

SOUTHEAST ASIAN SHIPPING IN THE INDIAN OCEAN DURING THE FIRST MILLENNIUM A.D.

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Abstract : The seafaring capabilities of the people of insular Southeast Asia have long been studied on the basis of linguistic affinities between Malay and the Barito group of languages spoken in Madagascar. This paper, however, focuses on ship-building technology and the development of a distinctive stitched plank and lashed-lug tradition of early Southeast Asian craft as indicated by archaeological discoveries in the region.

The people of Insular Southeast Asia, being the inhabitants of the largest archipelago in the world, have for long been routinely described as skilled mariners.¹ It is now generally accepted that Austronesian speaking people, after leaving their homeland in Taiwan approximately 5000 years ago, sailed south into Insular Southeast Asia, where they soon overshadowed pre-existing populations. From there, they went on 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 Southeast Asia.² For long, however, once lip service was paid to such obvious maritime adaptations and sailing talents, little else was usually said about the matter. At best, detailed studies of the surviving small sailing vessels of Oceania or Southeast Asia were carried out. Cultural diffusionists were thus content to endlessly discuss the origins and distribution of single or double outrigger canoes.³ The unsuspecting reader was therefore largely left with the romantic but unsubstantiated idea that fearless Austronesians had sailed around half the planet on flimsy outrigger boats. Another prevailing theory contended that the peopling of the Pacific Ocean by Austronesians was the result of accidental island hopping.⁴ And few bothered to understand how — in which practical circumstances — some of the Austronesian speaking peoples who had remained in Southeast Asia leaped across the Indian Ocean and reached west to Madagascar. The very few scholars that blew an early

1. Throughout this essay, rather than refer to « Austronesians », or, more accurately, « Austronesian speaking people » only, I will also more generally allude to the « peoples of Southeast Asia » or of « Insular Southeast Asia ». The share of the Austronesian ethnolinguistic entity appears to have been overwhelming in the development of sea going techniques in Southeast Asia and the Pacific. However, Melanesians, Mon and pre-Han populations of Southern China most probably had their say in this process, which remains to be documented.
2. Bellwood (1985, 1987) provides the most up-to-date synthesis of the available evidence on early peopling of Southeast Asia and the Pacific. On Madagascar, see Adelaar, 1989, Vêrin, 1975, Wright, 1989.
3. A typical example of such a diffusionist approach will be found in Hornell, 1970 : 253-271.
4. Sharp, 1963.

whistle were experienced sailors and knew something was amiss, but not enough attention was then paid to their work.⁵

However, progress achieved in a variety of largely independent fields of research into the history of pre-17th century Southeast Asian peoples now allow us to get a much better insight into the matter of early navigation.

The first solid blows to the earlier thoughtless approach came from the Pacific fringes of the Austronesian world: scholars experimentally re-enacted, with the help of the last generation of skilled indigenous high-seas navigators, a variety of far reaching Oceanic crossings.⁶ In the process, they brought to light the sophisticated non-instrumental navigational techniques which allowed the Austronesians to progressively occupy the Pacific islands, to reach and keep contact with remote and often tiny islands thousands of miles away, in a process that lasted well into the first millennium A.D. Through reassessing of the 18th century descriptions by Western explorers, it was also proven that the vessels that carried these people into the Pacific had often been complex plank-built canoes, not mere outrigger dug-outs.

Those Austronesian speaking people who remained in Insular Southeast Asia are known to have generated large states during the first millennium A.D., leaving 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 » or « Hinduization », from the 4th-5th century A.D. onwards, followed by « Islamization » after the 13th century, largely concealed the internal dynamics of these Southeast Asian polities. As a reaction to this approach, some 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 trade networks.⁷ The archaeology of such early trading polities centered along the main trading routes of maritime Southeast Asia remains very much in its infancy, but reassessment of earlier finds and some recent archaeological research do confirm that incipient states in southern Thailand, along the western coast of the Malay Peninsula and the northern coasts of Java and Bali had established trading links with both India and Vietnam as early as the last few centuries B.C. Evidence is provided by artefacts such as Southern Indian rouletted ware, Dong-son and other bronze artefacts. Trade networks — some of them involving long distance exchange patterns — were thus clearly forged by South-East Asians long before Indian influences were felt in their region and significantly transformed the religious scene and the state formation process, around the 3rd century A.D. at the earliest.⁸

After an early first millennium period of which we know very little, Indianized states sprouted in a variety of places in Indonesia, around the 4th-5th centuries. The Malay, Southern Sumatra based trade oriented state of Srivijaya, active between the late 7th and the 13th centuries A.D., was often compared to Mediterranean thalassocracies and indeed displayed a variety of their attributes. Thanks to its strategic position astride the straits area of Southeast Asia, it not only controlled much of the trade carried along the trans-Asian maritime route, but also was among the major shippers of the network. And it appears now that this Malay power had much to say about regular sailing to Madagascar: linguists have now

5. Gabriel Ferrand (1910, 1918, 1919), a former merchant navy officer, looms prominently among those scholars who tried to draw attention to the past high-seas maritime skills of Southeast Asians. As early as 1910, drawing on Portuguese and Arabic sources, he remarked in his paper « Les voyages des Javanais à Madagascar » that Malay World sailing traditions had a lot more to show for than just what was then visible. Schrieke, in a short essay written in 1919, defended very much the same ideas. Nooteboom (1950), whose own dissertation was on Indonesian dug-outs (*largo sensu*), followed up.

6. Among others, see Gladwin, 1970; Dodd, 1972; Lewis, 1975, 1980; Feinberg, 1988.

7. 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.

8. Ardika & Bellwood, 1990; Glover, 1989; Ray, 1989, 1990. Recent studies by J. Wisseman Christie (1986, 1990) on the relationship between maritime trade and state formation in early 1st millennium A.D. Southeast Asia provide clear examples of what is being achieved in this field.

proved that the Austronesian language of the Barito group spoken in Madagascar was heavily influenced by Malay and that exchanges with the remote island across the Indian Ocean lasted into the early centuries of Islamization of Sumatra.⁹

After Islam took over as the major religion in the Southeast Asian archipelago (between the 13th and the 17th centuries), political and economic power in the Straits area and the northern coast of Java was shared by a variety of harbour-based polities (such as Aceh, Melaka, Banten, Demak, etc.). Further confirmation of the role played by Southeast Asian polities was brought forward by historians dealing with the region's maritime scene around the 15th-17th centuries A.D. This period, recently referred to as the « age of commerce » of Southeast Asia, should more correctly be described as one significant peak in a long history of maritime activities. It is now clear that the people and polities of the region played during this period an active, significant role in Asian trade networks, as commercial entrepreneurs as well as shipbuilders. Their trading networks, then as earlier on, extended not only over the Southeast Asian archipelago, but also all the way to the Middle East, India and China. Early 16th century Portuguese sources were particularly useful in this regard as they describe the situation as it was immediately before major changes took place. These resulted in a radical slowdown of indigenous Southeast Asian participation in these international commercial activities, during the second half of the 16th century.¹⁰

A number of timely finds and excavations of contemporary shipwrecks have also allowed nautical archaeologists to complement and confirm these sources. From the incipient trade-oriented polities of the late 1st millennium B.C. and early 1st millennium A.D., to the far more complex Indic states such as Sumatra-based Srivijaya (7th-13th c.), Java-based Majapahit (13th-15th c.) or to the multiple Islamic harbour-cities of the archipelago during the 14th-17th centuries, all these maritime powers of Insular Southeast Asia operated locally built trading vessels of more than respectable size (figures between 350 and 500 tons are most often referred to in written sources). The « lashed-lug and stitched-plank » technique (described below) was used for vessels of all sizes during the first millennium A.D. and the first few centuries of the second millennium. Progressively, during the first half of the latter millennium, it gave way in the larger Southeast Asian trading vessels to structures where frames and planks were assembled with wooden dowels only (and with iron nails in the hybrid South China Sea tradition).¹¹

Finally, the fact that the sea, boats and maritime trade played an important role in societies speaking Austronesian languages is made obvious by the recurring references to these in their rituals, mythology, iconography and literatures.¹² Similarly, terms revealing early adaptations to a maritime environment and mastering of sailing techniques were reconstructed by linguists for proto-Austronesian languages.¹³

Premises were thus laid, on which one may now build up a new picture, setting aside earlier assumptions : people from the maritime areas of Southeast Asia have indeed played from early times an active role in developing the technical and entrepreneurial skills they needed to take an active part in the economic development of the Old World, across the Indian Ocean and the South China Sea. These past nautical techniques have been broadly — if fragmentarily — documented during the last decade. Southeast Asian maritime history and archaeology, however, have not as yet received much attention among non- specialized academic circles.

This essay has no other ambition than to summarize recent work in this new and still promising field of research, focusing roughly on the 1st millennium A.D. Indian Ocean scene. In doing so, I would

9. Adelaar, 1989, 1994 ; Dahl, 1991. I have recently brought to light historical data that reinforces the conclusions of linguists (Manguin 1993a).

10. Reid, 1988-93, Manguin, 1993.

11. On Southeast Asian large trading ships of the 15th-17th centuries, see Green & Harper, 1983, 1987 ; Manguin, 1980, 1984, 1989, 1993 ; Reid, 1992. For earlier ships, see the references quoted below.

12. Tenazas, 1973, Manguin, 1986a, 1991.

13. Blust, 1984-85 ; Pawley & Pawley, in press.

like to submit some new avenues for investigation into the field of Southeast Asian and Indian Ocean maritime history.

The evidence from archaeological sites : the stitched-plank and lashed-lug craft of early Southeast Asia

As of now, all dated pre-14th century ship structures found in archaeological contexts in Southeast Asia belong to one single technical tradition. They are built by raising planks on each side of a keel-piece that shows clear signs of having evolved from a dug-out base (thus pointing to a development from an earlier simple dug-out canoe, from which planks were progressively raised). Moreover, all or part of their components are held together by a variety of stitches and lashings made from the fiber of the sugar palm (*Arenga pinnata*, the *tali ijuk* of the Malay/Indonesians, the *cabo negro* of the Filipinos ; rattan stitches were found in some recent, non-archaeological, examples). This technique therefore appears to have been in general use in early Southeast Asia. This is confirmed by its survival under a variety of forms in scattered areas over most of the region, from Hai-nan and Viêt-nam to the Philippines and Eastern Indonesia, in some cases well into the 20th century. In Eastern Indonesia, the best known craft built according to this technique are those of present day Pulau Lombok whale-hunters.

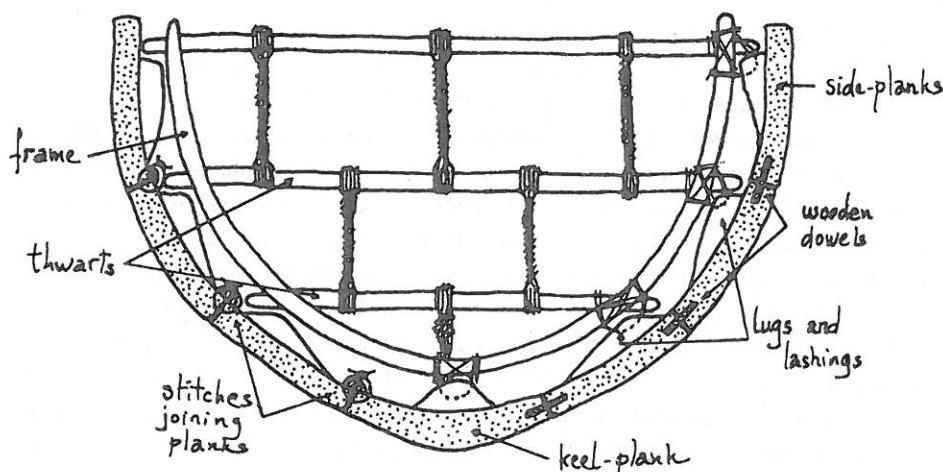


Figure 1. Hypothetical reconstruction of a stitched-plank and lashed-lug hull section (based on the Pontian and modern boats ; not to scale)

Southeast Asian vessels assembled in such a way are conventionally described as belonging to the lashed-lug and stitched-plank tradition (fig. 1).¹⁴ The lashed-lug technique is found in some modern craft as well as in all those found in an archaeological context (pl. Ia, Ib). All these vessels have protruding cleats or lugs (usually called *tambuku* in Insular Southeast Asia) carved out on the inner side of the planks, with holes hollowed out in them, so as to be able to lash them — and the planks they are part of — to sets of more or less flexible ribs and/or transverse thwarts. The stitched-plank¹⁵ technique is associated to lashed-lugs when the planks with which hulls are built up are held together by way of

14. An excellent analysis of this tradition in 17th century Philippines will be found in Scott, 1983. Horridge (1978, 1982) provides a good technical interpretation of the compressed hull of lashed-lug boats. The evidence available on ancient and modern South-East Asian stitched-plank and lashed-lug craft is discussed at length in Manguin, 1985.

15. I have now deliberately adopted the term « stitching » to describe the disconnected lashings used by Southeast Asians, as opposed to the continuous sewing of Western Indian Ocean shipbuilders. Hence « stitched-plank » tradition, rather than « sewn-plank ».

stitches of vegetal fibre passed through holes drilled near the edges (generally within the seams, not visible outside the hull). In some of the older remains from archaeological sites as well as in most modern craft, this stitching of the planks together appears to have progressively given way to dowelling, usually with locking pins added to prevent the planks from riding apart. The compressed hull structure thus obtained is unique in Asia (but very similar to that of early Scandinavian boats).¹⁶

The earliest plank-built boat structure known so far in Southeast Asia was found on the Malay Peninsula, at Pontian (see table-fig. 2) : ¹⁴C dating of its timbers yielded a 3rd-5th century A.D. calibrated date. Despite the fact that this dating was carried out long after the remains were exposed in 1926, the result accords with the dating of ceramics that were found on the site by Evans. The latter are similar to some of those discovered at the site of Oc-eo, in southern Viêt-nam, which gives them a broad 1st to 6th century A.D. age.¹⁷

Some badly damaged pieces of timber kept in the Wat Khlong Thom Museum (southern Thailand) are part of a similar ship structure. No dating has been carried out on these, but a very tentative indication of their age is given by their close similarities with the Pontian boat and their apparent association with the bead producing site of Khuan Lukpad which dates from approximately the first half of the first millennium A.D.¹⁸

Three rescue operations on sites containing boat remains belonging to this same shipbuilding tradition were recently carried out by the National Research Centre of Archaeology of Indonesia, in collaboration with the École Française d'Extrême-Orient. No systematic excavation could be carried out in either of them because of earlier uncontrolled digging or destruction, but the remains recovered, some of them in excellent condition, provide us with further solid data for the study of the stitched-plank and lashed-lug tradition.¹⁹

In South Sumatra, in the western suburbs of the city of Palembang, in a pond locally known as Kolam Pinisi, in a marshy area that would have had access to the Musi river before silting took place, two dozens badly damaged planks were discovered and excavated in 1990, including a small part of a keel piece. They clearly belonged to a large, sturdy hull that had its planks stitched together and fastened to the frames by way of lashed lugs. A ¹⁴C dating gave a 5th-7th century A.D. calibrated date that would indicate maritime trade being carried out in the area probably before the official foundation of Srivijaya in the late 7th century.

Still in South Sumatra, at Sambirejo, some 10 km downstream from Palembang, a better preserved site yielded eleven planks and a rudder belonging to at least three boats, in an ancient river bed some two kilometres away from the Musi River (*pl. Ib*). They were recorded in 1988. The rudder has an overall length of 5.94 m and is 0.56 m at the broadest point. It has three holes in it : a rectangular one for the tiller (at an 90° angle to the axis of the vessel) and two more for lashing ropes that kept it fastened in place on the side of the hull. Its shape is strikingly similar to the 8.27 m long rudder found in Palembang in 1959 and now kept there in the Museum Badaruddin. Both were used as quarter-rudders, exactly as practiced in 19th-20th century traditional sailing boats of Indonesia. Eight of the planks clearly belong to a single vessel built according to the stitched-plank and lashed-lug technique. These planks vary in length, width and general shape (the longest is 9.95 m long, the shortest 4.02 m ; average width is approximately 0.23 m ; thickness $\pm$ 35 mm). Rectangular lugs are carved out at regular intervals ($\pm$ 0.50 m) on the inner side of the planks, on which holes are provided for fastening the planks to the frames. Pairs of holes ($\pm$ 10 mm in diameter) are also bored at matching intervals of $\pm$ 0.76 m on the facing

16. Hornell, 1970 : 253-271.

17. Evans, 1927 ; Gibson-Hill, 1952 ; Manguin, 1985 : 333-335 ; Booth, 1984 : 203.

18. Mayuree, 1987 ; Manguin, 1985a.

19. Final reports on these three sites are being prepared. Finds at two of these sites were summarized in Manguin, 1989, and all three are described in an unpublished 1991 DEA dissertation of the EHESS (Paris) by Lucas P. Koestoro.

SOUTHEAST ASIAN LASHED-LUG CRAFT DATED BY 14C

<i>Name of site</i>	<i>Province</i>	<i>Date BP</i>	<i>Calibrated date</i>	<i>Lab. ref.</i>	<i>Publication</i>
Pontian	Pahang, Malaysia	1657±60	Cal AD (260,430)	BM-958	Booth 1984 : 203
Kolam Pinisi	South-Sumatra, Indonesia	1510±50	Cal AD (434,631)	Gif-8483	Unpublished
Jenderam Hilir	Selangor, Malaysia	1470±90	Cal AD (465,655)	I-10.757	Booth 1984 : 203
Sambirejo	South-Sumatra, Indonesia	1350±50	Cal AD (610,775)	Gif-7871	Manguin 1989
Butuan 5	Agusan del Norte, Philippines	735±90	Cal AD (1230,1295)	?	W. Ronquillo, personal communication
Butuan 2	Agusan del Norte, Philippines	700±90	Cal AD (1270,1410)	GaK-7741	W.H. Scott, personal communication
Butuan 1	Agusan del Norte, Philippines	1630±110 640±110 210±90	AD 320±110 (non cal.) AD 1310±110 (non cal.) AD 1740±90 (non cal.)	GaK-7744 GaK-7742 GaK-7743	W.H. Scott, personal communication
CRAFT DATED FROM ARCHAEOLOGICAL CONTEXT					
<i>Name of site</i>	<i>Province</i>	<i>Site description</i>		<i>Publication</i>	
Kuan Lukpad	Krabi, Thailand	Unexcavated, seemingly associated with 5th-6th century AD bead producing site		Manguin 1985a	
Parit Pak Kasih	South-Sumatra, Indonesia	Unexcavated, reportedly associated with 12th-13th century ceramics		Unpublished	
Paya Pasir	North-Sumatra, Indonesia	Associated with 12th-14th century AD Chinese ceramics; harbour site of 12th-14th century AD site of Kota Cina		Manguin 1989	

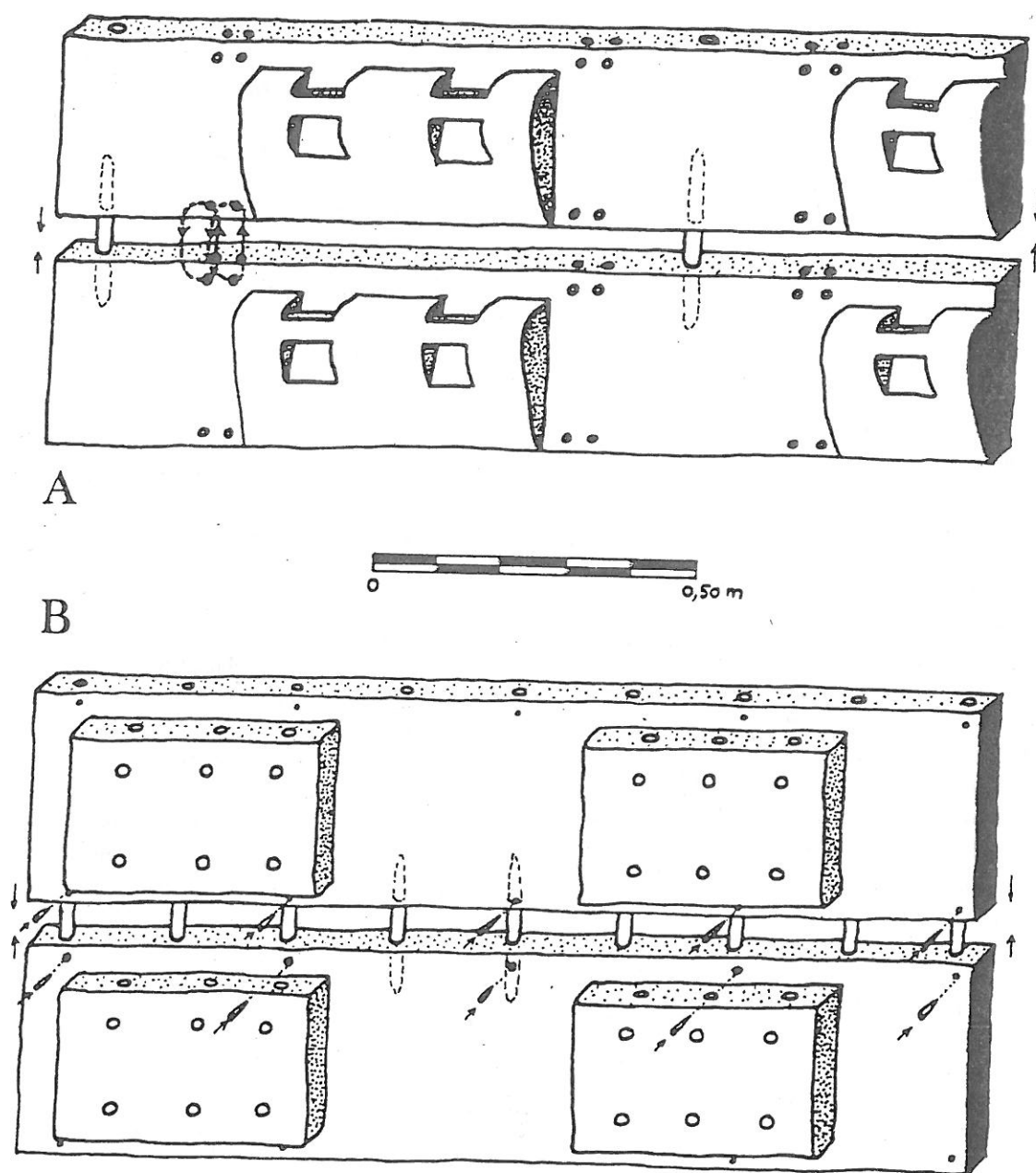


Figure 3. Fastening of the planks in the Pontian (A) and Butuan (B) boats

planks : these extend from the inner side of the planks into their seams and allowed for the lashing of the planks together (fig. 3).

Finally, other holes (also 10 mm in diameter) are found in the seams of the planks at average intervals of 0.18 m : wooden dowels would have been inserted in them to provide added rigidity to the hull. Traces of dowels and of *ijok* fibre are still to be seen in some holes. The keel piece, the garboards and a presently unknown amount of bottom and top planks are missing. The longest (but still incomplete) strake reconstructed so far is approximately 14.50 m in length. A very rough estimate of the length of the missing parts of the hull would give the vessel a total length of 20 m to 22 m.

A sample taken from a broken part of one plank of boat III yielded a 7th-8th century A.D. calibrated date, which also puts this vessel firmly into the Srivijaya period of South Sumatran history, at a time therefore when regional as well as long distance maritime trade was the main economic activity of the region. The remains at Sambirejo appear to belong to a swift and long boat rather than a large, bulky trader.

The Paya Pasir site, in the northern suburbs of the city of Medan (North Sumatra) is a large sandy area formerly covered with coconut groves and reeds which was used extensively for public-works sand-quarrying. This digging resulted in the creation of vast water-filled pools some two to three meters deep. This is where a large amount of ceramic sherds was recovered in 1989 together with some thirty badly damaged fragments of old timbers, some paddles and part of a wooden anchor. The timbers belong to a variety of vessels of different sizes, all belonging to the lashed-lug tradition (pl. Ia).

The timbers from smaller boats include stepped stem and/or stern pieces.²⁰ The timbers from larger ship(s) come in a variety of shapes, including the broken-off extremity of a large keel piece. Five timbers are portions of large, sturdy planks (the longest, broken off piece is only 3.68 m long ; but they reach a respectable 37 cm in width and some 75 mm in thickness) ; they no doubt belonged to a vessel or vessels of considerable size. No holes for lashing the planks together were to be seen on the recovered planks, but dowel-holes are bored on both edges of the planks, indicating that the planks were held fast by wooden dowels (some of them still visible). One extremity is shaped into a classical stepped scarf-joint. The typical protruding lugs (30 x 18 x 5 cm) of the lashed-lug tradition are carved out of the inner side of the planks. They are bored with four holes meant to lash the frames to the planks (some holes still contained remains of *ijok* fibre). Eight other timbers are frames of various sizes and shapes, floors as well as side-frames, all with bevelled joints at their extremities (with a single dowel hole for fastening them together). They all are crudely carved timbers, typical of the lashed-lug tradition of shipbuilding. The largest are some 2.30 m in length and up to 20 cm or more in diameter. Most of them still showed traces of having been lashed (to the planking). One of them kept its *ijok* lashings largely intact, therefore further confirming that these were the remains of a vessel belonging to the lashed-lug tradition (pl. Ic).

There is no way to offer a precise estimation of the overall size of the larger Paya Pasir vessel(s) (pl. Ia). However, a number of elements points towards a respectable tonnage. The width (31 to 37 cm) and thickness (± 75 mm) of the side planks, the diameter of the dowel-holes (18 mm), the size of the carved-out lugs (33 x 18 x 5 cm), the substantial dimensions of the frames and the overall sturdiness of the timbers all bear witness to the large size of the vessel(s). All the above measurements are much larger than those obtained from any other known ship of the lashed-lug and stitched-plank tradition found so far in an archaeological site in Southeast Asia. On the other hand, they are very close to the dimensions of the planks and frames of a 15th century ship belonging to a later dowelled « South China Sea tradition » recovered at Bukit Jakas (Pulau Bintan, Riau) in 1988 : her planks are 37 cm wide and 10 cm thick, dowels are 20 mm in diameter ; the overall length of this well-preserved ship is estimated at 30-32 m²¹. The Paya Pasir vessel(s) may therefore well have been large high seas traders. In fact this is the closest one ever got to the 50 m length stitched-plank ships from Insular Southeast Asia described by Chinese sources of the 3rd and 8th century A.D. (see below).

20. See Burningham, 1992 for a discussion of such stem/stern pieces in ancient and recent Southeast Asian vessels.

21. Manguin & Nurhadi, 1987 ; the final report by the same authors is in preparation.

The Paya Pasir site has now been proven to have been the harbour site of the neighbouring settlement of Kota Cina, active during the 12th-14th century A.D., and known to have traded extensively with both India and China.²² The ceramics recovered alongside the timbers during the rescue operation all belong to this same period. Because of the massive disturbances at the site, this association could not be confirmed by a controlled excavation. However, Kota Cina being a single period site, there are good grounds to conclude that the large timbers recovered at the harbour site also belong to this period of overseas trading activities.

Broken off pieces of planks with dowel holes and protruding lugs were also recovered from tin mining sites at Jenderam Hilir (south of Kuala Lumpur, Malaysia). The area they come from is presently being excavated by Malaysian archaeologists.²³ A ¹⁴C analysis of a sample taken from one of these timbers yielded a 5th-7th century A.D. calibrated date.

Finally, a number of comparable ship structures were found in Butuan (Northern Mindanao, Philippines). Three of them have been excavated and two reliable ¹⁴C analyses yielded 13th-15th century calibrated dates.²⁴ A detailed study of the well preserved hull structure now kept at the National Museum of Manila is presently being carried out by the Department of Maritime Archaeology of the Fremantle Maritime Museum. This will provide the first systematic data on Southeast Asian lashed-lug vessels.²⁵

Historical evidence on 1st millennium A.D. Southeast Asian craft

Chinese textual sources regarding such 1st millennium A.D. vessels have been repeatedly quoted elsewhere. They corroborate the existence of large stitched-plank ships in early Insular Southeast Asia. They also provide us with vivid descriptions of the use to which these vessels were put during the 1st millennium A.D. Superstructures are also described — albeit only summarily —, a welcome complement to archaeological sites in which only the infrastructures are to be found.²⁶

To sum up, on the basis of two descriptions left us by trustworthy Chinese Buddhist pilgrims who boarded these ships en route to Sumatra and from there to India, and on the archaeological data described above, the constructional features of these ships — called *kunlun bo* by the Chinese, i.e. « Southeast Asian ships » — may be listed as follows :

- 1 — They were large, even by modern sailing standards (up to 50 m in length, some 600 tons burden).
- 2 — No iron was ever used in fastening their components together. Texts clearly refer to fastening with sugar palm fibres.
- 3 — Some craft had several layers of planks (a feature common in later South East Asian ships).
- 4 — They were rigged with multiple masts and sails, a sure indication of sophisticated high-seas sailing skills (and again a feature of later ships of the region).
- 5 — They probably had no outriggers, for such a conspicuous device would no doubt have struck the minds of Chinese witnesses, unfamiliar with this kind of exotic gear ; moreover, it is difficult to conceive the fitting of outriggers on such large vessels. No outriggers have been found so far in an

22. McKinnon, 1975-77, 1985 ; Miksic, 1979.

23. Leong Sau Heng, 1992 ; Booth, 1984 : 203. One paddle recovered in this site also yielded a 5th-7th cent. A.D. calibrated date. I am grateful to Dr. Leong Sau Heng for having shown me the timbers from Jenderam Hilir.

24. Philippine Delegation, 1985 ; Scott, 1982. The three dates obtained from Butuan-1 timbers do not check (see table-fig. 2) ; the often claimed 3rd-5th century A.D. date cannot therefore be trusted.

25. A preliminary report on this ongoing work was published by Clark, Green & Vosmer, 1993.

26. These sources (3rd and 8th cent. A.D.) were first published by Pelliot (1925) ; see also Hui-lien Lin (1979 : 90) for another 4th cent. A.D. reference to stitched boats. These texts were discussed at length in Manguin, 1980 : 274-276, and 1985.

archaeological context ; the question remains therefore open as to their use in the largest ships (though I would think they were not used on the latter).²⁷

The Southeast Asian iconographic evidence for ships of the first twelve or thirteen centuries A.D. is poor, with the famous 8th century Borobudur reliefs standing out of the lot. These, together with the few other representations available, provide us with some details of the superstructure that are not revealed in archaeological contexts. They are, however, well known from later historical and ethnographical data. All vessels depicted are Southeast Asian : widespread use of tripod (or bipod ?) masts, of quarter rudders, of at least two types of sails (the canted square-sail and a kind of lug-sail, both illustrated in the Borobudur reliefs) ; a spritsail seems to be a current feature of the time ; outriggers are often but not always depicted. None of these iconographic depictions appear to represent the very large vessels encountered in archaeological sites or described by Chinese sources.

No solid proof has therefore been brought forward to provide additional evidence for the existence of the allegedly huge ships referred to as *kunlun bo* by the Chinese (reaching some 50 m in length and carrying some 500 passengers). The term *bo*, said by the Chinese themselves to be a transcription of a foreign term, has not yet been reconstructed in a Southeast Asian language. However, in a passage of the *Periplus of the Erythraean Sea*, the phrase *kolandio phonta* has been interpreted as a corrupt Greek form of *Kun-lun bo*. It refers to the ships that sailed from India to Southeast Asia (Chrysé).²⁸ The remains of the largest vessel(s) found so far, at Kota Cina, belonged to ships of quite respectable size (some 30 m in length), but cannot compete with the *kunlun bo*. For the time being, we thus have to rely on these two corroborating Chinese sources of the 3rd and 8th century A.D. Considering the technical precision and the internal consistency of these descriptions, and their overall agreement with the evidence provided with archaeological data, I see no intrinsic reason to doubt their accuracy. Moreover, we know from other studies that such large vessels were common in later centuries, at a time when written sources are abundant enough to be fully trusted. Finally, the various states that dominated the late first millennium A.D. historical scene in Insular Southeast Asia, prominent among which was the maritime-oriented state of Srivijaya, were no doubt complex enough polities to provide sufficient financial means, manpower and organizational capacities to succeed in building such large vessels.

Technical cross-influences in the Bay of Bengal ?

Recent historical and archaeological data have therefore allowed us to identify, within Southeast Asia, a hitherto neglected indigenous shipbuilding tradition and to trace the various stages of evolution it has undergone during the past two thousand years. The evidence shows an original, structurally unique technical assemblage which was developed at least as early as the Chinese or Indian Ocean neighbouring traditions.

This is not to say that India or China had not developed their own sailing skills in early times : they are both known to have done so. In the Indian context, however, textual and iconographic sources alone are available : without any corroborative data from archaeological sites, they remain insufficient to define satisfactorily the early Indian ship-building tradition(s).²⁹ In fact, to the best of my knowledge, there are

27. The preliminary reconstruction of the water lines of one Butuan ship seems to indicate that she could only have been stable enough when fitted with outriggers (Clark, Green & Vosmer, 1993). But she is not a large trader and compares best with the swift boats from Sambirejo.

28. Christie, 1975 : 345-63. R. Stein (1947 : 65-67) had already proposed this reading of the *Periplus* text. Other interpretations of *kolandio phonta* through Sanskrit or Tamil have also been propounded (Coedès, 1910 : XVII, n.1 ; Meile, 1940 : 90-92).

29. Since Mookerji (1957) wrote his trend setting book on Indian shipping, many Indian scholars have gathered evidence provided by written sources ; for an overview of the evidence, see Lewis, 1973, Schlingloff, 1982, Manguin, 1986, and the multiple references quoted therein.

presently no indigenous Asian ships that have been recovered from an archaeological context west of the Straits of Malacca.

The Bay of Bengal remains therefore very much a *mare incognitum* when questions of a technical nature are raised for the 1st millennium A.D. The close links established between its eastern and western shores from at least the last few centuries B.C., the continuous economic and cultural interchange that took place during the period of our concern, all point towards the evolving of a fair amount of interchange and cross fertilization, if not of homogeneity, in technical traditions.³⁰ Much remains to be done on those lines in the classical disciplines of architecture and art history, not to speak of ship-building traditions. It has by now been proved that such cross-fertilization occurred in the South China Sea between Chinese and Southeast Asian ship-building traditions, and in the western part of the Indian Ocean between Middle Eastern and Indian traditions.³¹ I therefore see no reason why this would not have happened in the Bay of Bengal. The present imbalance of our knowledge in favour of early South-East Asian techniques, as a result of the lack of comparable evidence across the Bay of Bengal, does not facilitate the appraisal of the situation. With the exception of recent descriptions of the structural characteristics of a few surviving craft, there are no descriptions of such vessels precise enough to provide technical details that would allow for a reliable comparison between early ship-building traditions of India and Southeast Asia (as opposed to descriptions of less relevant superstructures or general statements on size or amount of sails and masts, etc.).

Recent work carried out in the Maldives, though, has brought to light some unexpected conclusions: most of the structural features of Maldivian *dhonis* are shared by Southeast Asian craft of the lashed-lug tradition (as opposed to Western Indian Ocean sewn-plank vessels).³² As far as I can ascertain, there are two possible explanations for such close similarities between South-East Asian and Maldivian traditions:

1 — The Maldivian techniques could have been introduced by Southeast Asian shippers that were still regular visitors to the archipelago in the early 16th century, either on a trade circuit to and from the Maldives or on their way to the Western half of the Indian Ocean, and specifically to Madagascar. I have discussed elsewhere the evidence available to document a trans-Indian Ocean route south of the Equator that would have been used exclusively by the Austronesians on their way to Madagascar, via the Maldives.³³

2 — Both the Maldivian tradition and that of Insular South-East Asia could belong to the above mentioned hypothetical broader tradition that would earlier have encompassed all or part of the eastern part of the Indian Ocean, including, possibly, the East coast of India and Bangladesh.

I believe there is presently no way to choose between these two hypotheses (which are in fact not mutually exclusive). But I would like here to suggest one further avenue for exploring and reinforcing the second hypothesis. In the present absence of archaeological data, one possible approach is to examine linguistic evidence. This shall of course have to be double-checked with technical studies as soon as the relevant data is produced, as technical terms and names of vessels may often travel faster than the techniques they are originally attached to.

This linguistic evidence suggests that Southeast Asian and Bay of Bengal traditions (and possibly those of the West coast of India that were superseded by the development of the Arabo-Indian techniques) did share a so far undetermined range of common characteristics. Terms used to designate

30. Kulke, 1990 uses Goethe's phrase « elective affinities » to describe the parallel « indianization » process undergone by both shores of the Bay of Bengal.

31. On the hybrid South China Sea tradition, see Green & Harper (1983 : 41-44), Manguin, 1984 and Green, 1986. On the Western Indian Ocean tradition, see Lewis, 1973 and Manguin, 1986.

32. Millar, 1993, Manguin, 1993. A joint paper on the subject of Maldivian ship-building is being prepared by the two above authors and Jeremy Green.

33. Manguin, 1993a.

different types of vessels are common to languages of both sides of the Bay of Bengal (and at times further East or West). The well known generic Malay and Javanese term *perahu/parawu* for ship is no doubt cognate to Dravidian *pataku/patavu/padahu*, with the same meaning. It is difficult to decide at this stage which is the origin of the word. It is generally given as being of Dravidian origin, as it does not seem to appear in Austronesian languages earlier than in 9th century inscriptions.³⁴ On the other hand, *wangkang* and cognate forms, also generic terms for boat, are found in most Austronesian languages (including those spoken in the Pacific). It has been reconstructed into the Proto-Austronesian stock, which proves without any possible doubt its Southeast Asian origin. It is however found in Old Mon inscriptions and is attested under the form *vangkam* in a Tamil nautical treatise of the 16th century as well as in early 1st millennium A.D. Sangam texts such as the *Maduraikkanci*, certainly indicating in this case an East to West borrowing.³⁵ Another well known word of probable Austronesian origin is *sampan*, and it also appears in Bangladesh, Tamilnadu and Sri Lanka. The Malay term *kapal*, clearly from Dravidian *kappal*, raises different options as it is always used in classical as well as in modern Malay for vessels of foreign — particularly Indian — origin. However, it appears that this word is also felt as a recent introduction in Dravidian languages, thus further complicating the problem.³⁶ These are just crude suggestions that need further investigation by epigraphers and linguists. They however no doubt indicate that such common words were used on both sides of the Bay of Bengal. This in turn implies a measure of sharing and cross-fertilization in nautical traditions, starting with the organization of oceanic trade networks in early historical times.

34. In an Old Balinese inscription of 896 A.D. The word *perahu* also does not appear to have been reliably reconstructed into Proto-Malayo-Polynesian or Proto-Austronesian stock.

35. Blust (1984 : 220) for Proto-Austronesian and Proto-Malayo-Polynesian reconstructions.

36. Prof. Arunachalam, personal communication. Burrow and Emeneau, 1961, no. 1022, 3175, 3391 ; *Tamil Lexicon*, s.v. *vankam* ; Paranavitana, 1966 : 210 ; Nadarajah, 1968 : 548 ; Panikkar and Srinivasan, 1972 : 21 ; Kuiper, 1962 ; van Ronkel, 1902. The Old Mon *khang*, clearly a cognate of *wangkang* (by metathesis), also has the meaning of ship (Luce, 1985, II : D39).

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Abbreviations

BAIMA : *Bulletin of the Australian Institute of Maritime Archaeology*

IJNA : *International Journal of Nautical Archaeology*

JESHO : *Journal of Economic and Social History of the Orient*

JFMSM : *Journal of the Federated Malay States Museums*

JMBRAS : *Journal of the Malayan Branch, Royal Asiatic Society*

JSEAS : *Journal of Southeast Asian Studies*

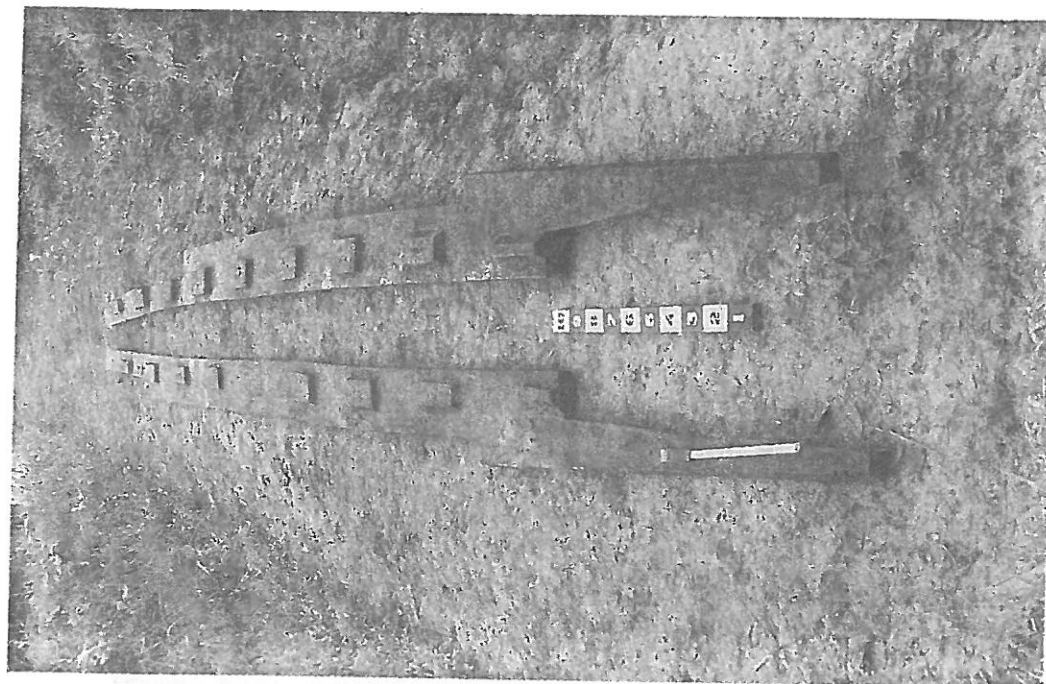
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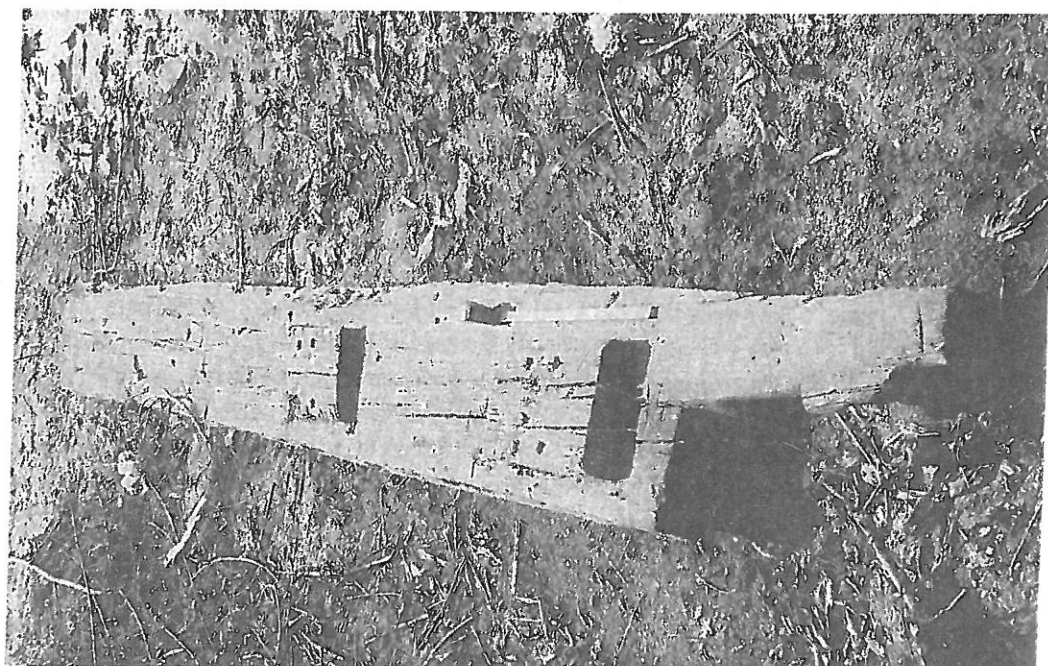
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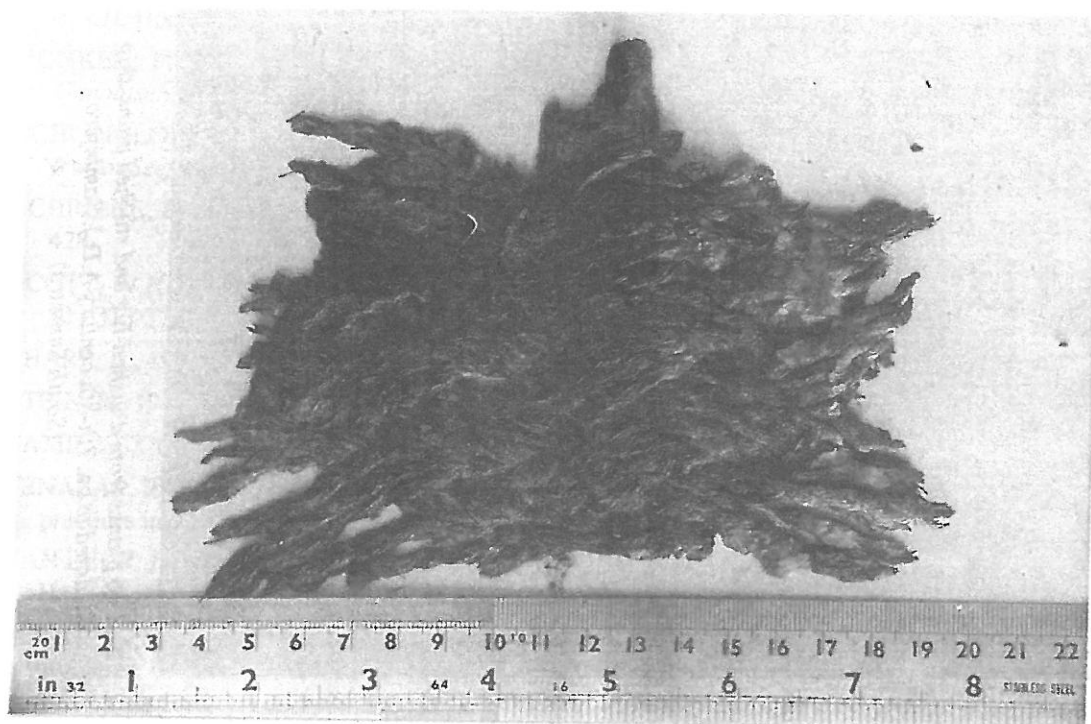
PLATE I



Ib. Two planks from a lashed-lug and stitched plank ship
(dated to ca. 7th-8th century A.D.), Sambijero
(South Sumatra)



Ia. Fragment of a plank from a large lashed-lug ship
(dated to ca. 12th-14th century A.D.), Paya Pasir
(North Sumatra) (the scale is 50 cm in length)



II. *Lashing (sugar palm fiber) from a frame of a large ship (dated to ca. 12th-14th century) A.D.)*
Paya Pasir (North Sumatra)