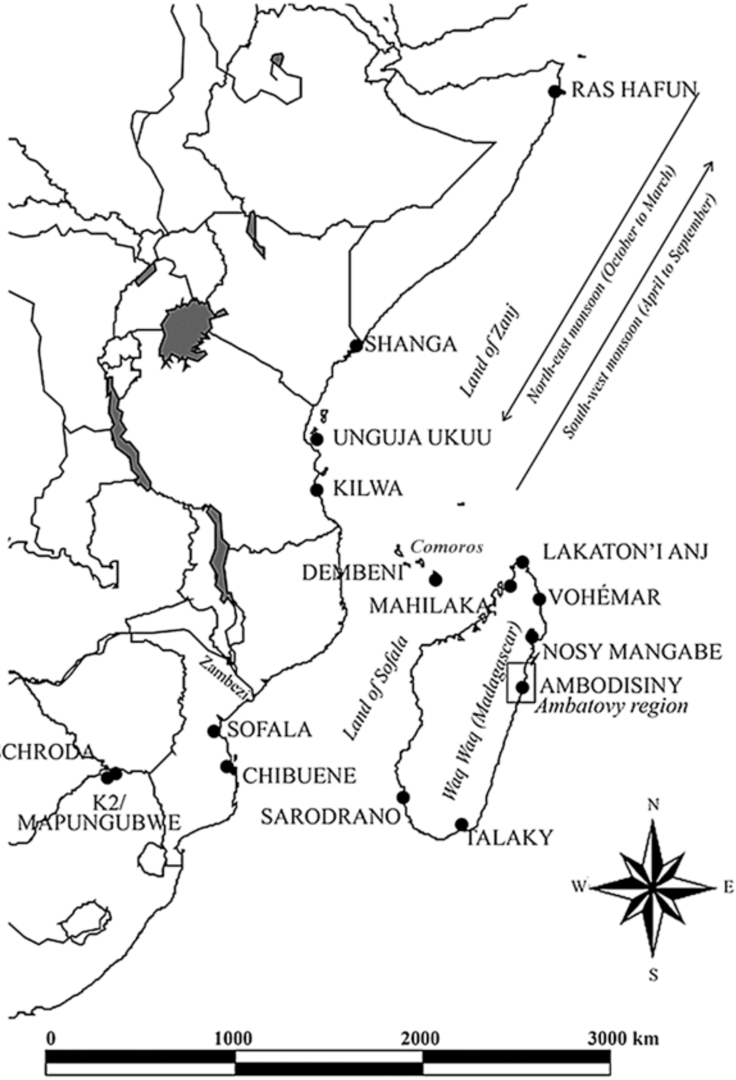
Madagascar and the Comoros

As several sites with traces of human settlement have been identified along the northeast coast of Madagascar dating from between the sixth and ninth centuries CE (Dewar and Rakotovololona 1992; Dewar and Wright 1993), it is generally accepted that humans had settled in Madagascar from the middle to the end of the first millennium. Another settlement site further south, near Vohémar, dated to the ninth century CE, located close to chlorite schist quarries, contained both ceramics and chlorite schist vessels—a Malagasy marker export item when found in other parts of the East African coast (Vérin and Wright 1999). Sarodrano, on the southwest coast, is another earlier site with ceramics and charcoal dated to between 410 and 710 CE (Battistini and Vérin 1971). On the island of Nosy Mangabe, in Antongil Bay, coarse fabric ceramics decorated with *Arca* shell imprints, chlorite schist sherds, and iron slag, was found in a layer dated to between 660 and 990 CE, and a similar site has been found 20 km inland (Vérin and Wright 1999; Burney et al. 2004).

Even though the early ceramic styles of Madagascar are indistinct, the *Arca* shell impressions have been correlated to similar impressions in the Comoros (Chanudet 1988, 2011; Liszkowski 2011; Wright 1984) where archaeological sites with ceramics, such as Dembeni, on Mayotte, are dated from 800 CE (Allibert et al. 1990, 1992). Similar impressions have been reported on the east African mainland but in small numbers (Vérin and Wright 1999), and there is a need for comparative analysis of this material with shell-impressed ceramic assemblages from the northern Mozambique coast dating to the early centuries CE (Sinclair et al. 1993). The late first and early second millennium CE styles common on the African mainland, such as TT/TIW, is largely missing from Madagascar, although some occurrences have been identified in the south (Parker Pearson et al. 2010). Thus the first millennium CE archaeological record of Madagascar appears more similar to that of the Comoros than the African mainland. Meanwhile, the Comoro sites, notably Dembeni, have a high (4 percent) amount of imported ceramics, mostly from the Near East and China, that so far has not been found on the east African coast (Allibert et al. 1990, 1992).

Two Distinct First-Millennium Trade Hubs

Although fragmentary, the late first millennium CE archaeological record suggests close contacts between Madagascar and the Comoros that extend to the Near East and China. By contrast, the east African coast appears to have been commercially well connected to the Near East and the Persian Gulf. Hence, as originally suggested by Shepherd (1982), the East Africa–Indian Ocean trade network may have constituted two distinct hubs, with possibly also different sets of trading partners—the one incorporating Madagascar and the southernmost section of the present-day Swahili coast, and the other the northern east African coast. This appears to be corroborated by Wood (2012) who has distinguished two different types of imported glass beads on the east African coast: the East Coast Indo-Pacific series (or East Coast I-P), common in the northern trading centres; and Zhizo beads which dominate the southeast coast. Zhizo beads, occur in high numbers in Chibuene and interior sites such as Schroda (precursor to K2 and Mapungubwe, Map 9.2), but rarely appear in northern sites. It would therefore seem likely that the southernmost extension of the East Africa Coast, Madagascar, and the Comoros constituted a separate trading hub (Sinclair et al. 2012). This theory is yet to be supported by other archaeological evidence. For instance, TT/TIW ceramics, found in Chibuene, are generally absent from sites on the Comoros and in Madagascar. Again, chlorite schist vessels, a marker export from Madagascar, occur infrequently in East Africa. Moreover, Chibuene seems to have lost its position as a trading centre by 1000 CE, and Zhizo beads disappear completely from the second millennium CE farming community sites—being replaced by the East Coast Indo-Pacific series (East Coast I-P) common throughout southern Africa (Sinclair et al. 2012; Wood 2012). Thus there appears to have been a significant change in trading patterns at the end of the first millennium CE. The account by Buzurg ibn Shahriyar in 945–946 CE, may possibly give some explanation of this



Map 9.2 East African Coast and selected late first millennium and early second millennium sites in Madagascar

change. Buzurg described how the Waq-Waq in outrigger canoes pillaged and conquered villages and towns of the Sofala region on the southern extension of the east African coast. According to Buzurg, they sailed for a year across the ocean to reach the Sofala coast where they sought ivory, tortoiseshell, leopard skins, ambergris, and slaves (Trimingham 1975: 133). This account has been taken to suggest that the Waq-Waq were Indonesians who had sailed directly from their homeland. It may also be taken to suggest political and social disruption of earlier trade patterns (Wood 2012, and see further discussion in Wood this volume).

Regardless of whether or not Madagascar was closely connected to the southeast African coast, it is clear from other lines of evidence that there were late first millennium contacts between the African mainland and Madagascar. African crops such as sorghum, and the legumes cowpea (*Vigna unguiculata*) and Bambara groundnut (*Voandzeia subterranean*), now grown in Madagascar, are likely to have been brought from the African mainland. These crops still retain their Bantu name and Beaujard (2011a,b) finds it likely that they were imported sometime during the first millennium, either through contacts or direct migration (see also Vérin et al. 1969). Sheep, goat, cat and dog were also introduced to Madagascar from the late first millennium (ninth to tenth centuries: Radimilahy 1998, see review in Boivin et al. 2013). It is conventionally assumed that these domesticates where brought by Austronesian colonisers, but the transfer may also have taken place from the African mainland. A number of translocations of wild animals, such as the wild bush pig and blue duiker, also occurred from the African mainland to the Comoros, and by the tenth century to Madagascar (Boivin et al. 2013). Around the same time there is also evidence of translocation of wild species from Madagascar to the Comoros (Radimilahy 1998), and from the Comoros to the African mainland (Boivin et al. 2013; see also Walsh 2007)[2]. Many other examples of exchanges in material culture have been reviewed by Blench (2010).

Early Second Millennium Contacts

Archaeological sites are more numerous from the beginning of the second millennium CE. In northernmost Madagascar, forty sites have been identified, mostly dated to between the twelfth and thirteenth centuries. They contained ceramics, beads, marine shell and bones from terrestrial fauna (Dewar and Rakotovololona 1992; Dewar and Wright 1993). In the uppermost layers of Lakaton'i Anja Cave (already alluded to above), Persian Gulf sgraffiato (eleventh to thirteenth centuries), green glazed ware (thirteenth to fourteenth centuries or later), and white glazed ware from southern China (eleventh to thirteenth centuries) were found together with local ceramics (Dewar et al. 2013). Imports such as sgraffiato have also been found further south on the northeastern coast, at Vohemar, where their occurrence is dated to the third century CE onwards (Vernier and Millot 1971; Rakotoarisoa and Allibert 2012; Amigues 2012; Allibert 2012; Radimilahy 2012; Rasoarifetra 2012; Zhao 2012), and Irodo, dated to the twelfth century or earlier (Battistini and Vérin 1967; Vérin 1975, 1986; Dewar 1984).

On the northwest coast of Madagascar, one of the earliest known trade centres was Mahilaka, which dated to between the ninth and fifteenth centuries CE (Radimilahy 1998). The site, covering an area of about 70 ha, is surrounded by a wall 1.5 km in length and about 600 m wide. Physical remains also include a fortress, mosque and vestiges of a dam. Excavations have revealed that Mahilaka sustained an urban population from at least 1000 to 1400. The site yielded evidence of the importation of Chinese porcelain dating to the tenth, fourteenth and sixteenth centuries, together with other stonewares, Persian Gulf sgraffiato, Islamic monochrome, glass beads and glass fragments, ivory artefacts and 2300 beads glass beads most of which were similar to those found on the east African coast (East Coast I-P and Khami I-P series as identified by Wood 2012; see also Wood in this volume). The site shows architectural and material similarities with Swahili sites in East Africa and the offshore islands, which suggests that Mahilaka formed part of the wider Indian Ocean trade network prior to the thirteenth century CE (Martin 2010), but material remains also suggest affinities with South East Asia (Radimilahy 1998). The reasons for the abandonment of Mahilaka in the sixteenth century are not understood and require further research (ibid).

On the southernmost coast of Madagascar, the site of Talaky has been interpreted as a first to early second millennium CE trading centre (Battistini et al. 1963; Parker Pearson et al. 2010). Trade centres have been investigated in the southern arid region of Madagascar that are contemporary with, but much smaller than, Mahilaka (Radimilahy 1981; Parker Pearson et al. 2010; Radimilahy and Crossland 2015). In these, glass bead types similar to those of Mahilaka have been recovered, and a few that are similar to the assemblages that occur in Mapungubwe and Zimbabwe in the southern African interior (the K2 I-P series according to Wood 2012). Recent surveys in the Ambatovy region of east-central Madagascar, focused on sites dating chiefly to the late second millennium, reveal indications of long distance trade, with the presence of chlorite schist, graphite and sgraffiato (Rakotoarisoa 2011). Later sites dating from the twelfth century onwards have also been reported by Crossland (2001, 2014) in the central Andrantsay region. The site Ambodisiny, on the mid-east coast, where a chlorite schist jar from Vohemar was found, has been preliminarily dated through association with pottery and regional affinities to the twelfth century and, dated to the same period, imports such as Persian Gulf sgraffiato, Islamic monochrome, Chinese celadon, glass fragments, and glass beads (Radimilahy 2011b). In the Anosy region of southeastern Madagascar, surveys and excavations by Rakotoarisoa (1998) have revealed a number of settlements dating from the tenth century but no evidence of foreign or long distance trade before the early second millennium. Rakotoarisoa identified four settlement phases. The earliest was characterised by small settlements, practicing fishing, hunting, cattle herding, and possibly rice cultivation. From the fourteenth century there is evidence of increased specialisation between settlements, and in the sixteenth century the emergence of a hierarchical pattern of settlements, sometimes fortified, and long distance trade that brought new immigrants who took political control of the region.

In sum, in the early second millennium Madagascar appears to have been more closely connected to the northern east African coast network than was the case in the first millennium CE. Many marker imports, such as Sassanian and sgraffiato, occur both in Madagascar and along the east African coast, and strong Madagascar–East African linkages continued into more recent historical times (see e.g., Allibert 1997–1998; Hébert 1998; Gueunier 2004). At the same time, Madagascar's contacts with the Austronesian influence zone also remained strong into the early second millennium (see chapter by Manguin in this book).

Summary

Our review, which focuses on two key questions, the first human settlement of Madagascar and the degree of interaction between Madagascar and the African mainland in the first and early second millennium CE, shows that the prehistory of Madagascar might have to be revised. There are now different lines of evidence that suggest human presence dated to the BCE era. Notwithstanding the important critical problems raised by Andersson (2014), we do find that the lithics from Lakaton'i Anja Cave and Ambohiposa Rockshelter and the associated BCE dates are plausible and fill an important gap when it comes to early settlement and landscape transformations in Madagascar. In any case, even with a later CE date the presence of LSA type lithics needs to be explained. The archaeological evidence from Lakaton'i Anja is supported by the findings of possible cut marks at many other sites dated to around the centuries BCE/CE and also here we find the confirmations by Perez et al. (2005) and Gommery et al. (2011) that these are indeed cut marks convincing. These small traces of possible early human presence are concentrated in the far north, and similar occurrences occasionally occur in other parts of Madagascar, but more archaeological evidence is needed before early human presence in Madagascar can be accepted as incontrovertible.

Genetic studies have indeed suggested a contribution of ancestry to the populations of these settlements from Africa, Southeast Asia, and Arabia-Persia as discussed here. The initiation of specific Malagasy genetic transformations may now have to be moved back in time and the influence of a pre-existing Malagasy population prior to Austronesian settlement must be considered and tested in genetic models.

The possibility that humans may have been present in the Madagascar ecosystem for several millennia also introduces the possibility that human-induced landscape changes were much more gradual than has previously been assumed. The early hunter-gatherer communities did not, from what we know, have a large scale impact on vegetation patterns. Even though fire may have been used for clearing vegetation or for creating grazing areas for wild animals, this was on a small and local scale. As discussed above, there are no clear indications of transformation of vegetation through land use before c. 1250 CE. The settlement of humans, however, might have had significant effects on the ecosystem. The co-adaptation of humans, plants, and animals, as far as we know, has over a time period that in evolutionary terms is very short and this, in combination with climatic variability, may also be one of the explanations for the extinction of megafauna and smaller fauna in Madagascar between c. 450 BCE and 950 CE.

We have also attempted here to explore the different lines of evidence for contacts between Madagascar and the African mainland. The possible early settlement of hunter-gatherer groups most likely took place from the African mainland, though much more archaeological research, and comparison between lithic assemblages, is needed in order to understand possible Madagascar–Africa linkages. The early settlement of Madagascar may also mean that we have to in part revise our understanding of the prehistory of the African mainland. As has been discussed here, we consider it likely that hunter-gatherer communities on the coast had boats and were skilled enough to navigate a difficult and changing shoreline. It is unlikely that the archaeological traces of hunter-gatherers represent one single movement of people (even though the findings are few) but rather several movements over time by small communities. We have used the term of high *connectedness* to describe the eastern African coast in the centuries BCE/CE and this network, we argue, also included Madagascar. The movement of domesticates, plants, and fauna (and other cultural traits that have not been discussed here) across Madagascar and the African mainland, does suggest continuous contacts even if, thus far, the actual dates of introduction in Madagascar are relatively late.

Over the first millennium, influence from the Austronesian cultural zone can be seen, including possibly human migration. Certainly the number of settlement sites then increased significantly in Madagascar. In the late first millennium CE, the archaeological record of Madagascar appears to be more similar to that of the Comoros and the Austronesian influence zone than to the African mainland which extended to the Near East and China. Thus, Shepherds' (1982) suggestion that the East Africa–Indian Ocean trade network comprised two different hubs, one including the southernmost coastal stretch of east Africa and Madagascar, and the other the northern east African coast, is supported here. By the end of the first millennium CE, old trade networks may have broken down and other partners and trade constellations were negotiated. Thus in the early second millennium CE, Madagascar appears to have become more closely connected to the northern east African coastal network than was the case in the first millennium—which intriguingly roughly correlates with the evidence for increased "maritimity" among Swahili populations (Fleisher et al. 2015). Contacts and exchanges between Madagascar and the African mainland have also continued to be strong in more recent historical times. However, that is, as they say, another story.

Notes

1. In the seventeenth century Flacourt (2007) also reported oral traditions about the *Zafikazimambo* dynasty (descendents of Mambo), who originated from northern Mozambique (see also Allibert 1988). Groups still known as *Mambo* live in Madagascar but the oral tradition of the identity of *Mambo* and the timing of the supposed movement to Madagscar is not clear from oral tradition.
2. The black rat (*Rattus rattus*) and house mouse (*Mus musculus*) are other examples of translocation (though possibly accidentally) that have taken place, the earliest finding of rat dates to the sixth to eighth centuries though they were present earlier in Egypt and appear in Madagascar from the tenth century. The early first century CE dates of black rat and house mouse bones from Madagascar, used by Blench (2010) to argue for the presence of early contacts with the Greek–Roman world are still to be corroborated (Boivin et al. 2013).

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CHAPTER 10

A Genomic Investigation of the Malagasy Confirms the Highland–Coastal Divide, and the Lack of Middle Eastern Gene Flow

Jason A. Hodgson

Introduction

The island of Madagascar is among the last of the major landmasses to have been populated by humans, yet this colonization remains one of the least well understood. Madagascar is the world's fourth largest island by area, and is separated from mainland Africa by the Mozambique Channel. This separation occurred during the early Cretaceous, and Madagascar has been entirely isolated from the mainland since at least the early Miocene (McCall 1997). The long history of isolation led to a largely endemic flora and fauna that contains many ancient and unique lineages such as the lemurs, and makes Madagascar one of the world's most important biodiversity hotspots (Ganzhorn et al. 2001). In contrast, humans arrived in Madagascar only within the last few thousand years, the result

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of the confluence of two of humanity's great population expansions—the Bantu-speaking and Austronesian (Dewar and Richard 2012; Dewar and Wright 1993). Subsequent human activity has had devastating effects on Madagascar's biodiversity, with the extinction of almost all of the megafauna (Burney et al. 2004) and the loss of most of the forest that once existed, including a >50 percent reduction over the last 70 years (Green and Sussman, 1990). Understanding the peopling of Madagascar helps shed light on both human movements around the Indian Ocean, and the role that humans have played in Madagascar. Nonetheless, much of the detail regarding the origins of the Malagasy and their settlement of Madagascar remains unknown. In this chapter, I use genomic data to address two important albeit very basic questions about the Malagasy. First, how do groups from the Malagasy littorals differ genetically from those that live in the highlands; and second, from how many source populations do the Malagasy descend?

It has long been known that, despite their proximity to sub-Saharan Africa, the people of Madagascar (the Malagasy) are ethnographically more affiliated with the people of Southeast Asia than with Africans (Johnston and Birkeli 1920). There are currently more than 20 million people in Madagascar (CIA 2014), the population having increased by nine million since 1990 (Green and Sussman 1990). They are divided into over 18 ethnic groups (Kottak 1971; Tofanelli and Bertoncini 2010), all of which speak a dialect of Malagasy, an Austronesian language most closely related to that spoken in the Barito River region of Kalimantan, Borneo (Dahl 1951; Gray et al. 2009; Serva et al. 2012; Adelaar in this volume). The only exception is a small group of bilingual Swahili speakers on the northwest coast (Dewar and Wright 1993). Though undoubtedly Austronesian, Malagasy contains many Bantu and Sanskrit loan words (Dahl 1951). The Malagasy are primarily agriculturalists, relying on rice, taro, chickens, and pigs of Asian origin, and millet, sorghum, and cattle of African provenance (Beaujard 2011a; Blench 2007). However, the Mikea, an ethnic group from the southwest coast, live as hunter-gatherers (Blench 2007). Biological and cultural variation between Malagasy ethnic groups remains poorly understood, although it is generally acknowledged that coastal groups are more African in their physical appearance and pastoral lifestyle than are the highland rice-cultivators (Blench 2007; Tofanelli and Bertoncini 2010). Genetic studies evaluating mitochondrial DNA, Y-chromosome, and nuclear DNA confirm that all sampled Malagasy groups have substantial African and East

Asian ancestry (Hodgson et al. 2014b; Hurles et al. 2005; Pierron et al. 2014; Tofanelli et al. 2009).

It is clear from the island's cultural and biological diversity that its settlement by humans was a complex affair. Moreover, the archaeological record as to the sequence and timing of arrivals is the subject of considerable dispute (Ekblom et al in this volume). Whatever the arguments for initial human activity in Madagascar, the first permanent human settlements do not appear until about 1300 BP, and become widespread only from 1000 BP (Dewar and Richard 2012). The origins of the first settlers remain largely unknown, as does the timing and sequence of the first migrations to Madagascar. It has been suggested that the first migrants were hunter-gatherers from Africa (Blench 2007). However, this remains speculative. There is no close genetic relationship between the hunter-gatherer Mikea and mainland African hunter-gatherers, and no evidence as yet of any early African hunter-gatherer contribution to present-day Malagasy genetic diversity (Pierron et al. 2014).

However, by 1000 BP, when the archaeological record suggests significant population densities, there is evidence for both African- and Austronesian-associated cultural goods, including domestic animals and crops from both regions (Beaujard 2011a; Blench 2007; Dewar and Richard 2012; Dewar and Wright 1993). Moreover, by at least 900 BP, Madagascar was fully integrated into the Indian Ocean trade network (Dewar and Richard 2012; Dewar and Wright 1993).

Several hypotheses have been proposed to explain the settlement of Madagascar. Otto Dahl (1951) suggested that the earliest possible colonization by Austronesians was during the fifth century CE, because Sanskrit loan words do not appear in Indonesia until this time. Hubert Deschamps (1960) argued that the genetic mixing of Austronesians and Bantu occurred in East Africa, prior to the proto-Malagasy arrival in Madagascar—and thus that the Malagasy arrived in a single migratory wave. Robert Dewar and Henry Wright (1993) argued that Austronesians were the first to arrive, and that they settled in the highlands where better conditions existed than on the coast for rice cultivation; and that subsequently Bantu-speaking migrants from East Africa settled the then unoccupied coastal regions. Most recently, Roger Blench (Blench 2007, 2010) has argued that the first colonizers were hunter-gatherers from East Africa who reached Madagascar prior to the arrival in East Africa of Bantu-speakers. These initial settlers, Blench argues, were similar in origin to the remnant click-speaking hunter-gatherer groups of East Africa such as the Hadza. They were followed by Austronesians who had previously had significant contact with the African mainland, and brought with them Bantu-speaking Africans as labour. Blench (2007) attributes the distinction between highland and coastal groups to higher disease (e.g. malaria) prevalence in the lowlands, and greater natural resistance of Africans to malaria.

The currently dominant hypotheses about Malagasy origins are largely derived from linguistic and archaeological data which, however, remain speculative due to the relatively sparse archaeological record, and the ambiguity of linguistic data. Although the study of Malagasy population genetics is still in its infancy, genetic data may potentially clarify the major issues surrounding Malagasy origins. The first investigation of Malagasy DNA sequence variation identified the presence of the mitochondrial "Polynesian motif" (Soodyall et al. 1995); a marker associated with the Austronesian expansion throughout the Pacific (Friedlaender et al. 2007). M.E. Hurles et al. (2005) investigated maternally inherited mitochondria and paternally inherited Y-chromosomes from four highland ethnic groups and found nearly equal proportions of African and East Asian inheritance, thus confirming the initial finding of genetic contributions from both African and Austronesian source populations. S. Tofanelli et al. (2009) expanded upon this by collecting mitochondrial and Y-chromosome data from three southern coastal groups in addition to the highland Merina and found a similar dual heritage in the coastal samples. However, the coastal samples were found to have greater variation in African lineages, and a greater proportion of African Y-chromosomes. Neither study was able to identify the source Austronesian or African population from which the Malagasy descend.

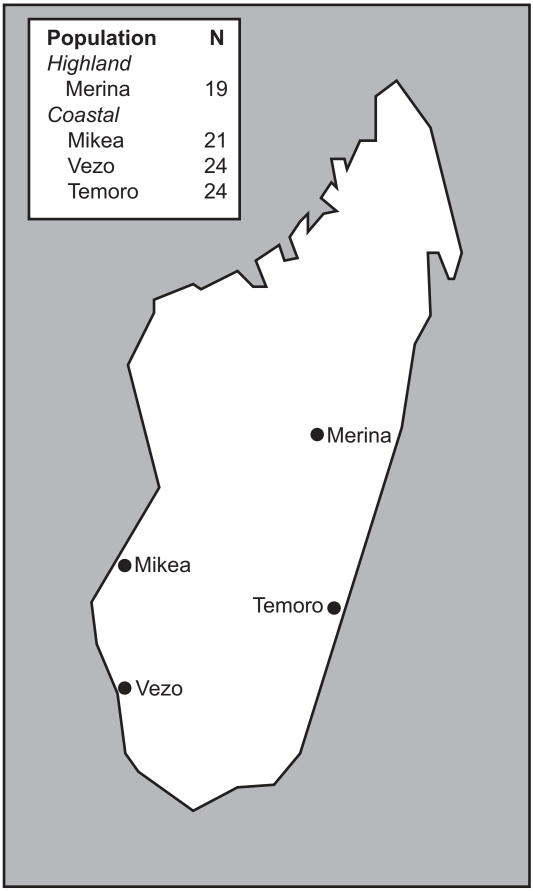
The mitochondrial and Y-chromosome studies clearly demonstrate substantial African and East Asian ancestry in all sampled Malagasy ethnic groups. However, multilocus genomic studies are required to accurately estimate the proportions of ancestry contributed by each source population. Two studies have estimated Malagasy admixture proportions from genomic single nucleotide polymorphism (SNP) data. D. Pierron et al. (2014) genotyped 750k SNPs from three coastal populations and found the proportion of African ancestry to be ~67 percent in all three groups. They estimated the admixture to have occurred between 20 and 32 generations ago (600–960 BP), assuming 30 year generations (Langergraber et al. 2012). The time of admixture was estimated using the decay of admixture-induced linkage disequilibrium (Loh et al. 2013). Simulations have shown that when multiple waves of migration have occurred, this method is biased towards the most recent event (Hodgson et al. 2014a). Thus, the most recent episode of admixture likely occurred 600–960 years ago. However, older episodes cannot be ruled out.

Hodgson et al. (2014b) genotyped 10k SNPs from a highland Merina sample and found the proportion of African ancestry to be 48 percent. The difference in African ancestry between the two studies is consistent with noted phenotypic differences between the regions (Tofanelli and Bertoncini 2010). Nevertheless, because the studies used different comparative populations, and different SNPs, the estimates are not necessarily directly comparable. Hodgson et al. (2014b) also found ~4 percent ancestry most similar to the European comparative samples. This finding is intriguing because it is possible that it represents a Middle Eastern or European contribution to the Malagasy population. As no Middle Eastern comparative samples were used, this hypothesis was not possible to test; and no Middle Eastern genetic contribution has hitherto been found, despite the extensive cultural contact between the two regions (Capredon et al. 2012; Hurles et al. 2005; Tofanelli et al. 2009).

In this study, I use the available genomic SNP data to quantify the difference in ancestry proportions between highland and coastal groups, and to formally test for a Middle Eastern contribution to the Malagasy. Population genetic studies are inevitably limited by the availability of appropriate comparative samples. Understanding Malagasy genetic history requires comparison to the global populations that are closely related to, and serve as proxies for, their ancestral source populations. Ideally, this would mean including extensive sampling from coastal groups around the Indian Ocean basin with an emphasis on the East African coast and Island Southeast Asia; however, few such comparative samples are currently available. In particular, no Island Southeast Asian comparative populations were available for this study. Practically, because human genetic variation is largely clinal and because the Malagasy are known to contain ancestry from relatively distantly related sub-Saharan Africans and Southeast Asians, important insights can be made through comparison with available mainland Southeast Asian and East Asian populations since these are relatively closely related to Island Southeast Asians. Here, I utilize all available Malagasy genomic data in conjunction with the best available comparative samples taken from the Human Genome Diversity Project (Cann et al. 2002), and from my colleagues and my previous research (Hodgson et al. 2014a; Hodgson et al. 2014b).

Results

To compare the genetic diversity between highland (Merina) and coastal (Mikea, Temoro, and Vezo) Malagasy ethnic groups (Map 10.1), I assembled a data set containing the maximal number of SNPs from available data (Table 10.1). The resulting dataset contained only 2559 autosomal SNPs, which are far fewer than most human genomic studies. To test if the dataset contained suitable information to detect genetic differences between populations I performed multidimensional scaling (MDS) upon the pairwise matrix of identity by state (IBS) among all individuals in the dataset.



Map 10.1 Map of approximate Malagasy population sample locations used in this study

Table 10.1 Sample information, 2.5k SNP dataset

Population	*N*	*Source*
Madagascar		
Merina	19	Hodgson et al. (2014a)
Mikea	21	Pierron et al. (2014)
Vezo	24	Pierron et al. (2014)
Temoro	24	Pierron et al. (2014)
Africa		
South African Bantu	16	Hodgson et al. (2014a)
Mozambican	19	Alves et al. (2011)
Burunge	20	Bauchet et al. (2007)
Europe		
European	42	Bauchet et al. (2007)
South Central Asia		
Mala	11	Bauchet et al. (2007)
Brahmin	11	Bauchet et al. (2007)
East Asia		
Chinese and Japanese	20	Norton et al. (2007)

This method assumes that SNP allele sharing indicates a closer genetic relationship, and reduces the overall pattern of allele sharing to significant independent dimensions. When plotted, individuals with greater genomic similarity are closer together. Also, the significant dimensions often correlate to geography (Novembre et al. 2008).

As expected from worldwide analyses (Wang et al. 2010), and a previous analysis using a similar dataset (Hodgson et al. 2014b), the first dimension separates sub-Saharan Africans from the rest of the world, while the second dimension separates groups across Eurasia (Fig. 10.1). Also as anticipated, the four Malagasy groups were found to cluster between the Africans and East Asians. There are two clear Malagasy clusters. The first is shifted in the direction of the Africans, and contains all the individuals from the three coastal groups. The second is shifted in the direction of the East Asians and contains eight of the nineteen highland Merina samples (Fig. 10.1). This finding is broadly consistent with greater Asian ancestry in highland groups (Tofanelli and Bertoncini 2010; Tofanelli et al. 2009), although it suggests that there is greater variation within highland than coastal groups.

In order to quantify the differences in ancestry between individuals and between groups observed in the IBS-MDS plot, I used the model-based

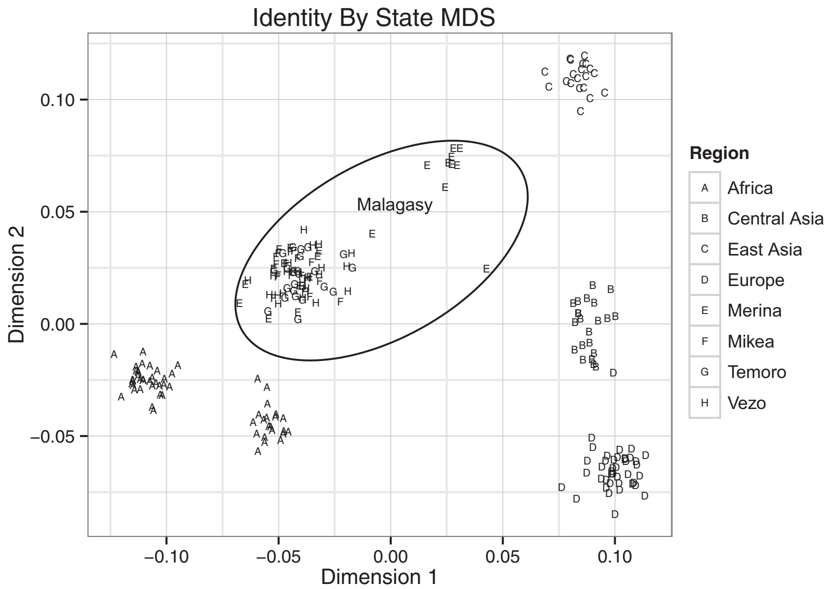


Fig. 10.1 Plot of the first two dimensions of a multidimensional scaling analysis of pairwise identity by state using the 2.5k SNP dataset. The Malagasy are intermediate between the sub-Saharan African and East Asian samples as expected if the Malagasy are a mixture of Bantu- and Austronesian-speakers from the East African coast and Island Southeast Asia, respectively

non-hierarchical clustering method implemented in the software ADMIXTURE (Alexander et al. 2009), which employs a fast maximum likelihood implementation of the model used in the well-known software STRUCTURE (Falush et al. 2003; Pritchard et al. 2000). This method infers K ancestral populations by minimizing Hardy–Weinberg and Linkage Disequilibrium (LD), and assigns proportions of each genome to an inferred ancestry component (IAC). Thus, group membership is inferred from genetic data alone and no *a priori* geographic or group information are considered.

I first sought to infer the number of IACs that best describes the data by running ADMIXTURE in cross validation mode for $K = 2–5$ and choosing the value of K that minimized the error. It was found that $K = 3$ IACs best describes the data. A bar plot of the inferred ancestry for $K = 3$ shows that the sub-Saharan Africans primarily have ancestry from the black IAC, Europeans have ancestry from the light grey IAC, and East Asians have ancestry from the dark grey IAC (Fig. 10.2). Hereafter, I name IAC by the geographical region from which it is found in highest frequency. I place the region in quotations to indicate that the regional association may be dependent upon the samples included in the analysis. For example, the "East Asian" IAC likely reflects Southeast Asian ancestry in the Malagasy; however, since such comparative samples were not available for this study, it is impossible to be geographically or ethnically more specific. The East African Burunge show a significant proportion of the "European" IAC, consistent with findings of back-to-Africa migrations from the Middle East during the past 20,000 years (Hodgson et al. 2014a; Pagani et al. 2012; Pickrell et al. 2014). The Brahmin and Mala, from India, show a mix of "European" and "East Asian" ancestry, suggesting that these IAC grade clinally across Eurasia. Malagasy ancestry proportions are summarized in Table 10.2. As expected, the four Malagasy groups primarily have "African" and "East Asian" ancestry, with greater "African" ancestry in the coastal (62–65 percent), than highland (47 percent) groups. The highland Merina also show much greater variation in ancestry proportions. All four Malagasy groups show small and variable proportions of "European" ancestry (2–4 percent), with no apparent difference between highland and coastal groups.

The 2–4 percent "European" ancestry found in the 2.5k dataset is interesting. There are at least six possible explanations: "European" ancestry reflects: (i) Middle Eastern admixture; (ii) genetic input from Europeans shipwrecked on the island from circa 1500; (iii) admixture from the French colony in the southeast of the island from 1643 to 1674; (iv) genetic input from European pirates who made Madagascar their bases, notably between 1680 and 1720; (v) post-1895 French colonial admixture; or was (vi) inherited along with the "East Asian" ancestry from the Austronesian migrants. The first five hypotheses require a third genetic input into the Malagasy, in addition to the well-known Bantu and Austronesian components. The final hypothesis requires only Bantu and Austronesian ancestry. In this scenario, the "European" component would reflect clinal variation in the "European" IAC across Eurasia, and was a component of the Austronesian parent population.

In order to distinguish between these hypotheses, I assembled a dataset including more comparative populations and 150k SNPs (Table 10.3). This data set included European, Middle Eastern, and many more Asian samples, but excluded the highland Merina for whom the expanded SNP

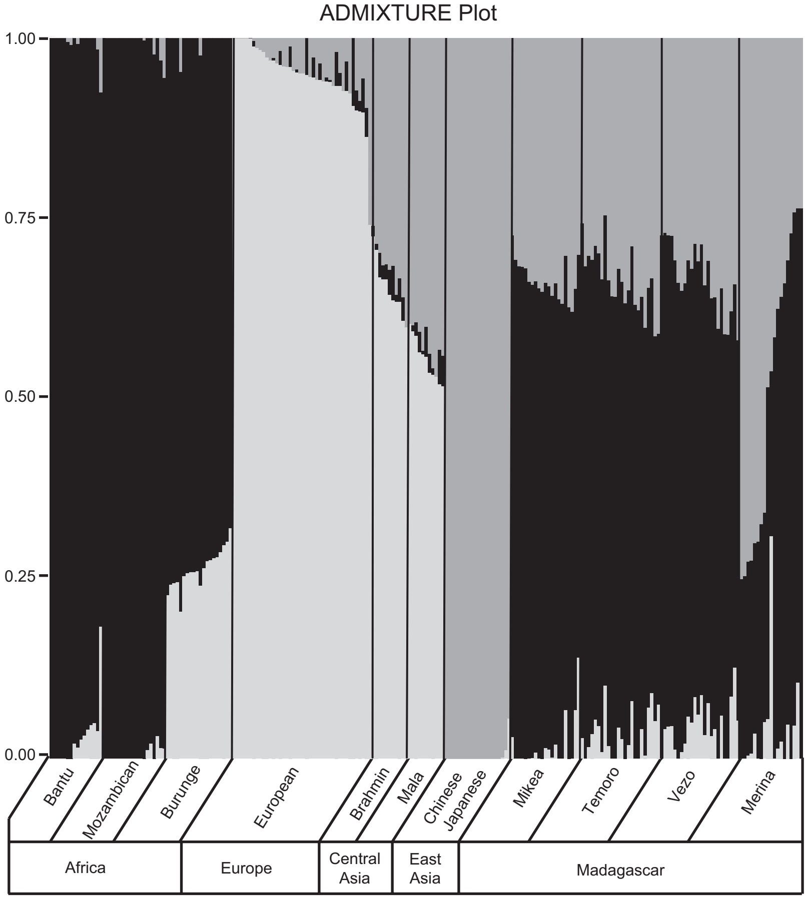


Fig. 10.2 Barplot of inferred individual ancestry components from ADMIXTURE analysis of the 2.5k SNP dataset with three inferred ancestry components. The three components largely correspond to "African" (black), "European" (light grey), and "East Asian" (dark grey) clusters. The Malagasy show variable amounts of "African" and "East Asian" ancestry, with less variation and greater "African" ancestry in the coastal populations (Mikea, Temoro, and Vezo) than the Highlanders (Merina). These ancestry components likely reflect the proportions of ancestry from Bantu- and Austronesian-speakers

Table 10.2 2.5k SNP ADMIXTURE $K = 3$ ancestry proportions summary

Population	*"European"*		*"African"*		*"East Asian"*	
	Mean	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*
Highland						
Merina	0.04	0.07	0.47	0.20	0.50	0.20
Coastal						
Mikea	0.02	0.03	0.65	0.03	0.34	0.03
Temoro	0.03	0.03	0.63	0.05	0.34	0.04
Vezo	0.04	0.03	0.62	0.05	0.33	0.05

data is not available. The 150k SNP data was used to greater explore the "European" IAC found in the 2.5k SNP dataset. I first used ADMIXTURE in cross validation mode to determine which value of K best described the data for $K = 2–15$, and found that cross validation error was minimized with $K = 5$. The plot of IACs with $K = 5$ is shown in Fig. 10.3. The plot shows IAC 3 to be primarily "African", IAC 1 primarily "European", IAC 5 primarily "Middle Eastern", IAC 2 primarily "Central Asian", and IAC 4 "East Asian". The four Eurasian components are not exclusive to any of the populations, and instead grade across Eurasia. The mainland Southeast Asian Cambodians primarily consist of the "East Asian" IAC, suggesting that the East Asian comparative samples do serve as an acceptable genetic proxy for Southeast Asians. As expected, the Malagasy show majority "African" (66 percent) and "East Asian" (32 percent) ancestry. Of the remaining 2 percent ancestry, "Central Asian" comprised the majority (Table 10.4). This analysis fails to find any support for significant Middle Eastern or European ancestry in the Malagasy.

To test the hypotheses further, I used the method implemented in the software TREEMIX to infer the relationships among populations in the study and the history of migrations between populations (Pickrell and Pritchard 2012). The TREEMIX model assumes that extant populations primarily result from splits between ancestral populations, and that differences in allele frequencies between groups are a result of genetic drift since the splits. Thus, a bifurcating tree joining populations with the smallest allele frequency differences can describe the relationship between most populations. However, allele frequencies in populations with admixture from one or more distantly related populations will be poorly described by the tree structure. TREEMIX takes advantage of this to infer migrations

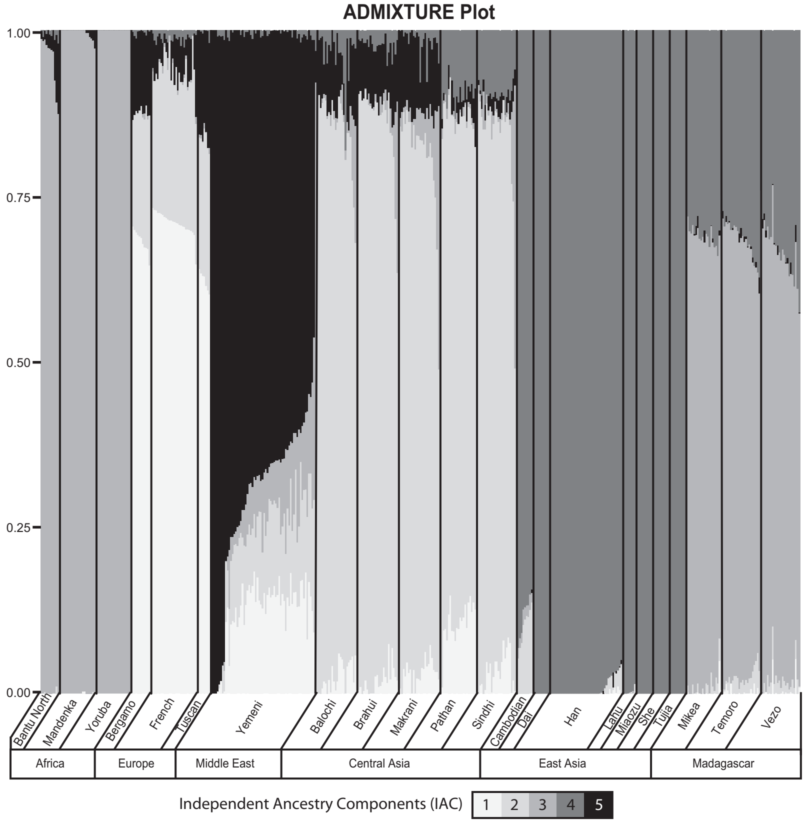


Fig. 10.3 Barplot of inferred individual ancestry components from ADMIXTURE analysis of the 150k SNP dataset with five inferred ancestry components. Here the coastal Malagasy (Mikea, Temoro, and Vezo) show no significant amount of the "Middle Eastern" ancestry (IAC 5) that is predominant in the Yemeni

in complex datasets. TREEMIX first infers the bifurcating tree with the minimum amount of genetic drift between populations using a maximum likelihood approach. Then, given this tree, the covariance matrix of shared ancestry and its standard error are computed. A history of migrations between distantly related populations on the tree would increase the observed standard error. TREEMIX then adds weighted migrations between branches on the tree to improve the fit of the graph to the data.

Table 10.3 Sample information, 135k SNP dataset

Population	*N*	*Source*
Madagascar		
Mikea	21	Pierron et al. (2014)
Temoro	24	Pierron et al. (2014)
Vezo	24	Pierron et al. (2014)
Africa		
Bantu North	11	HGDP
Mandenka	22	HGDP
Yoruba	21	HGDP
Mid East		
Yemeni	64	Hodgson et al. (2014b)
Europe		
Bergamo	12	HGDP
French	28	HGDP
Tuscan	8	HGDP
South Central Asia		
Balochi	24	HGDP
Brahui	25	HGDP
Makrani	25	HGDP
Pathan	22	HGDP
Sindhi	24	HGDP
East Asia		
Cambodian	10	HGDP
Dai	10	HGDP
Daur	9	HGDP
Han	44	HGDP
Lahu	8	HGDP
Miaozu	10	HGDP
She	10	HGDP
Tujia	10	HGDP

Table 10.4 135k SNP ADMIXTURE $K = 5$ ancestry proportions summary

Population	*"African"*		*"European"*		*"Mid Eastern"*		*"Cent. Asian"*		*"East Asian"*	
	Mean	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*
Mikea	0.68	0.02	0.00	0.01	0.00	0.01	0.01	0.01	0.31	0.02
Temoro	0.66	0.04	0.00	0.01	0.00	0.01	0.02	0.01	0.31	0.03
Vezo	0.65	0.04	0.01	0.01	0.00	0.01	0.02	0.01	0.33	0.05
Total	0.66	0.04	0.00	0.01	0.00	0.01	0.02	0.01	0.32	0.03

For the TREEMIX analysis, I used the populations from Table 10.3 and added the San hunter-gatherers (HGDP) as an outgroup (Pickrell and Pritchard 2012), and allowed TREEMIX to sequentially add 1–10 migrations. The bifurcating tree grouped the populations largely as expected, with the populations geographically distant from Africa being the most distantly related to the Africans (Pickrell and Pritchard 2012). The Malagasy grouped with the sub-Saharan Africans. A plot of the residuals of the standard error, given the inferred tree shows the greatest error in the Yemeni with respect to the African populations, and the Malagasy with respect to the East Asian populations (Fig. 10.4a). Correspondingly, the first migration TREEMIX infers is from the node ancestral to the Mandenka, Yoruba, and Bantu North to the Yemeni. African ancestry in the Yemeni has been documented previously (Abu-Amero et al. 2007; Cerny et al. 2008; Hodgson et al. 2014a; Richards et al. 2003). The second inferred migration is from a population intermediate between Cambodians and the other East Asian populations into Madagascar (Fig. 10.4b). This is consistent with the hypothesized Island Southeast Asian input into the Malagasy. When TREEMIX is asked to add migrations 3–10, it never infers a second migration to Madagascar (data not shown). The improvement in log-likelihood with added migrations begins to plateau at the seventh migration, indicating that all migration edges that significantly improve the graph have been found by the tenth migration.

Discussion: Genetic Variation Within Madagascar

The highland Merina were found to have less "African" ancestry (47 percent) than the three coastal populations (62–65 percent), and greater variance in their ancestry proportions (Table 10.3). This was expected based upon the acknowledged difference in phenotype between the regions (Tofanelli and Bertoncini 2010), and the estimated admixture proportions from the two previous genomic studies (Hodgson et al. 2014b; Pierron et al. 2014). However, this study is the first to estimate admixture proportions from genomic SNP data in both highland and coastal groups in a comparative framework, and is the clearest evidence yet that the greatest genetic differentiation within Madagascar is found between highland and coastal groups, rather than between ethnic groups. Greater sampling of Malagasy ethnic groups is necessary to confirm this.

Blench (2007) has suggested that the division between highland and coastal populations can be explained by differences in resistance to disease

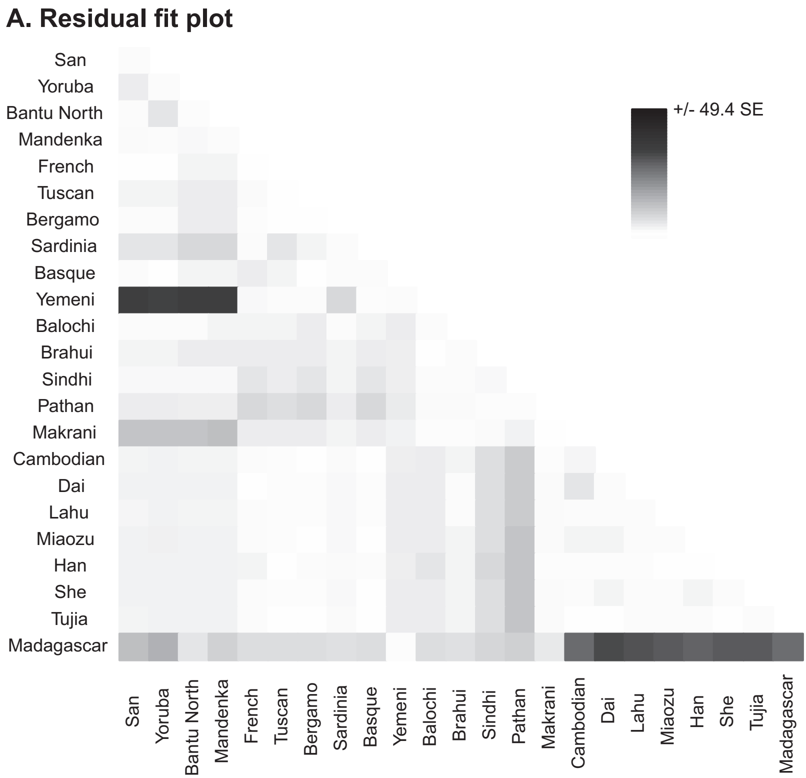
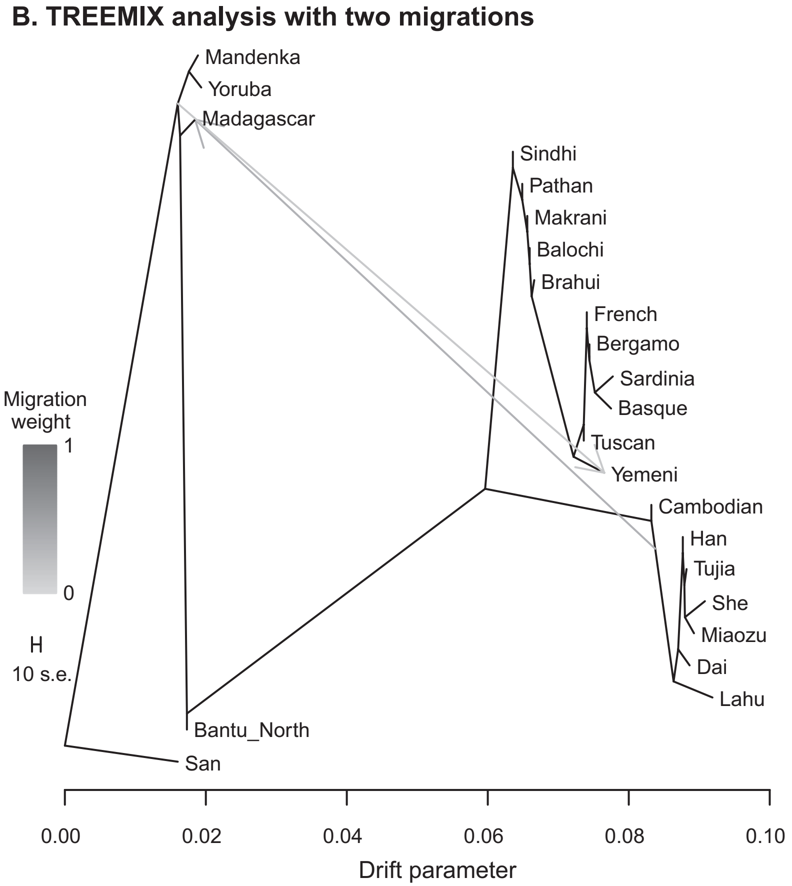


Fig. 10.4 TREEMIX analysis of the 150k SNP dataset, with San as outgroup. (**a**) Covariance matrix of allele sharing with standard error, given the inferred bifurcating relationship among populations. Greater error indicates poorer fit of the tree structure, and the likelihood of a migration from elsewhere on the tree. (**b**) Inferred bifurcating tree of relationships among the populations with two migrations. The Malagasy are most closely related to sub-Saharan Africans, but with a heavy migration from Southeast Asia into the Malagasy. No other migrations into the Malagasy were inferred when additional migrations were added.

between Africans and Austronesians. Both falciparum and vivax malaria are endemic to Madagascar (Guerra et al. 2010; Hay et al. 2010), and African populations are known to have natural resistance to both malaria parasites (Hill et al. 1991; Miller et al. 1976; Neel 1949; Tishkoff et al.

Fig. 10.4 (continued)



2001). There is evidence that natural selection has increased the frequency of the African vivax-protective Duffy-null allele in Madagascar (Hodgson et al. 2014b), and both highland and coastal groups have the protective allele at high frequency (Menard et al. 2010). This suggests that malaria has indeed exerted an important pressure upon the Malagasy, and settlement in the most afflicted regions may have been difficult for groups that had greater Asian ancestry and less resistance. However, natural selection has largely reduced the differences in resistance to vivax malaria between coastal and highland populations, and the same may be true for resistance to the more lethal falciparum malaria.

Both the IBS-MDS (Fig. 10.1) and ADMIXTURE analyses (Fig. 10.2) reveal that the Merina have a bimodal distribution of ancestry proportions. Nine of nineteen Merina have greater than 50 percent "African" ancestry, and these range from 58 to 76 percent with a mean of 66 percent. The ten Merina with less than 50 percent "African" ancestry range from 23 to 46 percent with a mean of 29 percent. The nine Merina with predominant "African" ancestry are within the range observed for the coastal Malagasy populations, while the ten Merina with predominant "East Asian" ancestry are clearly differentiated. It is not clear why the Merina sample displays this bimodal pattern. The Merina individuals sampled for this study were from Antananarivo and self-identified as Merina (G. Campbell pers. comm.). Assuming the ethnic identities of the samples are correct, we previously hypothesized that migrants from the coast may have adopted Merina ethnic affiliation, since the Merina are the historical rulers and remain the culturally dominant ethnic group (Hodgson et al. 2014b). During the nineteenth century, slaves were imported into the highlands from both Africa and non-Merina areas including the coast (Campbell 1988). It is possible that the observed bimodal variation in "East Asian" and "African" ancestry proportions among the Merina is a legacy of their slaving past and the transport of coastal peoples to the highlands as forced labour. Further research is needed to test this hypothesis.

Malagasy Source Populations

The extensive influence of Islamic peoples in Madagascar is evident from the archaeological record, and demonstrates that Madagascar was fully integrated into Indian Ocean trade networks by 900 BP (Dewar and Wright 1993). Given the extent of the contact it might be expected that Middle Easterners would have contributed to Malagasy genetic diversity. Also, the French colonial period lasted from 1897 to 1960, giving opportunity for a European input to the Malagasy. Surveys of mtDNA and Y-chromosome diversity have not revealed any convincing evidence of Middle Eastern or European ancestry in the Malagasy (Hurles et al. 2005; Tofanelli et al. 2009). An analysis of immunoglobulin allotypes in the Antemoro ethnic group, who claim descent from Mecca, also found no evidence of Middle Eastern ancestry (Capredon et al. 2012). The absence of evidence for gene flow at individual genetic loci is not strong evidence that gene flow did not occur, especially if the amount of gene flow was low. Consequently, data from multiple independent loci are needed to rigorously test the hypothesis. Multilocus SNP data from the Merina has suggested the possibility of low levels of western Eurasian ancestry in the Malagasy (Hodgson et al. 2014b), though this was not formally tested.

This study represents the first formal test for a Middle Eastern contribution to Malagasy genetic diversity using genomic SNP data. First, the highland and coastal samples were found to have similar low levels of the “European” IAC (~4 percent) with the 2.5k SNP dataset (Fig. 10.2 and Table 10.2). With the greater information content found in the 150k SNP dataset it was possible to further differentiate the “European” IAC into “European”, “Middle Eastern”, and “Central Asian” IACs. The non-African and non-East Asian fraction of Malagasy was primarily assigned the “Central Asian” IAC. This “Central Asian” IAC forms 9 percent of the ancestry of the mainland Southeast Asian Cambodians suggesting it may also have been at high frequency in the Austronesian ancestors of the Malagasy (Fig. 10.3). The TREEMIX analysis revealed that the best description of the coastal Malagasy populations was of a Bantu-related African population with a single heavy migration from a population closely related to the Cambodians (Fig. 10.4b). Thus, no evidence for any Middle Eastern or European contribution to Malagasy ancestry was found, further confirming the dual origin of the Malagasy found in previous studies (Hurles et al. 2005; Tofanelli et al. 2009).

These results suggest that the Islamic contribution to Madagascar and the Malagasy was entirely cultural. However, it is not clear to what extent the three coastal populations sampled here are reflective of other Malagasy ethnic groups and it remains possible that ethnic groups from the northwest coast in the region of the Islamic ports do have a Middle Eastern genetic legacy. Greater Malagasy ethnic sampling will be required to answer this question more definitively.

The Austronesian population from which the Malagasy descend remains unknown; however, the TREEMIX analysis indicates a population genetically similar to the Cambodians to be the source population given the comparative samples available for this study. Linguistic similarity has led to the hypothesis that people from the Barito River area of Borneo are the ancestors of the Malagasy (Dahl 1951). This hypothesis makes little initial sense, as the Barito River is far inland and the people have no known history of seafaring, although some scholars have hypothesized that Malay traders employed people from the Barito River area as forced labour on their ships, because Malagasy also contains many Malay loanwords that are absent in the language spoken in the Barito area (Adelaar 1989, 2009; Adelaar in this volume). An analysis including Island Southeast Asian comparative samples will be necessary to test from where in Southeast Asia the likely Austronesian source population of the Malagasy originated. The seafaring and coastal Malay may be differentiated from inland Bornean groups by having a greater proportion of the "Central Asian" IAC due to their high mobility and extensive contact with the Indian subcontinent. If there is such variation, and multiple Austronesian source populations are included in the analysis, the TREEMIX method may be able to identify the most likely source populations for the Austronesian component of the Malagasy.

Conclusions

This study is the first combined analysis of genomic SNP data from highland and coastal Malagasy, and further confirms the admixed African and Southeast Asian ancestry of both regions, and the predominance of Southeast Asian ancestry in the highlands and African ancestry on the coasts. The highland Merina are also notable for having greater variation in ancestry, with many individuals resembling the more African coastal groups in their ancestry proportions. Finally, the first formal test for a Middle Eastern or European genomic contribution to the Malagasy found no evidence for either. While these findings add to our understanding of the population history of Madagascar, they also make clear that greater genomic sampling of Malagasy regional and ethnic diversity, as well as the potential African and Southeast Asian source populations are needed to understand this fascinating event in the human past.

Materials and Methods

Malagasy and Comparative Samples

Two datasets were assembled from the available Malagasy genomic SNP data, and comparative samples. The 2.5k SNP dataset (Table 10.1) incorporates the 10k SNP Merina Malagasy data from Hodgson et al. (2014b) and the 750k SNP data from the Temoro, Vezo, and Mikea Malagasy from Pierron et al. (2014). To assure maximal SNP overlap, comparative samples for the 2.5k SNP dataset include those available from studies that used the same genotyping platform as the 10k Merina data (Alves et al. 2011; Bauchet et al. 2007; Hodgson et al. 2014b; Norton et al. 2007; Pierron et al. 2014). The 150k SNP dataset (Table 10.3) incorporates the 750k Malagasy SNP data, along with select African, European, Middle Eastern, and Asian populations available from the Human Genome Diversity Project (Cann et al. 2002) and Hodgson et al. (2014a).

Population Structure

The multidimensional scaling analysis was performed with PLINK (Purcell et al. 2007). First, the SNPs were pruned for linkage disequilibrium (LD) by sliding a 50 SNP window and randomly excluding one of every pair of SNPs with genotypic correlation greater than 0.5. The LD-pruned dataset retained 2474 SNPs. From this, a matrix of pairwise identity by state (IBS) was calculated for all pairs of individuals. Multidimensional scaling (MDS) was then performed upon the IBS matrix.

Genetic structure and individual ancestry proportions were inferred using the software ADMIXTURE (Alexander et al. 2009). This method implements a non-hierarchical clustering algorithm to infer K ancestral population clusters, and assign individual ancestry to the clusters by minimizing both Hardy–Weinberg disequilibrium and LD within clusters. Using the same LD-pruned dataset used for the MDS analysis, I first sought the value K that best described the data by employing the ADMIXTURE cross validation mode for the indicated range of K values, and choosing the value of K that minimized the error.

Migration Analysis

The software TREEMIX was used to infer the bifurcating tree that best described the relationship among the populations, and to infer the magnitude and direction of migrations given the bifurcating tree (Pickrell and Pritchard 2012). To do so, allele counts from all common SNPs from the study populations (Table 10.3) and the HGDP San were extracted using a custom Perl script. For this analysis the three coastal Malagasy populations were combined into a single Malagasy sample. The allele counts from 159,496 common SNPs were then used as input for the TREEMIX software. The bifurcating tree and the associated covariance matrix with standard error were first estimated with the San designated as outgroup.

Then, 1–10 migrations were sequentially added, recording the migration graph and the likelihood of the graph with each subsequent migration.

Plots

All plots were created in R (R Development Core Team 2011), using the core package or the ggplot2 library (Wickham 2009).

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CHAPTER 11

Intercontinental Networks Between Africa and Asia Across the Indian Ocean: What Do Village Chickens Reveal?

J.M. Mwacharo

Introduction

The prehistory of the Indian Ocean world can be likened to a complex historical jigsaw puzzle, and has attracted deep interest from various disciplines (Chaudhuri 1985; Pearson 2011). The objective has been to find and fit together the various pieces to complete and demystify the puzzle. At present, the assembled pieces reveal a multiplex pattern of cultural contacts, trade, and biological translocations, including intercontinental linkages and interactions that shifted according to region and over time.

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The Indian Ocean, 73.56 million km^2 in area, and characterized by significant ecological and cultural diversity, witnessed some of the world's earliest seafaring and maritime activities. Evidence from archaeo-botany and archaeo-zoology reveals wild and domestic plants and animals, weeds, and spices were translocated east and westward across the Indian Ocean between diverse geographic regions (see Boivin and Fuller 2009; Boivin et al. 2009; Fuller and Boivin 2009; Fuller et al. 2011). These contacts and translocations led to major socioeconomic transformations that contributed to the evolution of languages, ideas, and technologies, including the alteration of the genetic constitution of humans, plants, and animals (Arnold 1995; Pearson 2011). These are reflected in the complexity of the different cultures, languages, and genetic traits on the present-day coastal communities of eastern Africa and Madagascar. They reflect rich and ancient long-distance linkages with the Middle East, and Asia, although mystery still surrounds the long-term evolution of such connections.

The advent of seafaring was a critical catalyst for intercontinental linkages that placed water masses at the heart of international trade routes and interactions. Through seafaring activities, many domesticates were dispersed along maritime corridors and these influenced substantially the development of agriculture. Domestic chicken were an intrinsic part of these translocations in historic times, possibly much earlier. The debate over the origin and movement of domestic village chickens is therefore an important one in understanding and reconstructing the trajectories of prehistoric human activities and relationships.

In this chapter, the current state of molecular genetic evidence based on the analysis of mtDNA datasets of village chickens is reviewed, attention being drawn to emerging scenarios for the dispersal of the species and therefore of early interaction and contacts which led to the emergence of complex trade networks that have been described in classical texts such as the *Periplus Maris Erythraei* (Casson 1980, 1989; Chami 1999a; Cappers 2006).

Domestic Chicken as a Biological Marker to Track Human Migration and Interactions

Domesticated animal and plant species are attractive options for unraveling patterns of human migrations. They offer a means to circumvent the sampling and analysis of rare and often scarce ancient human and animal remains. Some selected examples of wild and domestic animals that have been used to trace human movements and migrations are shown in Table 11.1. Chickens are a mostly sedentary species (Johnsgard 1999), have a restricted home range, and are incapable or poorly adapted to self-disperse by any means (Collias and Collias 1996; Kelly 2006). These factors together with their sociocultural and economic significance for humans imply that their current extensive dispersal and global distribution (Simoons 1994) is the result of anthropogenic dispersals. Nevertheless, a full account of their past translocations via maritime and terrestrial corridors still remains uncertain.

Table 11.1 Some selected domestic and wild animal species dispersed across the Indian Ocean

Animal species	*Possible origin and distribution*
Zebu cattle (*Bos indicus*)	South Asia; Widespread across eastern and southern Africa (Hanotte et al. 2002)
Sheep (*Ovis aries*)	The Fertile crescent; Widespread worldwide (Chessa et al. 2009)
Goats (*Capra hircus*)	The Fertile crescent; Widespread worldwide (Liukart et al. 2001; Fernandez et al. 2006)
Asian house shrew (*Suncus murinus*)	South/Southeast Asia; Currently widespread in Indian Ocean (Fuller and Boivin 2009)
Asian tiger mosquito (*Aedes albopictus*)	Southeast Asia; Widespread in Madagascar, Indian ocean islands, across Africa, Europe, and the Americas (Vazeille et al. 2001; Benedict et al. 2007)
Black/ship rat (*Rattus rattus*)	South/Southeast Asia; Widespread in Indian Ocean (Fuller and Boivin 2009)
House gecko (*Hemidactylus*)	Natural distribution across mainland Eurasia; Translocated to Indian Ocean islands via natural and anthropogenic means
House mouse (*Mus musculus*)	Asia (northern India to Southwest Asia); Transferred along terrestrial and maritime routes (Fuller and Boivin 2009)
Pygmy shrew (*Suncus etruscus*)	South/Southeast Asia; Transferred by direct maritime route to Madagascar (Omar et al. 2011)
Feral domestic pig (*Sus scrofa*)	Eurasia multiple times; Widespread in Indian Ocean (Walsh 2007)
Javan Moongose (*Herpestes javanicus*)	South/Southeast Asia (Walsh 2007)
Indian civet (*Viverricula indica*)	South/Southeast Asia; Widespread in Indian Ocean (Walsh 2007; Larson et al. 2010)

Adapted and modified from Fuller and Boivin (2009).

Domestic Village Chickens in AFRICA

Theories on Chicken Domestication, and Occurrence in Africa

The main wild ancestor of domestic chicken, the red junglefowl *Gallus gallus*, occurs in sub-Himalayan northern India, southern China, and Southeast Asia (Delacour 1957; Johnsgard 1999). Whether or not the species was domesticated in a single geographic center in Southeast Asia (Niu et al. 2002; Fumihito et al. 1994, 1996) or across the geographic range of the wild species in South, East, and South-East Asia (Liu et al. 2006; Kanginakudru et al. 2008; Miao et al. 2013) remains a subject under intense debate among scholars. The issue of chicken domestication seems more complex than it appears with emerging molecular genetic evidence revealing possibilities of hybridization between all the species of the genus *Gallus* except *Gallus varius* (Nishibori et al. 2005), and the contribution of the yellow skin gene to domestic chicken by the grey junglefowl, *Gallus sonneratii*, which is endemic to southern India (Eriksson et al. 2008). Indeed, hybridization between wild and domestic fowls has been observed in Yunnan, China (Chang 2009), and has also been inferred in northern Vietnam (Berthouly et al. 2009).

The first skeletal remains of domestic chicken came from Chinese archaeological sites of Chishan in Hebei Province, and Peiligan in Henan Province dating to around 8000 years ago (Chow 1984; Rodwell 1984–1985). However, the validity of these bones has recently been questioned because their reanalysis has shown them to be of pheasants (Peters 1998; Deng et al. 2014). In the Indian subcontinent, evidence of the wild *Gallus* in Damdana, in the Ganges region, dates to between the fourth and second millennium BCE (Thomas et al. 1995 cited in Fuller 2006), while, several finds point to the presence of chicken by the mid-third millennium BCE in the western regions of Gujarat and in the Indus Valley, areas where the wild progenitor is absent today (Fuller 2006). Other finds from North India, within the home range of the wild progenitor, also date to the second half of the third millennium BCE (Fuller 2006). Very little archaeological evidence for early agriculture in mainland Southeast Asia exists (Glover and Bellwood 2004). It is not clear therefore whether chicken domestication occurred independently in this region. Thailand has been proposed as a center of chicken domestication (Fumihito et al. 1994, 1996). The earliest *G. gallus* remains identified in Thailand archaeological sites date to approximately 4000 years ago (Higham 1989). The cultural importance of chickens in Thailand is demonstrated by the interment of chickens alongside humans in the archaeological sites of Non Nok Tha and Ban Na Di (Higham 1989). Preserved chicken remains from archaeological sites in Island Southeast Asia are scarce and their utilization by ancient humans is often inferred based on their depiction on pottery or in paintings than by the occurrence of their remains in archaeological sites (Bellwood 2007).

The significance of domestic chicken in the sociocultural life and subsistence economy of most African societies (MacDonald 1992, 1995a) has been interpreted to suggest one of three possibilities: a long-term presence on the continent; a late arrival and quick integration into local customs and traditions (MacDonald 1995a,b), or multiple introductions at different time periods to fulfill multiple functions. However, no archaeological data has so far been found to support any of these suggestions (Williamson 2000).

Linguistic evidence, on the other hand, supports an early introduction and complex history of arrival and dispersal across Africa. Working on the basis of the distribution pattern of the root word for fowl across three African language groups, Williamson (2000) suggested at least two separate introductions and three routes of dispersal into West Africa—two across Central Africa and the Sudano-Sahelian zone from the east coast of Africa and one from North Africa across the Sahara. Further, noting that the terminologies relating to domestic animals in Madagascar appear to have been derived from the Swahili language, Blench (2008) suggested that the domestic chicken found in the island could have been introduced from the Comoros islands or East Africa.

Archeological evidence for the arrival of the chicken in, and its dispersal across, Africa remains scant and, in some cases, disputed. The picture is further complicated by the challenging task of identifying domestic chicken bones from those of indigenous African galliform's (MacDonald 1992). The few remains that have been identified show that, at the earliest, the domestic chicken was present in Egypt around the second millennium BCE (Houlihan and Goodman 1986). Until recently, the oldest, securely identified chicken remains in West Africa were from Jenne-Jeno, in modern-day Mali, dated to 500–850 CE (MacDonald 1995b)—although this is contested as it has been suggested that these finds most likely date to the eighth or ninth century CE (Dueppen 2011). New evidence from Kirikongo, in Burkina Faso, indicates that the chicken was common in West Africa by the sixth century CE, where it was probably present as early as the first century CE (Dueppen 2011). Research in East Africa shows that the chicken was common in several sites by the eighth to ninth centuries CE (Horton and Mudida 1996; Wilson and Omar 1997; Boivin et al. 2013). The earliest undisputed findings are from Unguja Ukuu, in Zanzibar Island dating to the sixth to mid-eighth century CE (Juma 2004). In southern Africa, evidence points to the occurrence of the chicken around the eighth to ninth century CE (see review by Mwacharo et al. 2013).

On the basis of the geographic distribution and dating of the purportedly most ancient undisputed zoo-archeological (c. 1567-1320 BCE) findings, as well as artistic (c. 1425-1123 BCE) and literary (1504-1450 BCE) evidence, it is currently considered that the chicken may have initially entered Africa through Egypt, dispersed southwards along the Nile Valley to Nubia, where archeological evidence dates the presence of chicken to the late fifth century CE (Houlihan and Goodman 1986), and subsequently reached West Africa through the Sudano-Sahelian corridor (MacDonald and Edwards 1993; Fuller et al. 2011). MacDonald and Edwards (1993) further suggested an independent diffusion into West Africa through the Sudano-Sahelian belt from the east African coast. This was perhaps related to the Indian Ocean trading networks. Boivin et al. (2013) point to the common simultaneous occurrence of remains of the common rat, *Rattus rattus* (a ship borne introduction), and the chicken in several sites on the coast and islands of eastern Africa, as well as in southern Africa, dating from the mid to late first millennium CE. This suggests an influx of the two species due to intensifying Indian Ocean trade.

Genetic Evidence Based on the Analysis of mtDNA Sequences

In the past two or so decades, researchers have analyzed mitochondrial DNA (mtDNA) as a standard way of reconstructing dispersal routes and dispersal chronology of domestic animals in different geographic regions (Bruford et al. 2003). Such reconstructions have been achieved by assessing phylogenetic relationships of haplotypes and Clades for various wild and domestic species. Some of these species include rats (Matisoo-Smith and Robins 2004), sheep (Chessa et al. 2009), goats (Fernandez et al. 2006), cattle (Edwards et al. 2007), pigs (Larson et al. 2010), and the chicken (Storey et al. 2012). Three factors render mtDNA attractive in this respect. First, its occurrence in high copy number in the mitochondria of most eukaryotic cells makes it appropriate for studying modern and ancient samples (Clayton 1991). Second, its almost complete maternal inheritance and rare recombination (Ho and Gilbert 2010; Pakendorf and Stoneking 2005), makes it appropriate to trace the maternal lineage of species. Third, its high mutation rate and polymorphism, especially of the control (D-loop) region, (Pakendorf and Stoneking 2005), makes it the fragment of choice for within-species comparisons.

Nine mtDNA clades (A, B, C, D, E, F, G, H, I) have been defined from an analysis of the first 539 base pairs of the control region of domestic chickens from Europe and Asia as well as wild red jungle fowl (Liu et al. 2006; Miao et al. 2013). Seven clades (A–G) had sequences from both domestic and wild chickens. In this chapter, the nomenclature of the mtDNA clades observed in domestic chicken follows that of Liu et al. (2006). A few studies have analyzed a similar fragment in village chickens from countries around the Indian Ocean (Fig. 11.1; Tables 11.2 and 11.3). These include from Africa (Razafindraibe et al. 2008; Adebambo et al. 2010; Muchadeyi et al. 2008; Mtileni et al. 2011; Mwacharo et al. 2011; Lyimo et al. 2013; Wani et al. 2014; Elkhaiat et al. 2014; Al-Qamashoui 2014), the Middle East (Liu et al. 2006), the Arabian Peninsula

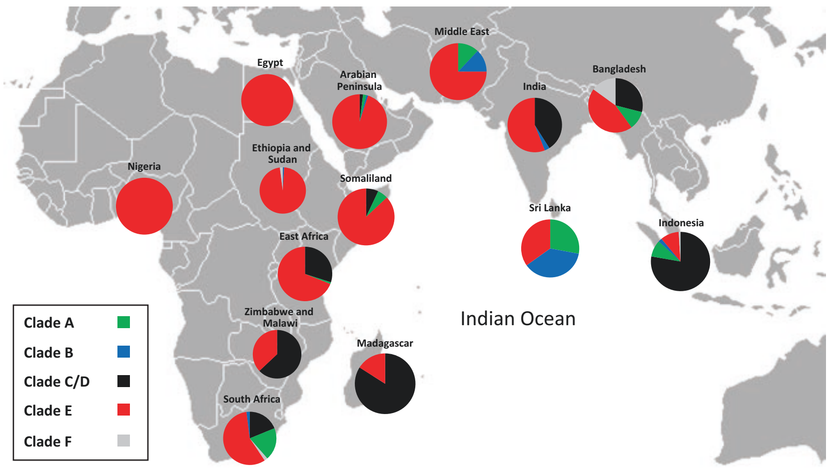

Fig. 11.1 Pie charts showing the proportion of the different mtDNA clades observed in domestic village chickens from countries/regions bordering the Indian Ocean.

Table 11.2 Nomenclature of mtDNA control region clades across different studies, their possible origin and equivalent clades following Liu et al. (2006) study nomenclature

Clades in Reference study	*Equivalent clades observed in African and Asia studies*													
Liu et al. 2006; Miao et al. 2013	Muchadeyi et al. 2008	Silva et al. 2008	Razafindraibe et al. 2008	Sulandari et al. 2008	Adebambo et al. 2010	Dana et al. 2010	Mwacharo et al. 2011	Mtileni et al. 2011	Zein and Sulandari 2012	Lyimo et al. 2013	Bhuiyan et al. 2013	Wani et al. 2014	Elkhaiat et al. 2014	Al-Qamashoui 2014
– Clade A (observed in South China and Japan) – Geographic center of origin: Yunnan province China and/or surrounding areas)	B1	SLvtHap 36 & 35		IIId		A	B	A	IIId		A			A
– Clade B (observed in Yunnan China) – Geographic center of origin: Yunnan China and/or surrounding areas	B2	SLvtHap 33 & 32				B	C	B						
– Clade C (observed in Guangxi and Guangdong China and Japan) – Clade D (observed in Indonesia and India, and in Chinese and Japanese gamecocks) – Geographic center of origin: South and Southwest China and/or surrounding areas (i.e., Vietnam, Burma, Thailand, India)	A		I	II		D/C	A	D	II	D	D			C

Table 11.2 (continued)

Clades in Reference study	*Equivalent clades observed in African and Asia studies*													
– Clade E (observed in Europe, Middle East and India)	C	SLvtHap 1 & 13	II	IV	IV	E	D	E	IV	E	E	IV	E	E
– Geographic center of origin: Indian subcontinent														
– Clade F (observed in Yunnan China)							E	F			F	IIIa		
– Geographic center of origin: Yunnan China and/or adjacent areas														

Table 11.3 Clades observed from the analysis of mtDNA D-loop sequences of village chickens from countries around the Indian Ocean

Region/country/study	*Countries*	*Sample size*	*Frequency of clades[a] (%)*				
			C/D	*A*	*B*	*E*	*F*
Madagascar							
Razafindraibe et al. (2008)	Madagascar	77	84			16	
South Africa							
Mtileni et al. (2011)	South Africa	111	19	20	2	57	2
South-East Africa							
Muchadeyi et al. (2008)	Zimbabwe	99	55			45	
	Malawi	19	100				
East Africa							
Mwacharo et al. (2011)	Kenya	211	45	<1		54	
	Uganda	123				100	
Lyimo et al. (2013)	Tanzania	101	36			64	
Ethiopia and Sudan							
Muchadeyi et al. (2008)	Sudan	20				100	
Mwacharo et al. (2011)	Sudan	135				98	2
	Ethiopia	42			2	96	2
Wani et al. (2014)	Sudan	81				99	1
West Africa							
Adebambo et al. (2010)	Nigeria	232				100	
North-East Africa							
Elkhaiat et al. (2014)	Egypt	36				100	
Al-Qamashoui (2014)	Somaliland	15	7	6		87	
The Middle East and Arabian Peninsula							
Al-Qamashoui (2014)	Oman	100	2	4		94	
	Saudi Arabia	61			2	98	
	Yemen	31	4		3	93	
Liu et al. (2006)	Middle East[b]	16		12	13	75	
Indian subcontinent							
Bhuiyan et al. (2013)	Bangladesh	85	29	11		45	15
Liu et al. (2006)	India	27	41		3	56	
Silva et al. (2008)	Sri Lanka	132		12	16	15	
Southeast Asia							
Liu et al. (2006)	Indonesia	12	42		25	33	
Zein and Sulandari (2012)	Indonesia	210	84	4	2	8	
Sulandari et al. (2008)	Indonesia	483	75	11	1	11	2
Across Eurasia							
Liu et al. (2006)[c]	Europe and Asia	836	10/5	27	23	19	8

[a]Nomenclature follows that of Liu et al. (2006) study.
[b]Iran, Turkmenistan, Azerbaijan
[c]Liu et al. also observed clades G and I which are not present in domestic chicken from Africa, the Indian Subcontinent, Island Southeast Asia, the Middle East, and Arabian Peninsula

(Al-Qamashoui 2014), Sri Lanka (Silva et al. 2008), India (Liu et al. 2006), Bangladesh (Bhuiyan et al. 2013), and Indonesia (Liu et al. 2006; Zein and Sulandari 2012; Sulandari et al. 2008) (see Tables 11.2 and 11.3). Of the seven mtDNA clades observed in domestic and wild chickens (Liu et al. 2006), at least two are found in countries bordering the Indian Ocean (see Fig. 11.1; Table 11.3). The most common are clades C/D and E, while A, B, and F are rare (Fig. 11.1; Table 11.3). This suggests the presence of significant genetic diversity and possibilities of multiple origins and introductions.

Clade E is the most diverse and is widely distributed across the countries studied so far bordering the Indian Ocean (Fig. 11.1; Table 11.3). The next most common is clade C/D. In Africa, it occurs in countries adjacent to the Indian Ocean. It has so far not been observed in the continents hinterland (Fig. 11.1; Table 11.3). Outside Africa, the clade is predominant in Indonesia and occurs, albeit at low frequencies compared to clade E, in Bangladesh, India and in the Arabian Peninsula. It has not so far been observed in the Middle East and in Sri Lanka (Table 11.3). Clades A, B, and F occur in only four countries in Africa and at very low frequencies (Table 11.3). Clade A has been observed in Kenya, South Africa, and Somaliland; clade B in Ethiopia and South Africa and clade F in Ethiopia, Sudan, and South Africa (Table 11.3). Outside the African continent, clade A is present in Bangladesh and Sri Lanka, in Indonesia, in the Arabian Peninsula (Oman) and in the Middle East (Table 11.3). Clade B is present in India, Sri Lanka, Indonesia, the Arabian Peninsula and in the Middle East while clade F occurs in Bangladesh and Indonesia (Table 11.3).

Origin and Dispersal of the Five Clades

It has been suggested that clade C/D originates from Southeast Asia (Muchadeyi et al. 2008; Mwacharo et al. 2011; Miao et al. 2013). Liu et al. (2006) on the other hand, suggested an origin in South and Southwest China and/or surrounding areas, that is, Vietnam, Thailand, and Burma. The clade has a very large presence in the Indonesian islands (Fig. 11.1; Table 11.3). From its geographic distribution pattern, it has been argued that this clade reached East Africa (Mwacharo et al. 2011) including Madagascar (Razafindraibe et al. 2008) via a maritime corridor (Mwacharo et al. 2011). Based on the known history of human colonization of Madagascar (Razafindrazaka et al. 2010 and references therein;

Blench 2010), Razafindraibe et al. (2008) have suggested the origin of the clade to be the Indonesian islands; and that it is likely the legacy of Austronesian expansion to eastern Africa and Madagascar (Razafindraibe et al. 2008). Based on the decrease in diversity and frequency of this clade northwards from Madagascar along the Indian Ocean, Al-Qamashoui (2014) suggested it could have been introduced to East Africa and the Arabian Peninsula from Madagascar following its direct arrival in the island from either China or Indonesia. Another possibility is an introduction to the Arabian Peninsula, then to the Horn of Africa and East and southern Africa from India where the clade is also observed (Fig. 11.1; Table 11.3) across the Arabian Sea.

Given the available data, it is difficult to determine if this clade (C/D) arrived first in East Africa or Madagascar, or simultaneously along the eastern and southern Africa coastline including Madagascar. Several hypotheses offer themselves. One is that the clade traveled directly to East Africa, from where it was then introduced to Madagascar, and down the east African coast to southern Africa. A second is that it traveled first to Madagascar, and subsequently to East and southern Africa. The third possibility is that it was introduced simultaneously to Madagascar, eastern and southern Africa. Within Asia, the clade may have been introduced to Bangladesh and India from Indonesia across the Bay of Bengal. However, if it is assumed that the clade originates from South and Southwest China and adjacent regions as suggested by Liu et al. (2006), then an overland introduction will be the most likely. More data will be required before any of these hypotheses can be confirmed.

Liu et al. (2006) and Miao et al. (2013) proposed the geographic center of origin of clade E to be the Indian subcontinent (Table 11.2). This proposition gained the support of Muchadeyi et al. (2008) and Mwacharo et al. (2011). It is further backed by the commonly observed yellow skin phenotype among African (Daikwo et al. 2011; Melesse and Negesse 2011; El-Safty 2012) and Saudi Arabian (personal observation by the author) village chickens; a marker of introgression of the yellow skin gene (*BCO2*) into domestic fowls from the grey junglefowl of southern India (Eriksson et al. 2008). Whether or not this clade followed a maritime and/or terrestrial corridor to reach Africa and the Arabian Peninsula remains debatable. What may be certain however is that it was introduced to the Middle East via terrestrial dispersal. Given its occurrence in the Middle East, the Arabian Peninsula, Northeast, West, eastern and southern Africa (Fig. 11.1; Table 11.3), three possible routes of dispersal are envisaged. One is an overland dispersal from the Indian subcontinent via the Middle East to the Arabian Peninsula and Northeast Africa (Egypt). It then traveled south, along the Nile Valley, then westwards across the Sudano-Sahelian zone into West Africa. A direct maritime introduction via the Arabian Sea into the Arabian Peninsula and the Horn of Africa (Somaliland, Djibouti, etc.) is also possible and is favored by Al-Qamashoui (2014). Another possibility is that the clade reached East Africa and Madagascar directly overseas from the Indian subcontinent, or from Egypt traveling along the Red Sea and east African coasts. This suggestion has also been proposed by Al-Qamashoui (2014) based on the observation of a southward decline in the frequency and diversity of the clade from the Arabian Peninsula to southern Africa (see Fig. 11.1). A terrestrial dispersal accompanying the expansion of Bantu-speakers into southern Africa from the Great Lakes region cannot be discounted. It is the only clade observed in West Africa (Adebambo et al. 2010), the original homeland of the Bantu-speakers, and in the interlacustrine region of East Africa (Mwacharo et al. 2011), where the first Bantu-speaking migrants arrived around 1000 BCE (Russell et al. 2014 and references therein). In Asia, the clade may have been introduced to Sri Lanka and Indonesia by traveling across the Bay of Bengal.

Liu et al. (2006) proposed the center(s) of origin of clade(s) A and B (Tables 11.2 and 11.3) as Yunnan Province in China and/or surrounding areas. The presence of identical or closely related haplotypes of these two clades in European local chickens and fancy breeds and commercial breeds of chicken (Muchadeyi et al. 2008; Dana et al. 2010; Miao et al. 2013), led Mwacharo et al. (2011) to propose that they were introduced to Africa following the introduction of exotic and/or commercial breeds (broilers and layers) for crossbreeding purposes with local flocks to increase egg and meat production. The same can be used to explain the occurrence of these two clades in the Arabian Peninsula, the Middle East, the Indian subcontinent, and Indonesia (Fig. 11.1; Table 11.3). However, an earlier introduction to Africa from China via Sri Lanka, is also likely, as is, the possibility of overland introductions from Yunnan province to the Indian subcontinent and subsequently, to the Middle East and Arabian Peninsula. More data are required to further clarify and/or confirm the origin(s) and mode of dispersal of these two clades.

Clade F (Tables 11.2 and 11.3) has not been observed in commercial broilers and layers (Muchadeyi et al. 2008; Dana et al. 2010) and in European local chickens (Liu et al. 2006; Miao et al. 2013). Liu et al. (2006) have proposed the center of origin of the clade as South China (Yunnan province) and/or adjacent geographic regions such as Myanmar. The route(s) of introduction of the clade to Africa, Bangladesh, and Indonesia remains unknown. Its modern-day worldwide geographic distribution (Liu et al. 2006) hints to the possibility that it was most likely the consequence of either direct or indirect maritime introduction via Sri Lanka from Yunnan province. Its arrival in East Africa might have been facilitated by either the fifteenth century Chinese maritime trading or exploration activities across the Indian Ocean (Duyvendak 1939; Beaujard 2005; Mwacharo et al. 2011), and/or it traveled as a companion haplotype to other clades such as clade A. While its dispersal to Indonesia could have been through the Bay of Bengal, its dispersal to Bangladesh was most likely via a terrestrial route.

Conclusions and Future Directions

The Indian Ocean was a major arena for the exchange of flora and fauna from early times (Boivin et al. 2013; Fuller et al. 2011). Chickens were among the fauna that were transported from Asia to Africa, but there is still considerable debate as to their origins and dispersal patterns. The five mtDNA clades found in village chickens around the Indian Ocean rim, and the dating of zoo-archeological remains, highlight the important role in this exchange played by Africa's eastern and southern coastlines including Madagascar, the Indian subcontinent, and Southeast Asia. In this chapter, I attempt to outline what the discipline of molecular genetics, through an analysis of chicken mtDNA, further reveals about the issue. It is important to emphasize that the emerging picture from the analysis of such data is far from complete. Too few sites on the littorals of Africa and Asia bordering the Indian Ocean have been sampled and studied in detail, and the proposed tentative hypotheses offered here concerning the routes of dispersal need to be tested. Studies to date nonetheless offer some interesting preliminary observations, notably multiple origins and introductions for village chickens, and genetic contributions from South Asia, East Asia, and Southeast Asia. This highlights the complexity of the trans-Indian Ocean world interaction from early times.

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CHAPTER 12

East Africa in the Early Indian Ocean World Slave Trade: The Zanj Revolt Reconsidered

Gwyn Campbell

Introduction

Slavery studies have focused overwhelmingly on the Atlantic slave trade (Miller 1999) wherein between circa 1500 and 1880 some 12.5 million sub-Saharans, mostly young adult West African males (Lovejoy 2012) were shipped to New World plantations and mines, where they formed a concentrated chattel class that constituted the basis of a slave mode of production (Davis 1970; Patterson 1982; Meillassoux 1991). Scholars investigating slavery in the Indian Ocean world (IOW) have largely applied paradigms and perspectives derived from Atlantic slavery studies, and concentrated their attention on the east African slave trade to Arab- and European-run enterprises (e.g. Cooper 1997; Harms et al. 2013) and on the African slave diaspora in the IOW (Jayasuriya and Pankhurst 2003; Jayasuriya and Angenot 2008; Hawley 2008). The African slave export trade is generally held to have constituted an inequitable exchange whereby Arabs and Europeans took East Africa's prime human resources,

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and valuable raw materials such as ivory and gold, in return for cheap, generally low-quality cloth and other manufactures, thus creating what some have termed a “proto-colonial” system that established the basis for the “underdevelopment” of the continent (Sutton 1972: 11).

The Zanj revolt in Lower Iraq from 869 to 883 CE has long been seen as one of the earliest manifestations of this system (Nöldeke 1892: 146–175). It reflected the export of massive numbers of adult male slaves from “Zanj,” a term conventionally taken to mean the East African coast between the southernmost tip of Somalia and Mozambique, to transform the marshlands near Basra into cultivable land. This work, which involved removing the surface crust of nitrates and saltpetre and cultivating the cleared land, was so arduous, and the slaves so denigrated, that the Zanj rose in revolt from 869 to 883 in what was termed by James de Vere “perhaps the most successful slave rebellion of all times” (Allen 1993: 73) and by Thomas Ricks “the only mass slave uprising known in the Arab world” (Ricks 1998: 833). The rebels caused immense material damage, and killed tens, possibly hundreds, of thousands of people. The revolt was eventually crushed with the massacre of tens of thousands of Zanj; and from 883 CE enormous imports of East Africans into Iraq ceased (Popovic 1999; Allen 1993; Fisher 1998).

Alexandre Popovic’s analysis has become the basis for conventional interpretations of the Zanj rebellion; and in obtaining a forward from Henry Gates, relates it directly to anti-colonial and emancipationist movements of the modern era rather than, as in Theodor Nöldeke’s earlier account, to slave revolts of the Roman era (Popovic 1999; Nöldeke 1892: 149). The conventional view has been challenged by a number of scholars (e.g. Hunwick 1978; Fisher 1989) but recent backing from archaeologists Mark Horton, Jay Alexander, and Stéphane Pradines (Horton and Middleton 2000: 65–66, 74–75; Horton 2009, 2010; Alexander 2001; Pradines, 2012; Breen 2013) and historians and anthropologists such as André Wink, Abdul Sheriff, Philippe Beaujard, and Edward Alpers (Wink 2002: 30–31; Sheriff 2010: 228–229; Beaujard 2012: vol. 2, 106–107; Alpers 2014: 52–53; see also Gilbert and Reynolds 2004: 110, 380) has turned the conventional view of the Zanj revolt into one that is again becoming widely accepted. This justifies a re-examination of the issues involved. I here outline the conventional view of the Zanj Revolt, then re-interpret it in the light of revisionist work on the meaning of the term “Zanj” and on the early history of human bondage and human trafficking in the western IOW.

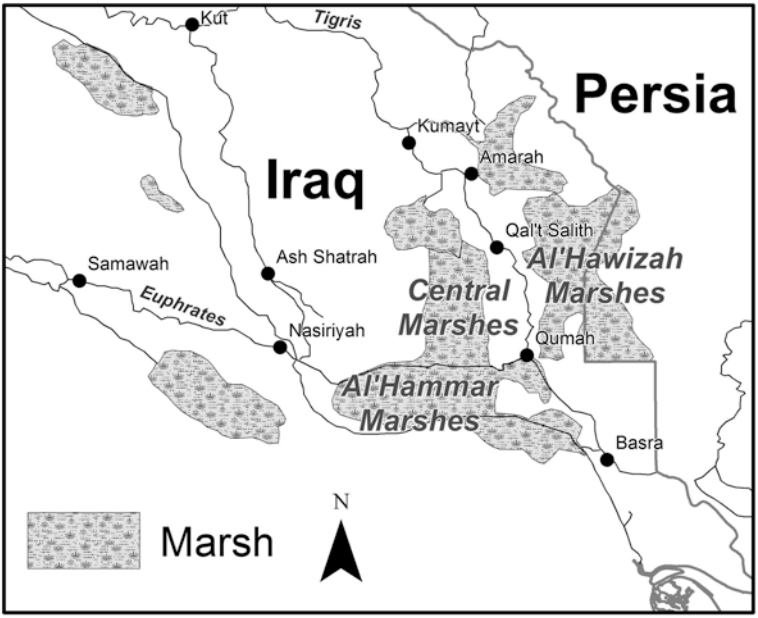
The Conventional View

While a significant literature on the East African slave trade arose from the mid-nineteenth century (Colomb 1968; Sulivan 2003), it became the subject of serious academic study only from the 1960s. A majority view quickly developed that, from early times, slaves constituted a staple, possibly the major, East African export. Reginald Coupland, following Hubert Chittick and John Trimingham, asserted that the slave trade constituted "the theme which is to run like a scarlet thread through all the subsequent history of East Africa until our own day," and that "Centuries before the agents of Europe began the same ugly business in the West, the agents of Asia in the East were stealing men and women from Africa and shipping them overseas to slavery" (Coupland 1965: 17–18; see also Chittick 1964: 51; Trimingham 1964: 2–3). Gervase Mathew confirmed this viewpoint (Mathew 1968). Joseph Harris specified that many African slaves, most from present-day Tanzania, were shipped to India (Gujarat, the Deccan) from the fifth to fifteenth centuries, though Michael Mollat backdated this trade to at least the sixth century BCE (Harris 1971: 5; Mollat 1971: 302–303). Prakashchandra Shirodkar (1985: 28) claimed that this trade was direct by the BCE/CE transition, from which time, Fred Morton (1998: 265) and Julie Wilensky (2002) asserted East African slaves, notably males, were being exported continuously to the Middle East, South Asia, and China; although Shihan de S. Jayasuriya and Richard Pankhurst (2003: 9) date such developments to the fourth century CE, and Mark Horton (2010: 11) to the sixth century. Moreover, the agents responsible for this trade were foreign: Mollat (1971: 302–303) highlighted the early (sixth century BCE) role of Deccan merchants; while for the first millennium CE, J.C. van Leur (1955: 99), and Solofo Randrianja and Stephen Ellis emphasised the role of Austronesians, Wilensky the Arabs, and Horton the Persians (Randrianja and Ellis 2009: 34–35; Wilensky 2002; Horton 2010: 11).

The conventional view notes that trade in East African slaves to the Middle East expanded markedly following the rise of Islam from the seventh century: Muslims could not enslave co-religionists, and thus sought slaves from non-Muslim realms, while manumission—considered a pious act—was relatively common and fuelled demand. The Islamic regimes built on the pre-existing slave trade networks. By the sixth century, the Sasanians (224–651 CE) dominated commerce in the western IOW including East Africa (Hornell 1946: 231; Hawley 1971: 35; Ricks 1970:

342–343). It was under the Abbasids (750–1258), however, that slavery became central to the social and economic fabric of the Muslim heartland, and an immense influx of slaves occurred (Bray 2004: 134). Persian Gulf demand for East Africans was high because they were cheaper than other slaves, considered physically strong, and, if later reports can be backdated, comparatively docile (Popovic 1999: 19, 20–22; Trimingham 1964: 2–3). Horton argues that as East Africans carried the sickle-cell gene, they were immune to the malaria that plagued the marshland region of southern Iraq, and thus the prime choice for manual labour from 833 CE when a project was inaugurated to convert the Basra marshes into cultivable land (Horton 2010: 6; Morton 1998: 265) (Map 12.1).

Alan Fisher claims that from the seventh to ninth centuries "tens of thousands" of Zanj, comprising some 75 % of the total slave workforce, were employed in southern Iraq (Fisher 1998: 967; Rashidi 2008: 575) while Dionisius Agius estimates that there were 50,000 newly imported East African slaves in the Basra region by 869 CE (Agius 2008: 99). Basra



Map 12.1 The marshlands of lower Iraq (Carl Hughes, IOWC)

and all important Iraqi towns had slave markets, from which the Zanj were channelled into gangs 500–15,000 strong (Savage 1992: 354–355).

Demand for slaves greatly stimulated the advance southwards down the East African coast of the Muslim trading frontier, which in turn helped lay the economic foundation of the Swahili civilisation (Allen 1993: 66; Nurse and Spear 1985: 3; Morton 1998: 265; Hunwick 1978: 31; Teelock 1998: 851). In the 800s, permanent Muslim trading settlements developed in the Lamu archipelago (at Manda, Shanga, and Pate) and on the southern Tanzanian coast (Mafia and Kilwa) (Nurse and Spear 1985: 3), with agencies in Mozambique (Chibuene) and the Comoros (Allen 1993: 73–74). Slave exports boomed, notably to the Persian Gulf (Tibbetts 1971: 2–3), as is reflected by finds in East Africa of Siraf manufactures of that era. Horton claims literary and archaeological backing for his contention that, by the mid-eighth century, Basra (Kharijite) merchants and their Ibadi collaborators from Oman had established a major slave-trading centre on Pemba (Qanbalu), and probably Zanzibar (Lanjuya), and re-invested their profits in draining the marshes where many of these slaves were employed (Horton 1985).

The Zanj Revolt Reconsidered

Scholars of the conventional view generally assume that "Zanj" referred to the East African coast and its black African population. "Zanj" was indeed a term often applied by medieval Arab geographers to East Africa. However, it is of disputed origin and application. In Arabic it meant "Land of the blacks or negroes," but was not of Arabic origin. Some scholars have suggested it derived from the Indian term "Zanzbar," meaning "country of the black man," or the Persian Pahlevi "zangik," meaning "Egyptian, Ethiopian, Moor, Negro; a savage" (Fisher 1998: 967). "Zanj," however, was only sometimes applied to the modern-day Swahili coast (Chittick 1970: 102–103; Tolmacheva 1986: 107). Masudi and Ibn Hawqal considered Zanj to lie between the Nile and East African coast, although these parameters were far from fixed: Ibn Battuta (fourteenth century) believed the Nile to flow from West Africa to Egypt (de Farias 1980: 120–121). Indeed, Zanj was sometimes conflated with the *Bilad as-Sudan*, "the lands of the blacks" (Savage 1992: 355). Moreover, some Muslim writers followed Ptolemy in considering that the southern part of the East African coast curved east to link up with South or Southeast Asia (de Farias 1980:

120–121). All this makes the geographical location of the Zanj subject to considerable speculation.

Similarly, "Zanj" only sometimes applied to the black population of the Swahili coast (Chittick 1970: 102–103). Al-Ya'qubi (d. 897) differentiated between peoples of West Africa (*Sūdān*) and those to the east (*Ḥabasha*), who included the Zanj, Beja (Buja), Nubians, and Abyssinians (Tolmacheva 1986: 106). Masudi (d. 956) also considered the Barbara—generally denoting the pre-Somali Cushitic-speaking population of the Horn—to be part of the Zanj (Tolmacheva 1986: 107–108), whom he and Ibn Qutayba (d. 889) included among the people of the Sudan (Savage 1992: 355). More mysteriously, Ibn Ḥawqal, writing c. 970, stated that a cold region of Zanj was inhabited by white Zanj (Talhami 1977: 446; Chittick 1977: 192–193). The term "Zanj" was also often used in a pejorative sense, referring to an uncivilised "Kaffir" or unbeliever (Turton 1975: 525–526; Savage 1992: 355). Finally, the French orientalist scholar, Barthélemy Molainville (1625–1695), who based his work on the Ottoman scholar Katib Çelebi/Hajji Khalifa (1609–1657), wrote that the "Zanj" or "Zengi" were "those whom the Italians call Zinghari and the rest of us Egyptians and Bohemians" (quoted in Popovic 1999: 30, n. 7).

In this respect, there is a similar confusion over the terms "Ethiopian" and "Kunlun." "Ethiopian" could refer to Abyssinian highlanders, eastern Africans (including the Zanj), or black Africans generally (Tolmacheva 1986: 106), while Greek literature on the western IOW during the BCE/CE transition frequently conflates "Ethiopian" and "Indian" (Warmington 1995: 13). Again, some scholars have interpreted the Chinese *kunlun*, "black person," as referring to the inhabitants of Pemba, or, more generally, Africans. The meaning of the term *kunlun*, however, initially referring to Annamite islanders, was extended to include darker-skinned peoples of the Malay Peninsula, Indonesian archipelago, Melanesia, certain Himalayan communities, and even Madagascar (Ju-Kua 1967: 32; Filesi 1972: 21; Wilensky 2002).

The Zanj Rebels

Contrary to the conventional view, many—possibly most—participants of the 868–883 "Zanj" uprising were not from the Zanj coast of East Africa. First, the rebel leader, ʿAlī b. Muḥammad al-Zanjī, although known as al-Burq, or Ṣāḥib al-Zanj, "Chief of the Zanj," was neither African nor enslaved. Born ʿAlī b. Muḥammad b. ʿAbd al-Raḥīm in his mother's family home near al-Rayy, some 8 km to the southeast of Tehran in Persia, he belonged through his paternal lineage to the ʿAbd al-Qays tribe of eastern Arabian origin—although his father was the son of a concubine from Sind. Well educated, he started his career as a panegyric poet at the court of caliph al-Muntaṣir (r. 861–2). He became a Qarāmita, a mixed group of revolutionary Ismaili Shiite factions and, claiming descent from Muhammed's sister-in-law, was recognised as a prophet and raised the banner of revolt against the Abbasid authorities (Al-Ṭabarī 1992: 30–31; Hawley 1971: 52, 64; Popovic n.d.; Oberling n.d.: 137; Clarence-Smith 2006: 57; Humphreys 2010: 536).

ʿAlī won initial support from local people, desert tribesmen, and *mawlā* (military personnel, usually former slaves, many of Central Asian origin). His first uprising in Bahrain was suppressed, but in 868 he and a core of followers moved to the marshlands near Basra. There, he forcibly enlisted *Shūrajiyyīn*, gangs of servile workers, initially from 50 to 600 strong, whose primary work was to remove the nitrous marshland topsoil (Al-Ṭabarī 1992: 31, 33–35, 59). They included non-Arabic speakers, but this is an indication of relatively new arrivals rather than specifically, as Horton claims, people from East Africa (Al-Ṭabarī 1992: 38; Horton 2010: 6). Al-Ṭabarī, the chief source for the revolt, indiscriminately conflates the terms "black" and "Zanj" (see, for instance, Al-Ṭabarī 1992: 56–58). Other rebel recruits comprised slave fugitives, and renegade caliphate soldiers; others were slaves taken from captured towns (Al-Ṭabarī 1992: 52, 111; Nöldeke 1892: 153). Humphrey Fisher and John Hunwick contend that overall most rank and file African rebels were probably of Ethiopian and Sudanese rather than East African origin, though their numbers included East Africans, Nubians, and probably West and Central Africans (Fisher 1989: 382; Hunwick 1978: 34; Sheriff: 225–227).

In contrast to African slaves in the Americas, "Zanj" rebels developed no slave or even black African "consciousness." This was due to a number of factors. The *Shūrajiyyīn* comprised not only slaves but also emancipated slaves and probably substantial numbers of peasants (Chittick 1970: 102–103; Popovic 1999: 136–137). Under the Umayyads, forced labour for ordinary subjects—contrary to the sharia—had caused widespread discontent (Petrushevsky 1985: 48), and it continued into the Abbasid era, when the harshest types of manual labour were imposed on convicts. Second, "Zanj" work in the marshes was not totally exploitative: the topsoil was carried away by mules, and some *Shūrajiyyīn* worked as transporters of provisions (Al-Ṭabarī 1992: 35, 40). Again, ‘Ali persuaded those he captured to pledge allegiance to him in return for the promise of good treatment, money, houses, and slaves—mainly Iraqi females enslaved following the rebel capture of towns (Al-Ṭabarī 1992: 38).

In addition, ‘Ali also drew into the rebel ranks many supervisors of the *Shūrajiyyīn*, Bedouin horsemen, imperial Abbassid troops (including Turkish and Central Asian soldiers), and at least one Jew (Al-Ṭabarī 1992: 38, 46, 52; Nöldeke 1892: 159, 163; Savage 1992: 355; Sindawi n.d.: 28, 30–31). Ricks considers that the Zanj movement involved even Abbassid officials (Ricks 2001: 408). The rebels also had wives, who were during battle sometimes obliged to supply their menfolk with weapons (bricks) (Al-Ṭabarī 1992: 62, 65). By 882, the rebel army numbered about 50,000, most of whom were probably local Arabs (Shaban 1978: 101–102; see also Fattah 2009: 93–94; Bacharach 1981: 473; Nöldeke 1892: 169). Moreover, most African infantry in the Abbasid army remained loyal to the regime, while some rebels, including “slaves,” joined the imperial cause, in 883 helping to crush the uprising (Al-Ṭabarī 1992: 63–64, 68–106; Bacharach 1981: 474).

Such factors indicate a distinct lack of either African or slave consciousness and reflect a century of internecine strife and shifting political allegiances in the Abbasid Caliphate. In 836, the Caliph al-Mu’taṣim transferred his government from Baghdad to Samarra, 125 km to the north, in order to reduce friction between his Turkish military elite and the Baghdadi population. However, inter-Turk and Turk-caliph tensions continued, central control weakened, and economic and political turbulence erupted, notably in southern Iraq and southwestern Persia (Khuzestan) (Al-Ṭabarī 1992: xv–xvi; Popovic 1999: 9–10). Al-Muwaffaq, titular caliphal ruler from 870 to 891, was obliged to recognise the de facto independence of several parts of the empire: of Egypt under Aḥmad ibn Ṭūlūn (835–884), who entered the Egyptian capital of Fustat in 868, consolidated his power with an army that included African and Berber elements (Bacharach 1981: 474); of Syria, which ibn Ṭūlūn annexed; of Persia under Ya’qūb ibn al-Ṣaffār (840–879); and a Shiite state in Ṭabaristān on the southern rim of the Caspian Sea (Hodgson 1977: 486–488; see also Haldon 2010: 248–250).

In this context, the Basra region was of critical importance. It constituted a crossroads controlling maritime routes south to the Red Sea, India, and China, riverine routes north to Baghdad, and major east-west overland trade and pilgrim routes (Agius 2008: 68–69). Thus, Geoffrey

King contends that "the great Zanj rebellion … once represented as a slave uprising has also been described as a conflict over the control of Gulf trade" (King 2001: 86). Moreover, the nearby marshes had long formed a residual base for refugees and rebels. There had been a "Zanj" revolt in the region in 695 CE (Bacharach 1981: 473), and from 820 to 834 enslaved Indians from Sind, forcibly settled in the marshes, along with a motley group of outcasts and refugees, rose in a revolt against central authority that was only suppressed with difficulty (Al-Ṭabarī 1991: 7; Nöldeke 1892: 152; see also Savage 1992: 356, n. 32). The "Zanj" rebels by 871 controlled much of lower Iraq (Nöldeke 1892: 159). On the west bank of the Tigris below Basra, they built a large city called Mukhtara, surrounded by extensive fields and palm groves and served by a network of canals. It included, besides homes for the rank and file, palaces for the leaders, mosques, and jails. Traders and Bedouins provisioned the city in return for plunder (as well possibly as money raised in taxes) and locally grown dates (Al-Ṭabarī 1992: 109 n. 324; Nöldeke 1892: 156–157). Allegedly, the rebels also captured 1900 boats from imperial forces (Al-Ṭabarī 1992: 52). Other rebel cities included Mania, near Wasit (captured by imperial forces in 880) (Nöldeke 1892: 165). As Muhammad Shaban has noted, the resources required to establish such towns, run a navy and army, and effectively participate in the regional economy would have been far beyond the capacity of allegedly unskilled, malnourished, non-Arabic speaking slaves (Shaban 1978: 102).

The conventional viewpoint is that following the suppression of the Zanj revolt in 883, slave imports from East Africa declined significantly. Any such reaction would, however, be expected to have first occurred shortly after the start of the revolt in 868, rather than following its suppression.

Genetics

Horton, following Popovic, argues that East Africans were imported to work in the Basra marshlands because they carried the sickle cell, and thus were immune to the malaria prevalent in the marshes (Horton 2010: 6; Popovic 1999: 11). It is well known that sickle cell gene (βs or HbS) distribution was driven by the selective advantage it conferred in protecting against *Plasmodium falciparum* malaria infection, and that βs expanded substantially to the Americas during the African slave trade (Piel et al. 2014: e80–e89). Following conventional historical interpretations, geneticists have assumed that the presence of βs in Middle Eastern populations was as a result of the East African slave trade (Daar et al. 2000: 39, 44), notably in the Basra marshlands where malaria had been prevalent for millennia (Gelpi 1973: 258–264; Potts 1994: 162).

More recent genetic studies, however, indicate complex origins for the sickle-cell trait in the Middle East. While the overall thesis of a predominant eastern African Bantu-speaking genetic inflow into the Gulf countries appears confirmed, the inferred timeline for this is from 980 CE—more than a century later than the "Zanj" Revolt (Hellenthal et al. 2014: 750–751). Moreover, studies of distinct chromosomal haplotypes show that the sickle-cell trait in the Middle East had a number of geographical origins. One, an Indo-European mutation that probably emerged among the Harappa people of the Indus Valley, gave rise to the Arab-Indian (or Saudi-Indian) haplotype that, probably during the Sasanian and possibly Abbasid period, spread to the oases of eastern Saudi Arabia, Bahrain, Kuwait, and Oman (Rahimi et al. 2006: 726; Daar et al. 2000: 40; Layton and Nagel 2010: 182). The Arab-Indian haplotype is also partly responsible for the high rate of the sickle cell trait in Azerbaijan, Baluchistan, Iran, Iraq (Sind slaves), and Afghanistan (Daar et al. 2000: 40). The other four mutations, developed in sub-Saharan Africa, where from 20 to 25 % of the population are currently carriers, gave rise to the Senegal (Atlantic West Africa), Benin (central West Africa), Bantu (central, east, and southern Africa), and (minority) Cameroon (southern Cameroon) haplotypes (Daar et al. 2000: 40; Layton and Nagel 2010: 182).

In Yemen, West African (predominantly Benin) haplotypes characterise 87.8 % of sicklers, and the Bantu haplotype only 3.3 % (Al-Nood, pers. comm.). The Arab-Indian haplotype is the major haplotype (90 %) in Bahraini sicklers, as in Kuwaiti sicklers (77.8 % Arab-Indian and 16.7 % Benin) (El-Hazmi et al. 2011: 601). The Bantu haplotype forms under 10 % of current sicklers in the Middle East-Persian Gulf region except in Northern Oman, and even there it is the least significant of three major haplotypes (Benin: 52.1 %; Arab-India: 26.7 %; Bantu: 21.4 %) (Daar et al. 2000: 39, 44). In Iraq, there are two main areas of sickle-cell concentration. One is the Kurdish region of Dohuk in the north where the most common haplotype is the Benin (69.5 %), followed by the Arab-Indian (12.5 %) and Bantu (7.8 %) (Al-Allawi et al. 2012: 333–342). The other is in the south, around Basra, where no results of haplotype distribution have yet appeared. It is, however, likely to be similar to Southern Iran where a 2006 survey indicated the distribution of haplotypes to be Arab-Indian (67.3 %), West African (17.3 %)—comprising Benin (11.5 %), Senegal

(4.8 %), and Cameroon (1 %)—and Bantu (15.4 %) (Rahimi et al. 2006: 722); and a 2011 survey of the inhabitants of Khuzestan, bordering Basra, revealed their haplotypes to be Arab/Indian (38 %), Benin (18 %), Senegal (16 %), Bantu (16 %), and Cameroon (12 %). This indicates fully 46 % of haplotypes in the region to be of West African origin (Keikhaei et al. 2012: 105–110). There were possibly two routes by which the West African haplotypes reached Iraq and the Persian Gulf. One dating to less than 2000 years ago, almost certainly associated with the rise of the Ottoman Empire from the mid-fifteenth century, ran across the Mediterranean to Turkey and subsequently to Northern Iraq. The other, more ancient route ran to the Middle East via Egypt and the Red Sea (Al-Allawi et al. 2012: 333–342; Daar et al. 2000: 39, 44).

That black Africans migrated to the Middle East is more generally indicated by the presence of signature sub-Saharan African mtDNA lineages in south Arabian populations. The distribution of the E3b1-M35 derivatives in Yemen, Qatar, and UAE, however, indicates an arrival from Northeast Africa via the Levantine corridor rather than through the Horn of Africa. The presence of the E3a-M2 lineage in Oman (7.4 %), Yemen (3.2 %), UAE (5.5 %), and Qatar (2.8 %) could lead to the conclusion that these chromosomes are a contribution from the East African slave trade (Cadenas et al. 2008: 381). However, the presence in Oman of M2 combined with the absence of E3b*-M35 is a profile common in central sub-Saharan Africa but not East Africa, where E3b*-M35 is a common haplogroup (Luis et al. 2004: 532). This might indicate the passage of slaves, any time over the last few millennia, from sub-Saharan West or Central Africa to the Arabian Peninsula. In more recent times, these may have been shipped via the Swahili coast from sources in Central Africa.

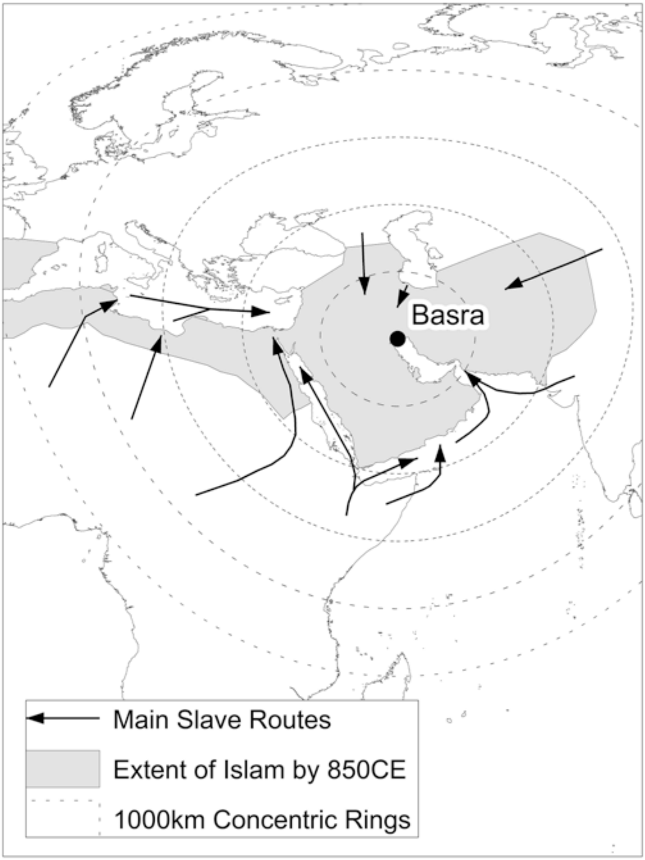
Moreover, among the Marsh Arabs of Iraq, the predominant haplogroups and sub-haplogroups are of an autochthonous Middle Eastern component. Southwest Asian and African contributions are both weaker and are more evident in mtDNA (inherited solely from the mother), indicating a greater female than male African input into the local DNA pool (Al-Zahery et al. 2011: 1), which is consistent with evidence that most African slaves shipped into Middle Eastern markets, as to IOW markets in general, were female (Savage 1992: 361; Austen 1992: 237). In addition, the greatest African affinity for the Y-chromosome haplogroups of the Basra marshlands are northwest Africa, the Sudan, Ethiopia, and Somalia—not the Swahili coast or its East African hinterland (Al-Zahery et al. 2011: 11). It also now seems clear that the greatest African genetic input into Arabia is of Ethio-Somali and Nilo-Saharan origin, which strongly suggests that most slaves into that region came via the Horn of Africa (Hodgson et al. 2014a).

Africa in the Abbasid Slave Trade

The first significant flow of African slaves to Muslim markets from the close of the seventh century comprised captives from the Muslim conquest of North Africa (Savage 1992: 356–357, 359). In the first stages of this, Berbers were enslaved. Most converted to Islam, but contrary to the conventional view, only from the late ninth century did all Islamic schools forbid the enslavement of Muslims; nonetheless, "rebel" Berbers of North Africa continued to be enslaved in the ninth and tenth centuries even after they had become Muslims (Savage 1992: 354, 359, 361). From the end of the seventh century to mid-eighth century, however, an Ibāḍī-dominated trading network developed which tapped the regions south of the Sahara as a new source for slaves, most of whom were acquired commercially (Savage 1992: 351–353, 358, 364; Gordon 2011: 71). In the 700s and 800s, "Abyssinians" were also enslaved in the Fezzan, a southwestern region of modern Libya, an indication of sub-Saharan migration into the area. In the tenth century, this traffic regularised and increased (Savage 1992: 364, 367) (Map 12.2).

Demand for African slaves lay primarily in the markets of the Muslim heartland. Ralph Austen estimated the medieval Trans-Saharan and Maghreb slave trade at between 800 and 1000 slaves annually. Most were women and children (Austen 1992: 223, 237; Savage 1992: 361). The best known historically were luxury slaves, notably *qayna*, female singers who entertained the caliphs and elite, while sub-Saharan African women were considered excellent wet-nurses and domestic servants. Sub-Saharan males were also imported as store-keepers, porters, boatmen, domestic servants, cooks, agricultural workers, and even keepers of private libraries; from the late ninth century, they were also imported as soldiers. Thus, from 868 the Egyptian army comprised not only significant numbers of highly prized slave Berbers, but also sub-Saharans from "Sudan" whose numbers rose from an initial 12,000 to as high as 45,000 (Savage 1992: 353–354, 358; Gordon 2011: 71; Bacharach 1981: 477–478).

African male slaves were also imported into Iraq, where in 750, following the overthrow of the Umayyads, a new dynasty, the Abbasids, was established in Baghdad. The Abbasids imported large numbers of slaves from



Map 12.2 The Muslim heartlands and main slave routes in c. 850 CE (Carl Hughes, IOWC)

surrounding regions. Significant numbers of white slaves, for example, entered Abbasid markets via the Volga River (Callmer 1977: 174–175). Also, as Islam made no major advances in India until the Ghurid invasion of the late twelfth century, predominantly Hindu and Buddhist India was until then a major potential region for slave raiding (Lambourn 1999: 63). The Makran, a significant source of slaves for the Persian Gulf in the nineteenth century, was also a probable source of slaves in the ninth century—the Arab trader Suleiman remarking in 851 CE that it was inhabited by "heretics called Šurâ" (Sulaymân 1922: 26). Iraq also imported African slaves. Ghada Talhami argues that until relatively late most African slaves entering the Persian Gulf were Ethiopians and especially Nubians and Sudanese (Talhami 1977: 443–444). However, it is probable that most came from West Africa, for their numbers declined significantly from 930 due the closure of sources of supply in West and West-Central Africa. In the late 800s, the effective independence of Isma'ili Shiites across North Africa closed the western trans-Saharan slave routes to Iraq, while the rise of first the Tulunid (868–905) and then the Fatimid (969–1171) dynasties in Egypt, closed the door on the Sudanese slave routes to Sunnite Iraq. Consequently, the Abbasids who had hitherto recruited Africans into their infantry, started enlisting Dailimi, Persian speakers from northern Iran, which was closer and lay on secure trade routes (Bacharach 1981: 472–474, 476–479; Haldon 2010: 245–246).

The indications are that, in contrast with northern, West, and Central Africa, the early trade in East African slaves was spasmodic and small-scale. Chittick, Timothy Fernyhough, and Thomas Vernet argue that from the seventh to fifteenth centuries, the Ethiopian highlands provided most slaves exported from East Africa, and that they passed via Zaila, in Somalia, to Zabid or Aden, and from there to the Persian Gulf (Fernyhough 1986: 105–106; Vernet 2009: 39–41). David Wright contends that a report in c. 850 CE, some 15 years before the outbreak of the "Zanj" revolt, by the Chinese voyager Tuan Ch'eng-shih, indicates "a thriving trade in ivory, slaves and ambergris" from the Swahili coast (Wright 2005: 120–121). This reference, however, is to pastoralists of "Barbarā" (probably Somalia), rather than present-day Kenya or Tanzania. It notes that ivory and ambergris were more significant than slaves for visiting Arab and Persian traders. Local, presumably Somali, women, who were the chief victims of the slave trade (local men being the chief enslavers), were sold for high prices—indicating a luxury trade in young women destined for the harems of the Middle East (Hirth 1909: 47–48; Freeman-Grenville 1962: 8). In all, modest numbers of slaves were exported from the East African coast south of the Horn of Africa (Zeila and Berbera) until the late eighteenth century (Freeman-Grenville 1968: 152; Sutton 1972: 25; Chittick 1970: 103; Talhami 1977: 445–446).

Popovic asserted that, for the Persian Gulf, East Africans were the cheapest of all slaves (Popovic 1999: 19, 20–22); while Horton indicates the possibility that from 800 to 870 some 270,000 slaves were shipped from the Swahili coast, an average of about 4000 per annum, approximately the same as for the nineteenth century, the era generally accepted as the peak of the East African slave export trade (Horton 2010: 7). Beaujard, in turn, considers that well over 1000 slaves per annum were exported from the Swahili coast between 800 and 1600 (Beaujard 2012: vol. 2, 290).

However, the difficulty of procuring such numbers would have been enormous, and the costs involved in their capture and shipment, prohibitive. This was due to a number of factors. A major reason for the relative insignificance of East African slave imports into Abbasid realms was the lack of an appropriate trading structure and the complex logistics involved. The Abbasids obtained through trade, tribute, and capture thousands of Indian, Turkic, European, and African slaves, the bulk of whom travelled to Iraq by established overland networks, supplemented sometimes by coastal shipment (Gordon 2011: 75, 78, 81; Savage 1992: 356; Clarence-Smith 2006: 6). Some slaves from eastern Africa and India came by sea, but generally from the closest markets of Ethiopia, the Horn, and Sind. Shippers moved slaves from port to port in coastal trade, sometimes using them as crew, before selling them at slave marts (Ricks 1988: 65). Such a great number of Sind slaves was imported in this manner in the mid- to late-eighth century that by 786 CE, they had flooded the Iraqi markets and fetched very low prices (Masudi 1989: 54).

By contrast with the major slave sources for ninth-century Iraq, East Africa was distant, while the Muslim trading network connecting to it was in its infancy and totally dependent upon maritime transport. Long-distance maritime trade entailed considerable investment, and the risks were great. It was expensive to construct a deep-sea dhow, and took years to train experienced ship captains and pilots (Agius 2010: 139; Gilbert 2004). Also, uncertainty about arrival and departure times rendered it difficult for merchants to plan transshipments and distribution (Geels 2002: 1265).

Further, the Zanj littoral was, as Ibn Hawqal noted in the ninth century, "miserable and sparsely populated. It was hardly cultivated, with the exception of the outskirts of the king's residence" (quoted in Talhami 1977: 446). Horton cites Al-Jāḥeẓ (776–869) as evidence of a large trade in Zanj slaves from the Swahili coast (Horton 1985). However, Al-Jāḥeẓ (2014) specifies that the Zanj slaves referred to were from Lamu Island alone, not from Zanzibar or from the mainland. They thus could not have been shipped in significant numbers:

> They [the Zanj] say: You [the Arabs] have never seen the genuine Zanj. You have only seen captives who came from the coasts and forests and valleys of Qanbuluh [Pemba], from our menials, our lower orders, and our slaves. The people of Qanbaluh have neither beauty nor intelligence. Qanbaluh is the name of the place by which your ships anchor. The natives in the Bilad Zanj are in both Qambalu and Lunjuya [Unguja—Zanzibar], just as Arabs are the descendants of Adnan and Qahtan in the Middle East. You have yet to see a member of the Langawiya kind, either from the coast (al-Sawahil), or from the interior (al-Jouf) (Al-Jā-Jā).

Buzurg ibn Shahriyar in c. 950 was the first to specify that slaves were captured or purchased on the continental coast between Zanzibar and Sofala, while al-Idrisi (1099–1165/6) noted that the ruler of Kish, an island at the entrance to the Persian Gulf, raided East Africa for slaves (Freeman-Grenville 1962: 9–13). These are isolated references, however, insufficient to support the proposition of Horton, followed by Beaujard, of a large and continuous East African slave trade either in the ninth century, or from 800 to 1600 (Horton 1996: 415; Beaujard 2012; vol. 2, 290).

The chief potential source of slaves would have to have been the relatively populous agricultural communities in the East African interior, notably in the well-watered and fertile intra-lacustrine region. Recognising this, Horton envisages the Usambara, Pare, and Kwale Hills as the main source regions for slaves, and speculates that

> A likely method of capturing slaves would have been through raiding parties organized from the Islands [Pemba and Zanzibar], possibly in partnership with particular mainland groups, several of which we know from historical sources had a fearsome reputation for savagery (Horton 2010: 8).

In his turn, J. Alexander asserts that,

> The trading pattern in the ninth century AD included slaves taken from Sofala at the mouth of the Zambesi River to Pemba and the Lamu archipelago … large numbers of male slaves being shipped to Basra to work in the irrigation projects in southern Iraq. … Others, mainly women and children, were taken there and to Arabia for domestic service. They appear to have been brought to the coast by indigenous rulers in the immediate hinterland and to have been obtained in local wars (Alexander 2001: 54).

In support of such a hypothesis, Horton cites Peter Schmidt for archaeological evidence of depopulation in hinterland East Africa due to the slave trade (Horton 2010: 7–8). However, Schmidt concludes that depopulation was due predominantly to human impact on the environment. He specifically underscores major similarities in the Usambara Mountains, Pare Hills, Taita Hills, Mount Kilimanjaro, and the area west of Lake Victoria where population pressure and intensive iron production resulted in deforestation and soil erosion, which by about 500–700 CE led to depopulation (Schmidt 1989: 75–76, 1997: 268–270).

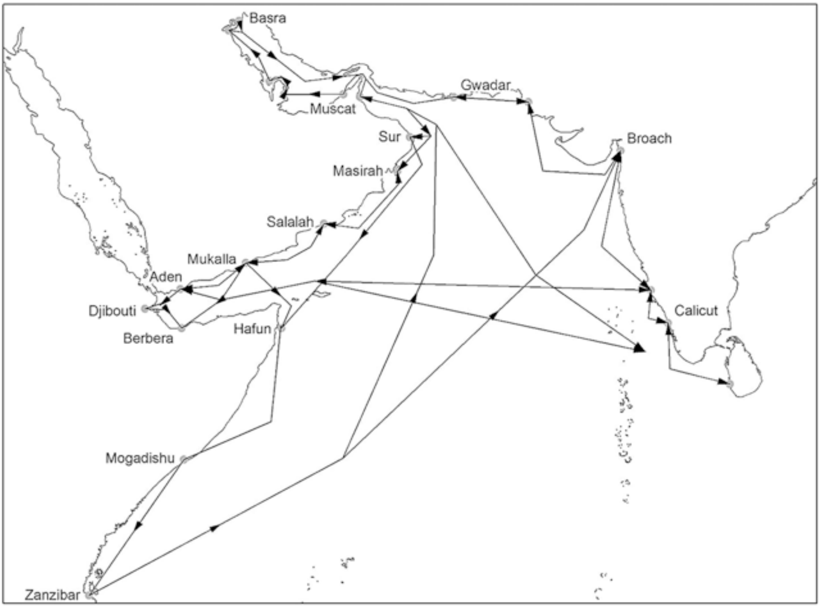
There is other evidence of depopulation associated with climate change. Population density in Africa is generally closely related to climate, specifically to rainfall. Following a wet period from around 500 CE, interior East Africa and the Great Lakes region including Lake Malawi experienced an extended period of low precipitation from c. 700 to 800, while major droughts affected the Lake Tanganyika region from c. 700 to 850 and Mozambique from c. 800 to 900 (Verschuren 2004: 147, 150; Alin and Cohen 2003: 31–49; Ekblom and Stabell 2008: 1139). This aridity probably underpinned significant human migration from equatorial East Africa towards Southern Africa which, by contrast, experienced an almost continuously wetter climate from 0 to 500 CE and again from about 900 to 1300 CE (Tyson et al. 2002: 133). Hence, considerable human migration occurred in ninth-century East Africa, but it was associated with climate change (aridity), drought, and human pressure on natural resources.

Additionally, the logistics of continuous large-scale slave raiding and shipping would have incurred considerable costs. Slave-raiding parties and their collaborators—even a modest operation might involve easily 10–20 well-armed men—needed to be recruited, armed, provisioned, and paid; and interpreters hired (Hansen 2005: 296). Also, maritime trade was seasonal. Vessels could only sail from Zanj to the Persian Gulf in April–early May or September, before and after the stormiest period (mid-May to mid-August) of the southwest monsoon (Agius 2005: 126). Should contrary currents prevent dhows from sailing north in March–April, they were obliged to "winter" in East Africa (Datoo 1970b: 1–2, 5). The optimum departure point for ocean-going vessels returning to the Gulf from East Africa was from Zanzibar and points farther north (Middleton 1992: 9–10), although vessels could sail from as far south as Kilwa (some 300 km south of Zanzibar). Thus, a large-scale slave export trade would involve significant groups of well-guarded adult male captives being marched to the coast, shipped to island entrepôts, and there held, fed, and surveyed in coastal stockades pending the arrival of the sailing season and the availability of sufficiently capacious, sea-worthy, and well-equipped boats (Sulivan 2003: 54; Alpers 2004: 15).

In support of his argument for massive East African slave exports to the Persian Gulf, Horton presents archaeological evidence for occupation of Unguja Ukuu on Zanzibar, radiocarbon dated to the sixth century, and for Ras Mkumbuu and Mtambwe Mkuu on Pemba from the ninth to tenth centuries (Horton 1985; Horton and Middleton 2000: 65, 74–75). The artefacts found support the existence of foreign trade with the Gulf, but not specifically the slave trade (Horton and Middleton 2000: 32, 44, 51, 56–57, 73, 77–78, 92–93; Horton 2004: 72; Horton 2009: 441, 445–447; Crowther et al. 2014: 21–44; Boivin et al. 2013: 251–252). Horton asserts that a few chain links found in East Africa dating to the period c. 750–850 could "possibly" be interpreted as slave chains and indicate a trade notably in adult male slaves (Horton 1996: 367; Horton and Middleton 2000: 75). They were unearthed, however, in the Lamu and not the Zanzibar Archipelago, and slave irons were a rarity in the Indian Ocean even at the height of the dhow slave trade in the nineteenth century (Colomb 1968: 44).

The maritime transport of slaves in large quantities over long distances accentuated problems of space, sanitation, and provisions aboard ship. The holds of larger ships suffered particularly from rat and cockroach infestation, and in storms bilges quickly became foul with stagnant water (Agius 2005: 143–144). Starvation and disease were the main causes of death among slaves, who, often malnourished and physically weak, were particularly vulnerable to dysentery and infectious diseases such as smallpox. The mortality rate among slaves on the voyage from East Africa to the Persian Gulf, discounted by Horton, was probably a minimum of 20 % (Ricks 1988: 67; Machado 2003: 21; Manning 1990: 258–259). This would indicate, if one follows Horton's estimate, that some 324,000 male slaves, averaging 4629 per annum, were shipped from Pemba and Zanzibar in the period 800–870 specifically for the Lower Iraq market (Horton 2010: 7) (Map 12.3).

In the nineteenth century, Indian Ocean dhows averaged 200–400 tons (the largest attained 500–600 tons) (Tibbetts 1971: 48–49; Agius 2005: 15, 97; Gilbert 2004). In theory, a dhow of 50 tons could carry 100 slaves, and those of 100 tons 200 slaves. Guillaume Grandidier and Raymond Decary estimated that a dhow with 12 crew could carry 200 slaves "stacked unchained in the bottom of the hold" (Grandidier and Decary 1958: 206). However, the largest numbers of slaves aboard a



Map 12.3 Early dhow routes in the western Indian Ocean (Carl Hughes, IOWC)

single dhow intercepted by George Sulivan off East Africa in the 1870s ranged from 119 to 156 (Sulivan 2003: 79). In one case in August 1858, a dhow of 94.5 tons, specially fitted out with a slave deck, was caught by a British anti-slavery patrol in the Comoros with almost 100 slaves aboard (House of Commons 1860: 17). Specially equipped slave dhows were exceptionally rare, however, and large slave numbers were confined to short voyages within East African waters. In the nineteenth century, almost half of all ships captured by British anti-slave trade patrols in the wider western Indian Ocean carried ten slaves or less (Colomb 1968: 43), and in July 1852, at the height of the maritime slave trade, eight "slave" vessels arrived in the Persian Gulf from Zanzibar, with an average of 55 slaves per ship (Ricks 1988: 66). Thereafter, due to British naval measures, local dhows took more risks and carried more slaves: from 1858 to 1873, 30 % of smaller slave dhows carried 100 slaves or more (although only 8 % of dhows of over 100 tons did so—Sheriff 1989: 137).

On the basis of nineteenth-century estimates of an average of 55 slaves per vessel, this would mean that, on average, 84 dhows would have annually congregated in the Zanzibar Archipelago from where, within a ten-week period (April–early May and September) they sailed with slaves for Iraq. Given a minimum of 15 crew members per dhow (and the need to maintain an armed guard to prevent any possibility of slave revolt), this would over a 70-year period have transformed Zanzibar during a few weeks each year into a major hub, with the need to provide food and water for a minimum of some 6000 men (free and slave), as well as ship-repair and other services. However, in earlier times, dhows were on average smaller. Duarte Barbosa indicated in c. 1515 that the dhows of East Africa probably averaged 100 tons (Manguin 1985b: 6), although Justus Strandes estimated that the largest local vessels off the East African coast at the start of the sixteenth century were around 50 tons (Strandes 1989: 81). A few larger dhows possibly possessed one deck, on the poop, under which was the cabin. However, most had no deck. This meant either carrying slaves as crew—a commonplace practice—or on top of inanimate cargo in the hold, which was open and vulnerable to heavy seas and spray (Manguin 1985b: 6; Tibbetts 1971: 51–52: Agius 2005: 95).

Damage to, or loss of, ships and cargoes due to storms, reefs, and pirates was considerable. As G.R. Tibbetts notes of long journeys, such as that between the Persian Gulf and Zanzibar:

> Constant damage is done to the average dhow while on a long journey and the '*Ajā'ib al-Hind*[1] is filled with passages referring to the repair of the ship after a storm. Ships are constantly being beached [for repairs], or new masts cut from the jungles (Tibbetts 1971: 49).

Overloading a ship proved dangerous in storms, and while jettisoning cargo might help, it entailed financial losses. Many such ships sank with all hands aboard (Agius 2005: 134). Navigational risks declined following the increasing use of astrolabes, charts, and sounding devices, but this occurred chiefly from the tenth century (Ricks 1970: 349–350).

A dhow generally took 35–42 days to sail from Zanzibar to the Persian Gulf depending on winds, currents, storms, pirates, and provisions and illness aboard ship. The longer the time taken, the higher the crew and slave cargo mortality. Large vessels generally carried crews of 20–30, one or two carpenters, and possibly an armed guard to protect against pirates. Smaller craft averaged about 15 crew. Traders were often accompanied by a few domestic slaves and concubines (Agius 2005: 97, 126, 138, 200–201; Tibbetts 1971: 59; Hansen 2005: 294). For lengthy voyages, such numbers posed problems of provisioning. In the nineteenth century, dhows carried millet, with which slaves were generally fed; as well as rice, dates, dried fish, coconuts, fruit, goats, and sheep. Crew members also fished. Diet aboard might be supplemented by unleavened bread, dhal, onions, ghee, fat, and sugar. High-sea dhows carried two to three large (450–680 litre) teak water tanks, although as the water was often tepid and salty, merchants and skippers kept their own earthenware jars with cold clean water (Colomb 1968: 40; Villiers 1948: 416; Agius 2005: 138, 141–142; Gilbert 2004). Sailors often suffered from dehydration, and crew and passengers sometimes died of thirst and starvation (Agius 2005: 142–143). This placed a premium upon following a route close to the East African littoral, as this afforded the opportunity to call at well-known sources of water on the coast and islands (Colomb 1968: 45), although the only perennially safe ports with access to good drinking water were the Bajun Islands, the Lamu Archipelago, and Zanzibar (Datoo 1970b: 5).

Conclusion

The conventional historical view is that the Zanj Revolt in Lower Iraq from 869 to 883 CE was led and orchestrated by East African slaves from Zanj, a term used in medieval Arabic for the present-day Swahili coast. This view has been given added weight by the endorsement of archaeologists, notably Mark Horton, who claim literary, genetic, and archaeological evidence for a massive trade in East African male slaves to Iraq from c. 800 to 870. A review of the evidence reveals otherwise, however. The term "Zanj" could indeed refer to the Swahili coast of East Africa, but it was also used in a more generic sense that included all black Africans. Interpretations of the revolt derive from the history of Al-Ṭabarī, who conflates "Zanj" with both African and rebel. In fact, the leaders and a significant proportion of the supporters of the revolt were neither Africans nor slaves, while it is likely that many, possibly most, African slave participants were from West and western Central Africa. Historical studies point to these regions as the source of most African slaves to Middle Eastern markets, including Iraq, and these are backed by genetic studies. There is scant archaeological evidence for slave raiding or trading in East Africa in the ninth century, and the literary evidence points to at most a small-scale and intermittent traffic in slaves.

Rather, commodities other than slaves fuelled the movement of the Muslim trading frontier south down the East African coast. Gold was the major product which initially attracted foreign traders to the Swahili coast, probably from the seventh century CE, followed by ivory, ambergris, tortoise shell, animal skins, dried fish, rock crystal, and high-grade iron ore exported to India for the manufacture of sword blades (Ricks 1970: 343, 351, 353; Rea 1976: 121, 125; Martin 1975: 369; Talhami 1977: 446–447; Sulaymân 1922: 28–30). Slaves had become an important commodity by the twelfth century; however, documents form the Cairo Geniza indicate that competition between Aden and Kish for the East African trade resulted in naval clashes between the two (Ricks 1970: 353), but the Swahili coast became a significant slave export centre only from the mid-eighteenth century.

Note

1. For instance, 'The Book of the Marvels of India' by Buzurg Ibn Shahriyār (d.399/1009).

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