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The Siren of Cirebon

A Tenth-Century Trading Vessel Lost in the Java Sea



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Directorate of History and Culture Value
Directorate General of Culture
Ministry of Education and Culture



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The Siren of Cirebon

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Horst R. Liebner



The Siren of Cirebon

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INTRODUCTION

MINISTER OF EDUCATION AND CULTURE

The book entitled *The Siren of Cirebon: A Tenth – Century Trading Vessel lost in Java Sea* is a masterpiece that is proper to be read by public. Horst Hubertus Liebner has researched about Indonesian Maritime History, especially a sinking trading vessel in the Java Sea, Cirebon, West Java. According to Horst's research, it is proven that archipelago has become a significant part of world shipping line at that time.

The evidences findings show any correlation between Arabian merchant with Persians and Tiongkok with shipping line Indonesian archipelago. At least with some of wooden beads that found, has an inscription of Allah *al-Maliku* (Allah, The King; *al-Maliku* is a beautiful name of Allah's) or *Al-mulku lillhi* (all power only belongs to Allah SWT). And also the Arabian inscription of *La ilaha illa Allah* on the beads that made from pearls consist *Syahada*'s words. Number of metal plate, such as slate with a dimensions 1,4 x 1,6 cm also in scripted with *Al-mulku lillahi al Wahid al Qodhar* (Allah has all power, The One, The almighty).

These relics show that Islam had been introduced in archipelago in 970 AD, as noted by Horst in his data. These findings provide historical evidence that the historical trace from Cirebon shows the Islamic arrival 300 years back of time, as noted in theory of Islamic arrivals in archipelago through Samudra Pasai in 1250 AD.

I have thought from this aspect that Ministry of Education and Culture, Republic of Indonesia, need to publish the book because it provide an insight of Indonesian archipelago civilizations either from cultural, economy or politics side, so as become character that is provided for Indonesian maritime development in the future.

I sincerely thank to Mr. Horst Hubertus Liebner of his time spending to research maritime history in the Java Sea, Cirebon, West Java. This research has provided an insight and the newest evidence in the development entrance islamic civilization in Indonesia.

I hope the book shall give an inspiration to whole Indonesia societies and growth through variety of dimensions and riches Indonesian maritime.

Jakarta, November 2014
Minister of Education and Culture
Republic of Indonesia

Anies R. Baswedan, Ph. D



The Siren of Cirebon

A Tenth-Century Trading Vessel Lost in the Java Sea

FOREWORD DIRECTOR GENERAL OF CULTURE

Indonesian Maritime History is not widely discussed. Important role of archipelago in shipping and trading could not be separated from the world cruise at the time, as well as its culture and civilization. Horst meticulously reviewed maritime history in waters of Cirebon. This study at least gives us idea about the important role of sea at that time. Several findings suggest the interaction among Indonesian people with Arabian and Persian.

If these findings can be used as historical evidence, it can be said that Islamic culture has the possibility of entering Indonesian archipelago around 970 AD. These findings may bring an alternative evidence of the relationship among the population of Indonesian archipelago with Arabian and Persian.

So that, it is necessary that Horst's work entitled *The Siren of Cirebon: A Tenth-Century Trading Vessel Lost in the Java Sea* is published by the Ministry of Education and Culture. Horst's historical trails in sinking Trading Vessel in Java Sea could be the oldest proof of Islamic entrance in archipelago's territory and become new discovery of Islamic entrance historical record in Indonesia.

In addition to providing historical maritime of Indonesia, I hope this book give more spirit for young generation to preserve, develop and use our maritime resources properly.

Jakarta, November 2014
Director General of Culture



Kacung Marijan



The Siren of Cirebon

A Tenth-Century Trading Vessel Lost in the Java Sea

PREFACE DIRECTOR OF HISTORY AND CULTURE VALUE

Assalamua'alaikum warohmatullahi wa barokatuh

Firstly, I would like to thank to God Allah SWT of blessing and guidance, we finally have published book entitled *The Siren of Cirebon: A Tenth – Century Trading Vessel Lost in Java Sea*. Book was written by Horst Hubertus Liebner which consists of the discovery of sinking vessel in Cirebon coast, West Java.


In addition to reveals the history of discovery and salvage of the cargo vessel that sunk around 970 AD in Cirebon coast, this book gives both information of sunken treasure and uncovered ancient relics in details. Such as thousand of Chinese ceramics, potteries, beads, metal artifacts, Chinese coins, sharpener, gold plate with ancient inscription, Hindu-Buddha's ritual equipments, Islamic Arabian slate and other materials. The illustration and image of sinking cargo vessel is written descriptively by the writer and also juxtaposed with similar relics at culture preservation sites in archipelago. So that the book is not only a documentary value, nevertheless it added a new knowledge in reconstructing a classical and Islamic history of Indonesia, especially the information on coming Islam to Archipelago.

The writer represents the maritime and cruise matter about the background of trading and maritime history in archipelago with foreigner such as Chinese, Arabian and Persian. These findings of this vessel have shown a wide trading correlation and well organized vividly around 970 CE in Asia. These view we can imagine of trading vessel maritime route at the end of the first millennium, more than 1.000 years ago. The bowels of the vessel reflect varying culture form a different nations and territory so as it can provide new knowledge of Indonesia history today, particularly about the revealing of maritime strategic role in archipelago at that time.

Thus, my impression admits that the book is published as cultural assets to awareness and improves Indonesia maritime particularly to give welfare to Indonesian.

Walaikumussalam warohmartullahi wa barokatuh

Jakarta, November 2014
Director of History and Culture Value


Endjat Djaenuderadjat



The Siren of Cirebon

A Tenth-Century Trading Vessel Lost in the Java Sea

FOREWORD

It has been acknowledged that Indonesia has the largest marine area compared with its land area. Indonesia also has a tradition of maritime and the greatness of nautical in the past, but ironically we have more information about the agrarian society and terrestrial life compared with the information about the dynamics of our maritime.

The findings obtained from the exploration of 10th century sinking ship in the Java Sea, North Cirebon in 2004-2005, not only have high value in terms of economy, but more than that, these historical data has great significance for learning of the dynamics archipelago maritime in 10th century, a thousand years ago.

To find the newest historical data of the dynamics archipelago maritime, we faced with the reality that the mastery of technology exploration underwater objects is a necessity, especially for maritime study in various colleges and research institutions in Indonesia.

Only by having a high ability of exploration, we can find a variety of artifacts from the bottom of our sea, such as a 10th century archipelago ship. By mastering a sophisticated technology of exploration, the sinking ship, which sunk more than 1000 years in the bottom of sea, can be possible to be reconstructed such as these 10th century archipelago ship, to identify the origin of its manufacture including the design of manufacture, as well as the type of wood used. Of the many cargo ships that were found by exploration team in 2004-2005, there are two types of great significance in historical maritime findings, especially the history of spreading Islam in archipelago.

First: Two hilts "sword" horn-shaped gold with calligraphy *LA ILAHA
ILLALLAH*

Second: A rectangular molding tool length 4,1cm x 6.7cm with a thickness of 1.2cm. This molding tool inscribed Arabic with kufic style, marked

Al. Malikullillahi: The kingdom belongs to Allah

Al. Wahidu: The One

Al. Qahhar: All-Omnipotent

The other findings of 10th century cargo ship, such as metals, precious stone, potteries, glasses, woods, ivories, bones, teeth and more. These findings are a set of data of the dynamics of maritime archipelago. The valuable data requires seriousness, accuracy and sophisticated technology to reveal its information. Hopefully this book can be the way towards technology exploration underwater objects.

Jakarta, November 2014

Chairman of the Indonesian Historian Society



Mukhlis PaEni



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1 Introduction

Labelled one of the largest troves ever found in Asia¹ the shipwreck discussed in this study in popular reception is rated among the most 'incredible treasures'² of recent times. The wreck yet yielded not only the ceramics, glasswares and jewels that marked it as a treasure trove: as will be seen in the following pages, many a more mundane object can tell us more about the ship and her unfortunate voyage than the rare highlights of the ceramic arts or the small number of gilded paraphernalia found in her hold. Then there is the ship itself, about a third of which was preserved under the shattered heap of cargo, the first ever vessel of its kind to lend itself to scientific inquiry. The eventual price tag on the cargo may be of interest for treasure-hunter websites - the intrinsic value of the find is its scholarly consequence.

The site's position, about 90 nautical miles north-northeast of the town of Cirebon on Java's northern coasts, gave the wreck its administrative alias. This appellation, however, led to a number of rather unlikely (and in cases illusive) interpretations.³ We shall therefore call the ship "Nanhan/ Cirebon" throughout this study, referring to both the origin of the majority of the Chinese coins found in the cargo⁴ and the site's "official" identifier. The coins and a graffiti on a shard of one of the more utilitarian ceramics allow to pinpoint the ship's fatal voyage to around 970 CE. The second in a row of three (partly⁵) documented wrecks of the tenth century, the Nanhan/Cirebon vessel provides support for Geoff Wade's arguments for an 'Early Age of Commerce' (2009) that supposedly preceded the well-discussed mercantile activities of both European and Asian merchants and mariners in the early modern ages.⁶

The position and cargo of the wreck indicate that the vessel was bound for the island of Java: it is hardly imaginable, that traders would have carried a freight of Chinese, Indian and Middle East provenance from that island into the direction of the Straits of Malacca, since centuries past the rendezvous of the maritime traffic between Western and Eastern Asia. Most of our present knowledge of the area's tenth-century history is limited to scattered secondary information found in Chinese and Perso-Arabian records; the only dateable events are a shift of Java's principal authority, hitherto based in the island's central regions, to its eastern parts in the 920s and, in the early 990s,



Chinese accounts of belligerent confrontation between Java and Sanfoqi, a realm in eastern Sumatra. Of the latter island we have only (mostly anecdotal) foreign reports. A picture of the region's histori- co-political conditions, the topic of Section 1.3, hence has to rely on a patchwork of interpretations of both earlier and later sources.

Lack of comprehensive data is even more felt in my efforts in outlining the socio-economic background of tenth-century maritime trade in Section 1.4. There evidently was sizeable maritime commerce; its actual volume, commodities, players, management and administration yet rarely figure in the sources. A critical review of the available information, again assembled from a much wider timespan than the late first millennium alone, implies that current understanding tends to overestimate the volume of the existing markets (and thus the aggregate of possible exchanges), while role and extent of indigenous Southeast Asian shipping throughout the era remain habitually understated.⁷ The extant sources also do not document the very practicalities of seaborne exchange: descriptions of organisational detail of maritime trade ventures become a topic only in much later centuries. There are suggestions of a relationship between political authority and commercial enterprise - yet we are missing tangible contemporary information on how far such affiliations could have reached.

Objectives and Approaches

The present study is not an art-historic study: this is in the capable hands of a number of Franco-Belgian institutions, chosen by the salvage company as 'depository of all of the excavation data and thus [...] the only place in the world where the cohesion of the wreck will be preserved'.⁸ Just the same, it cannot be the report of an underwater excavation. First of all, I am not a diver; the second (and possibly more important⁹) reason is a 'fundamental criterion [...] for many institutional maritime archaeologists' of the Western World: 'if any of the artefacts are eventually sold, it is not maritime archaeology' (Flecker 2009: 35¹⁰). This stipulation apparently does not touch upon my not having been employed by the company conducting the operations, but instead was asked for my expertise regarding expressly the "non-commercial" side of the find by the authorities that had licensed the salvage. This expertise, and particularly so that in insular Southeast Asian maritime culture and history,

provide the basics for this study.

My analysis of the wrecksite will follow the sequence of the salvage process: Chapter 2 examines the salvage works and the retrieved objects; Chapter 3 describes the remains of the ship that eventually emerged under the three-meter-high mound of scattered cargo and debris. Most of the discussion relies on the data I eventually was tasked to compile;¹¹ hence in Section 2.1 we shall consider the data generation process and the reliability of the resulting body of information in some detail.

The diversity of cargo items, ranging from Middle Eastern glasswares to (presumably) northern Chinese "porcelain",¹² gave rise to a number of speculations as to the ship's itinerary.¹³ The most straightforward answer to these queries is to be sought in an assessment and reconstruction of the vessel's stowage pattern through a computer-aided analysis of the distribution of the various cargo consignments over the wreck-site: any particular freight items stowed in higher layers of the hold would have been taken aboard after the cargo laden at the ship's initial place of departure, thus indicating possible further ports of call along her route. Some of the methods allowing such a reconstruction have been employed in the interpretation of other wrecks;¹⁴ others had to be developed from scratch. An integral part of these examinations is a virtual "categorisation" of the various types of ceramic vessels found in the Nanhan/Cirebon cargo through a number of fairly novel computer-based approaches.¹⁵

Chinese trade ceramics, the bulk of the surviving freight of the Nanhan/Cirebon ship, are a well-known import found in many sites throughout the Malay Archipelago and the Indian Ocean. The particulars of tenth-century production and trade in Chinese ceramics still are topic of a continuing scholarly discussion:¹⁶ we know almost nothing about the organisation of their manufacture, and there are no sources describing how such ceramics were exchanged and marketed between their producers and eventual end consumers.

The examination, first of all, of the large numbers of utilitarian pottery found on the wrecksite will address some of these issues.

It is often proposed that the 'typical and enduring model of Asian trade' (Evers 1988: 91) was that of 'peddling', a commerce motored by small-scale 'handicraft traders', many of which would travel with, literally, 'packs on their



backs, journeying individually or in company with peddler caravans' (van Leur 1967 [1955]: 55). The few available sources describing the nature of medieval seaborne trade ventures support this picture of "pedlar merchants", and even indicate structural features of the very ships employed in this commerce.¹⁷ The analysis of the Nanhan/Cirebon vessel's remains and the reconstruction of her hull in Section 3.2 and .3 provides some evidence of such structures.

Nevertheless, we shall see that the vast majority of the Nanhan/Cirebon ship's ceramic cargo were the mass-fabricated potteryxxx of a well-defined region, if not the same production. This raises questions concerning the volume and organisation of the commercial transactions behind the vessel's abortive venture: individualised "peddling" trade could hardly have generated the concentration of capital necessary for the procurement of the Nanhan/Cirebon wreck's ceramic cargo. Explanations for this discrepancy will have to be sought in the correlations between the structural features of the ship and the stowage pattern of her cargo.

The present study is not the place to comprehensively discuss the ethics of maritime archaeology, the topic of the next section. Detailing recovery of the cargo of a ship found in a depth of more than 50 m is a costly affair, and in the case of the Nanhan/Cirebon wreck was awarded to a commercial consortium. Seen from a merely functional perspective, 'returning lost material to trade is a valid activity' (Nautical Archaeology Society [Bowens, Amanda (ed.)] 2009: 6) that could possibly pay for such expenditures - in the views of most institutional (and mostly "western") practitioners of archaeology, however, the commercialisation of objects retrieved from an archaeological site categorically excludes their recovery from the scholar's trade. In Indonesia, where 'the funding or the aspiration' (Flecker 2011b: 28) for a non-profit utilisation of such discoveries are largely absent, laws and regulations effectively demand their commercial exploitation: here, the sale of so called repetitive' objects -above all, the tens of thousands of trade ceramics commonly salvaged from Southeast Asian wrecks-is perceived as both a source of national income and an incentive that might redirect the widespread looting of shipwrecks into a more manageable area. The administrative handling of the Nanhan/Cirebon salvage and the ensuing legal case, described in some detail, expound the volatility of these rulings. Yet, as noted by Bass (2011:10), even in the formally sanctioned domains of Western academia, 'an unpublished shipwreck, no matter how meticulously and brilliantly excavated, is simply a looted wreck'.

(Endnotes)

1. <http://news.bbc.co.uk/1/hi/8661380^01>, 2010-05-05, last accessed 2014-02-12; e.g. "Treasure from a Shipwreck off Java up for Auction", International Herald Tribune, 2006-11-15.
2. <http://listverse.com/2007/08/29/top-10-incredible-treasure-tr0ves/>; cf. e.g., <http://www.wengerna.com/blog/treasure-hunting-6-dive-expeditions-that-hit-the-jack-pot/>; or <http://www.buzzhuntco.uk/wp-content/2010/12/13-most-valuable-treasures-found-in-the-worldswf>, all last accessed 2014-02-12.
3. A recent example is Nayati's (2011: unpg.) inquiry into the 'wider issues' of the wreck's possible relationship 'with the situation on the land, in this case [...] the [fifteenth-century] kingdom of Cirebon', and her queries regarding the accuracy of 'the dating of the artifacts and ship'; cf. <http://www.dailymail.co.uk/news/article-2123445/somillion-worth-treasure-discovered-1-000-year-old-ship-wreck-coast-Indonesia-finally-sold.html>, last accessed 2014-02-14.
4. See Section 2.3.5.
5. The so called Intan wreck, topic of a number of publications (e.g., Flecker 2002, 2004; Twitchett and Star-gardt 2002); the Kara wang cargo (I in the following will omit the italics), partly recovered throughout 2008/9, and registered in a detailed database by a team of students of the Universitas Indonesia and the author (Irdiansyah 2011, Liebner 2009c, loogd, 2010).
6. See Reid 1988.
7. See, e.g., Part II in Babits and Tilburg (ed.) 1998; Green 1996; or Ptak 2007.
8. <http://www.musee-mariemont.be/index.php?id=home-en>, last accessed 2013-10-23.
9. See Bass 2011: 8; Alford 1998: 442.
10. Cf. Maarleveld 2011: 931b.
11. A copy of the database is found on the DVD accompanying this thesis. Compiled in MS Access 2010, the database has to be run in a Microsoft Windows environment.
12. For a discussion of this term see Section 2.3: 151 fn.117.
13. See, for instance, Utomo's (2010) assumption of 'a foreign ship, estimated to have sailed from the ports of Kufah or Basra'.
14. Explanations of such approaches are found in Section 2.1: 9gff.
15. See Irdiansyah 2011; Liebner 2009c!
16. For Yue wares, the majority of the ceramics found on the wreck, see the respective articles in Ho (ed) 1994; Miksic 2009b; or Scott and Guy (eds.) 1995.
17. See Section 1.3: 75!



1.1 Maritime Archaeology?

In public perception, 'Shipwrecks and Sunken Treasure'-the title of a popular publication on historic vessels lost in, appropriately, Southeast Asian waters¹ - are intimately linked. Yet, the search for commercially exploitable shipwrecks is one of 'the worlds' worst investment[s]': of 15 surveyed hunts for the various silver fleets lost in the Spanish Main 'only one [...] returned any profit', and it is estimated that, overall, just '1 in 20 salvage companies has any chance in making money' (Throckmorton 1998: 75, 80).

Such statistics, however, are habitually outshone by the rare hauls that sell for millions of dollars, generally to public acclaim. Notorious is the cargo of the Geldermalsen, a Dutch East Indiaman lost in 1752 off the entrances to the Straits of Malacca: 'unprecedented within living memory for any art world event', porcelain and gold reclaimed from the wrecksite were in 1986 disposed of for 'the highest total ever achieved, anywhere in the world, for such an auction'(Sheaf 1987: 22).² The find's 'dispersal' is claimed to represent one of the most significant, and romantic episodes that the art world has produced for the wider general public this century' *ibid.*: 22, 29); tactfully omitted were the deliberate and utter destruction of the site by its finders and the total absence of any responsible report on the operations.

Ethics: Science vs. Profits?

Though frequently declared a neoteric addition to its land-based counterpart, maritime archaeology yet looks back onto more than half a century of genuine scientific endeavour.³ A wide range of publications outline its theoretical framework and technical implementation;⁴ in Great Britain alone at least seven universities offer programmes in maritime archaeology.⁵ The benchmarks of the field -to mention only excavations of early medieval vessels- could be the Yassi Ada ship, a Byzantine vessel of the seventh century,⁶ the eleventh-century 'glass wreck' of Serce Limam⁷ or the Viking vessels found off Skuldelev in Roskilde Fjord.⁸ Such undertakings typically devote their attention to both ship and cargo; they usually involve a team of experts, both under water and on land; results of the investigations are published, often in series of articles and books and generally only after years of study; artefacts and, if feasibly retrieved, the vessel itself find a last haven in a museum. Many a discovery prompted the construction of a replica ship

that again became object of research, now but in shipbuilding techniques and seamanship.⁹

There is a wide range between the ideal of a scientific excavation, until today a privilege of the industrialised "West",¹⁰ and its nemesis, mere looting. Of the plundering rampant throughout Southeast Asian waters we will know little more than the internet advertisements for such takings.¹¹ Usually publicised in colourful print, many of the plain salvages taken into the limelight likewise do not worry much about scholarly standards. I mentioned the Geldermalserr, another celebrated Southeast Asian shipwreck was that of the 'Titanic of the East', the Chinese junk Tek Sing, founded in 1822 with great loss of life, the wreck yielded the reportedly largest amount of Chinese ceramics ever landed but, a short year after the operations and just in time for the upcoming auction, only an, at best, popular story-book as report.¹²

There are a number of "commercial" undertakings that have earned guarded recognition by the academic custodians of the state-run underwater archaeology business (involving sums of money for excavation, preservation and exhibition, essentially such it is) of the Western World.¹³ A recent example are salvage and sale of the cargo of the ninth-century Belitung wreck, an Arab or Persian vessel lost off the Indonesian island of that name. Accidentally discovered in 1998 by sea-cucumber divers, the wreck was "acquired" by a commercial salvage company, and exploited throughout 1998-99 under a commission issued by the Indonesian government. The site was mapped and gridded; commercially valuable as well as evidently unmarketable objects were surfaced and conserved; the ship's remains were comprehensively recorded. Much of the early findings on ship and cargo were published, both in scientific and popular media.¹⁴ In 2005 the lot was sold to a company owned by the government of the Republic of Singapore, which 'planfnd] to establish a travelling exhibition featuring the key artefacts before the collection ultimately takes up residence in a dedicated maritime museum' (Flecker 2008: 384). A number of respected scholars contributed to a well-edited catalogue.¹⁵ A replica ship was built and sailed from Oman to Singapore.¹⁶ The Freer and Sackler Galleries of the Smithsonian Institution first appearing as one of the co-organisers and co-curators of the exhibition tour, withdrew after a maelstrom of strong objections, by some American and European archaeologists and museum representatives' (Lu 2011: 41)¹⁷. In



an open letter, E. Bartman of the Archaeological Institute of America claimed that such enterprise 'will serve to blur the distinction between bona fide archaeology and treasure hunting'.¹⁸

The principal difference between the two contraries proposed by Bartman would appear to be the goal of the exploitation of underwater discoveries: sale or non-profit utilisation. Unquestionably, In heritage professions, one is not to appropriate the material one is working with (Maarleveld 2011: 932) such is to be arrogated for perusal and resultant edification. However, most of the results of institutional non-profit approaches are not in the public domain either: publications have to be bought; musea demand entrance fees.

A frequent (and undeniably accurate) argument against commercial salvage is the longterm profit5 in tourism revenues generated by Intelligently excavated, conserved, and exhibited shipwrecks5 (Throckmorton 1998: 77¹⁹), the main purviews of above professionals.

Castro (2010: 7) has claimed that To maximise profit and to do good archaeology are directly opposite objectives5. Salvage companies often reason non-compliance with ar-chaeological protocol by financial constraints - as their outlays have to be returned expe-ditiously, 'they do not have the luxury of time (Bass 2011: 12²⁰) necessary to conduct careful excavation and conservation. Not rarely they pursue the direct opposite: a considerable amount of the *Tek Sing* ceramics were dropped back onto Heluputan reef (so many that another company still recently was "working" the site²¹); a video recorded during a salvage at Karang Gina, a reef in the outer parts of the Bay of Jakarta, shows the company employed archaeologist smashing bowls and plates just retrieved as riot worth saving.²²

While competent archaeologist are excavating shipwrecks and conserving what's worth saving for less money (Throckmorton 1998: 82), most salvage operations yet are million-dollar projects, often of the technical and financial scale of industrial processes financed through stock exchange.²³ As in any better pecuniary enterprise, intrigues and machinations feed the greed, if not gluttony, of its thespians. Throckmorton notes many an example from US-American experience; the 32 million US\$ sale of the Belitung cargo entailed lawsuits between the company's owner and his marketing agent;²⁴ tug o wars between various salvage companies over the yield of the Nanhan/ Cirebon cargo coloured much of the legal case following its recovery.²⁵ If such were

the cornerstones, the margin between "archaeological" non-profit excavation and "commercial" salvage would be drawn easily — however, a recent haul professedly conducted according to strict archaeological protocol, the 500-million-dollar Black Swan salvage, saw protracted litigations between the commercial salvor and the government under whose flag the ship had sailed.²⁶

Threat from looters is a frequently forwarded rationale for commercial exploitation, and, naturally, expressly contended by salvage companies.²⁷ The Intan, Java Sea, and Nanhan/Cirebon wrecks were looted both before commencement of the licensed salvages as well as during eventual absence of the salvagers.²⁸ In an interview the director of the company in charge of the Belitung cargo claimed that 'when fisherman first discovered the shipwreck in early August 1998, the Indonesian government, fearful of looting, ordered [...] an immediate round-the-clock recovery operation'.²⁹ Some of such assertions may well be self-serving: informed sources suspect that in the Belitung and Nanhan/Cirebon cases initial pillaging was linked to executives of the Indonesian salvage companies applying for the licenses. In the latter instance, however, post-salvage plundering was under the aegis of security personnel that had supervised the licensed operations.³⁰

The widespread looting throughout Indonesian waters is unmissable. Detailed examinations of 26 mostly uncharted wrecks in the vicinity of Caspar Straits organised by In-donesia's Ministry for Tourism and Culture in co-operation with a salvage company between 2007 and 2010³¹ found only one undisturbed site (Fig.1.1-1). The latter, meanwhile, has been plundered extensively. Overall results of surveys until 2011 are shown in Fig.1.1- 2, Throughout 2012/3 the Indonesian secretariat regulating underwater salvage at the Ministry of Marine Affairs and Fisheries received 'a good dozen'³² of reports on looting activities. The latest publicised case is the detention of a looter caught red-handed off Mapur Island, Riau, in January 2014,³³ Undisclosed sources claim that while these lines were written in January 2014 at least five illegal salvaging operations were underway.

Legislation

The Geldermalsenf 'salvaged right under the noses' (Wells 2007: 157) of the Indonesian authorities³⁴ prompted the establishment of a first version



of the Panitia Nasional Pengangkatan dan Pemanfaatan Benda Berharga asal Muatan Kapal yang Tenggelam ('National Committee for Salvage and Utilisation of Valuable Objects belonging to the Cargoes of Sunken Ships', henceforth PanNas BMKT), then under the Republic's Coordination Minister for Political, Legal, and Security Affairs³⁵ This institution licensed a number of salvages, of which the Belitung, Intan and Java Sea wrecks are of interest to the present study. In the year 2000, the committee's bureau moved to the newly founded Ministry for Marine Affairs, and turned out a revision of the existing legislation³⁶ To date, the revised regulations saw a number of further additions.³⁷

The current directives dictate that all shipwrecks and cargoes of sunken vessels lying for more than 50 years in the waters of today's Indonesia, including the country's Exclusive Economic Zone and her continental shelf, are in the sole possession of the Republic of Indonesia, and are only to be exploited³⁸ if a license for this purpose is issued by the PanNas BMKT. Detailed procedures for the certification and surveillance of initial survey, assessment and salvage of a site were to be established through a number of further regulations; due to the small number of applicants for such licenses, however, the extant cases apparently are administrated on an ad hoc basis. The only publicly accessible protocols are the implementary regulations for surveillance released in 2011;³⁹

Licenses are issued only to a restricted number of "accredited" salvage companies, all of which are Indonesian legal bodies. It is of note that all but one of these had been active in the exploitation' of shipwrecks before the establishment of the revised procedures in the year 2000. I am unaware of the criteria applied here: except for a range of bureaucratic requirements to be fulfilled by the applicant, the accessible laws and regulations do not define any constraints to requests for a salvage license.

The regulations stipulate the sale of the retrieved objects; later versions, however, increasingly emphasise the role of items of national cultural heritage that are to be excluded from commercial exploitation. Any gross proceeds of sales are to be divided equally between the state and the salvage company.⁴⁰ Operational costs are the exclusive responsibility of the company; added to these are remunerations for various officers recruited from diverse governmental departments, institutions, the navy and, since 2007, the police

that have to accompany and supervise survey and salvage activities.⁴¹

Officially sanctioned marketing of the proceeds of salvages was anticipated to redirect otherwise pillaged takings into the nation's public coffers; involvement of a wide range of departments and institutions was expected to reduce the fraud and corruption that hitherto had facilitated export and sale of such treasures.⁴² The lack of funding and expertise on the part of the Indonesian government called for co-operation with commercial companies.⁴³ An euphoric public expected considerable gains.⁴⁴

The auction of the about 350,000 ceramics salvaged from the Tek Sing and taken out of the country under dubious circumstances in 1999 was the first test case of the regulations: based on the initial estimate of the auction house, the salvage company on the very morning of the sale had to agree to reimburse 2,500,000 US\$ to the PanNas BMKT, and permit unremunerated bids for exceptional objects by the representatives of the Indonesian Ministry of Culture present at the auction.⁴⁵ The 'deaf struck for the Intan and Belitung wrecks, transferred to Germany and New Zealand in, respectively, 1997 and 1999, meant that in exchange for the latter most of [the Intan cargo] was later returned¹ to Indonesia (Flecker 2011b: 27), where it since is under lock and seal in, one assumes, the PanNas BMKT's godowns. The procedures for an eventual sale via public auction by the Indonesian government's auction-house⁴⁶ were introduced only in 2009, apparently under the impression of the forthcoming sale of the Nanhan/Cirebon cargo.⁴⁷ None of the objects from about a dozen other licensed operations held by the PanNas BMKT has yet been sold. Except for a photo-essay on the ceramics found on the twelfth- to thirteenth- century Pulau Buaya wreck, issued many years after the licensed yet unrecorded salvage in 1989 none of the latter finds saw any publication.

Publication indeed is not a prerequisite of a licensed salvage. Requirements regarding technical expertise are detailed in the Ministerial Decree 39/2000: the licence-holder has to supply references' that the company 'fulfils the stipulations of valid excavation standards, in terms of equipment; expertise; experience as well as specialists to be employed' (Sect.IV.5.2.f.i); throughout operations; one is obligated to comply with the principles of the salvage of valuable objects' (Sect.XI.18); 'safe storage and treatment for the valuables [...] and experts for the treatment of the mentioned objects [have to be] provided' (Sect.VII.5). The only detailed regulations available; Reg.56/DJ-PSDKP/20n;



mention none of these points; but note that an underwater archaeology specialist or [a person] with relevant expertise' should be present aboard vessels conducting surveys and salvage (Sects.3.i.a, .b).

The Indonesian Law on Cultural Heritage N0.5/1992 failed to unambiguously declare underwater sites as part of the country's protected legacy; thus allowing the extant regulations on salvage to define items taken from shipwrecks as *bench berharga*, valuable objects'.⁵⁰ The Presidential Decree 12/2009 is cognizant of items that could be very important for the history; science, and culture of Indonesia; have a distinctive character and unique style; and are of very limited and rare nature';⁵¹ and, 'based on the laws concerning Cultural Heritage', declares them as property of the State. The decree yet again carefully avoids any wordings that could define salvaged objects other than as valuables.

This situation apparently is about to change with the impending institution of the revised Law on Cultural Heritage (No.11/2010): now cultural heritage is classified as possibly present 'on land and/or in water' (Sect.1.1), thus expressly including maritime sites.⁵² As a consequence, a number of the definitions in the existing regulations⁵³ of salvage have become legally obsolete. In 2010 the PanNas BMKT accordingly declared a moratorium on further licensing of salvage operations, awaiting the inauguration of a new set of laws and regulations. However, to date no efforts at surveillance were made, and looting activities increased notably.⁵⁴ Undisclosed sources claim that much of the pillaging is done by accredited companies that fear for their locations'.

The "Cirebon Case"

The recovery of the cargo of the Nanhan/Cirebon Wreck was considered as an opportunity to test the regulations instituted in the year 2000.⁵⁵ Both the administrative handling and the ensuing legal complications yet are a telling illustration of the realities of such projects: as observed by media already in the very early stages of the find's fate, 'with corruption and bureaucracy never far from the surface in Indonesia, the tale owes more to Franz Kafka than Indiana Jones'.⁵⁶

The wreck-site was found accidentally by local fishermen in 2003 and subsequently reported to an Indonesian salvage company, PT Paradigma

Putera Sejahtera, which applied for survey and salvage licenses. Initial proposals by Fred Dobberphul, a scientific diver schooled at the University of Hamburg, and the Research Agency for Fisheries and Marine Affairs to conduct a genuine scientific excavation were rejected by the PanNas BMKT: the suggested 1:1 split of any retrieved objects between musea and if deemed necessary Indonesia's National Auction House was considered as not compliant with the existing regulations.⁵⁷ Efforts were made to find private investors willing to divide the profits of a sale with the Indonesian government but still carry out a scientifically orientated campaign. Eventually, a Belgium-led syndicate, Cosmix Underwater Research and Recovery Ltd., agreed upon cooperation with the Indonesian salvage company, and the consortium was licensed to commence operations in April 2004.

While administrative minutiae were still under discussion, looting of the site had started and was only stopped by the intervention of an Indonesian navy vessel in February /March 2004. When the navy vessel approached, the looters dropped a considerable number of ceramics into the sea, noted on scatter plots around grid | F7| (see Figs.2.1-4 and -10). First surveys of the site proved that the looters had concentrated their activities at the highest point of the mound of tightly stacked ceramics; the results of their labours were a shallow trench over the apex of the site and a number of "holes" along the slopes of the tumulus, many of which are detectable on distribution charts. The total of looted artefacts is unknown: besides ca. 3000 items handed over to the license holders when "acquiring" the location in late 2003, an undisclosed number of objects⁵⁸ found their way onto the art collectors' market (Figs.1.1-3, -4). Still recently other vendors jumped on the bandwagon, probably due to the repute of the find (Fig.1.1-5).

In November 2004 operations at sea were halted on account of allegations of 'employing illegal foreign workers who are excavating precious sunken artefacts'.⁵⁹ The official reasoning were recent changes in the administrative procedures for working permits for foreign employees and their exceptions for offshore labour;⁶⁰ however, the new regulations had not been properly implemented⁶¹ and operations were allowed to continue in February 2005. It remained unexplained whether these allegations were related to the recent appointment of a director of another salvage company to the post of advisor to the Minister of Marine Affairs and Fisheries. In any case, the person in



question had joined the navy vessel that boarded the diving platform.

During the salvage team's absence a group of local divers commenced a further looting campaign and in January 2005 was duly arrested with 1,200 ceramics on board their vessels.⁶² Meanwhile, one of the contestants for the throne of the Kanoman *kraton* of Cirebon⁶³ had voiced his protest against the salvage operations: since it was found, as far as he was concerned, 'In waters that belong to Cirebon', he noted that 'this treasure, it could be said, is a treasure of the people of Cirebon⁶⁴ and hence demanded participation of the latter. When the licensed salvors returned to the location in February 2005, the base-line chains of the grid laid along the salvage site had been displaced by the looters and groundnet fishing.

While contemplating their novel approaches, the new executives in the Ministry of Marine Affairs and Fisheries decided to reorganise the administration of underwater finds and salvage. Their first step was to replace the director at the research department in charge of the secretariat of the PanNas BMKT, and transfer responsibilities to a dedicated bureau. The author, in October 2004 tasked with the "non-commercial" side of the find by the former agency, accordingly was partly reassigned to a tacit position in the new establishment. Despite a lack of coherent administrative procedures, these changes entailed an increase in the extent of bureaucratic obligations imposed on any activity related with the find. Some of the regulations considerably restricted visits by scholars, both Indonesian and foreign, to the site: even after having supplied all paper-work successively deemed necessary by the various offices involved, in at least one case the absence of a governmental insurance cover on board the salvage vessel was reason for barring an extended stay on board.

On the part of the new administrators and their representatives on the salvage location these protocols also implied an attenuation of the attention for artefacts that did not fall under the category of "commercial valuables". The absence of suitable administrative procedures thus made it impossible to donate the thousands of smaller shards unearthed to educational institutions. Space on board ship and in the warehouse proved limited, and the contents of the first containers filled with shards that had been landed in 2004 were in 2005 relocated to a spot just besides the wreck, where since then any of the thousands of shards after a first examination on

board ship had to be deposited anyway. For apparently the same reasons, any consignment of "non-commercial" samples had to pass through lengthy administrative procedures; as a result, a number of timber samples⁶⁵ could not be landed in due time, starkly degraded and eventually had to be returned to the sea before they could be documented. Items proposed to be of high commercial value were, on the contrary, at the very moment of their arrival on land indiscriminately locked away in a bank safe, impeding attempts at their conservation and identification. Despite repeated protests by Indonesian scholars and administrators in the nation's Culture Department, thus were, for instance, Art.148341, a small and fragile gold foil containing a Buddhist mantra, or Arts.127747 and 128110, hardwood beads with Arabic inscriptions,⁶⁶ made accessible only in 2007. A number of objects of a more delicate nature hardly lived through this enforced sojourn.⁶⁷

The first week of October 2005 saw the end of the field campaign; by the second week of the month the bulk of the artefacts still remaining on board the salvage vessel was transferred to the company's warehouse in southern Jakarta for crosschecks of registration and conservation. The field team was given a much needed respite, and commenced further cataloguing and preservation work in January 2008. On the 25th of that month the warehouse was searched and police-lined, preventing access to the artefacts; the small and separate field laboratory, storage for a number of "non-commercial" samples, followed suite on 1 February. In the following week the salvage vessel, by then anchored in the Roads of Jakarta, was searched and laid on chain.

The Indonesian company's estimate of a month for arriving at a solution for the case proved erroneous. My endeavours, on 3 March, to obtain a clarification from the Criminal Investigation Agency of the National Police of Indonesia (*Badan Reserese Polisi Republik Indonesia*) regarding the reasons for these measures elicited a rather cryptic response: while the responsible officers welcomed and encouraged any efforts in further conservation and research; they claimed not to be in the possession of the keys to warehouse and field laboratory or a writ of attachment for the artefacts; as they are a terrestrial force, any responsibilities for the ship would lie with the National Coastguard and the Harbour Police of Tanjung Priuk, Jakarta. On 6 March the samples in the field laboratory were confiscated, based on the writ of



attachment 07/Pen.Pid/2006/PN Jak-Sel, dated 2006-02-07. Plans to seize the bulk of the objects in the police-lined warehouse were assertedly abandoned due to a lack of sufficient means of carriage and courage.⁶⁸

In the night from 8 to 9 March, Jean-Paul Blancan and Fred Dobberphul, the two head divers still in the country, were arrested. As their case was not forwarded to a court, it remained unexplained whether they were accused of trespassing of regulations regarding national heritage, larceny of artefacts or other yet undisclosed illegalities. Following the first informed international press release, police accused them

of illegally salvaging their find during some 24,000 dives made over more than a year-long period. "Blancan doesn't have a licence to do that, only PT Paradigma does", deputy national police spokesman Anton Bachrul Alam told AFP, referring to the Indonesian salvage company that employed them. Their lawyer Yudhistira Setiawan denies the claim, pointing out that both divers have work visas as employees of the company and kept authorities fully informed of their excavation work.⁶⁹

Even after the ensuing "Cirebon Case" had petered out, its actual juridic footings stayed furtive. According to the fragments of information I could gather at the National Police's departments in charge of the case, accusations were related to a dispute around the legality of both the Presidential Decree 107/2000 and the Ministerial Decree 39/2000, then the latest legal instruments governing underwater finds. The constabulary deemed the decrees in this case invalidated by the Law on Cultural Heritage 5/1992; for other, on-going and/or recently finished salvage campaigns, however, they for the time being understood the existing legislation to be still and well fitting. This certainly included the exploits of a certain salvage company whose director in February 2006 had been sacked from his recent post as advisor to the Minister of Marine Affairs and Fisheries.⁷⁰ Though initial reports on the case had been filed and received by the police in the first half of 2005, it also remained unanswered why the national security forces hadn't stopped the operations at an earlier stage.

In a meeting of the PanNas BMKT on 6 February the vice-head of the National Police's law department had noted that, while 'the efforts accomplished by the National Committee [...] are most honourable', a number of contributions by witnesses have been carefully investigated', and would

be further analysed as soon as possible'.⁷¹ Director and owner of the above mentioned salvage company in interviews voiced their general suspicion that 'there was stealing';⁷² and soon an anonymous list of alleged infractions was circulated. Accusations that a former minister had used helicopters to appropriate numerous ceramic masterpieces and convey them airborne to Singapore had to be left as such: as the officers did not find time to assess available landing space on deck of the salvage vessel, it remains untried whether aviatric adventures of that kind would have been possible without endangering chopper, ship and crews aloft and afloat. The eight tons of gold suspected to be on board the salvage vessel, however, probably referred to a number of tin ingots that had not been unloaded while the ship was still alongside Marunda dock in Jakarta nor were listed in the spreadsheets containing the artefact count.⁷³ The main allegations though circled around the fate of the several thousands of ceramics that had been taken off the site before any licenses were granted. As the two arrested divers evidently had no direct role in any of these incidences, the reason for their detention consequently was changed into efforts for protection of witnesses to an alleged general fraud.

According to all possibly applicable laws and regulations, the retrieved objects were, in any case, still in the rightful possession of the Indonesian government. A minister declared that the find should be placed in a museum, to be built with funds supplied by the UNESCO;⁷⁴ a Director General hoped for talks between government and help by, yet again, the UNESCO 'in gathering interested parties'⁷⁵ for a possible further auction. In unison with UNESCO, the crown prince of the Kasepuhan *kraton* of Cirebon announced that 'the government [should] act wisely and cancel the auction', as it 'would be better if the artifacts remained in Indonesia and became part of the country's collection of invaluable assets'.⁷⁶ An inspiring plan was forwarded by the director of the National Auction House:

There truly are many Indonesian collectors who are interested in owning these artefacts. I therefore propose that the auction should not be for buyers of a single lot only [but that the find] should be auctioned in single items. [...] It could very well be that a museum that buys the whole lot of these Five Dynasty artefacts experiences a disaster, and then eventually these evidences of Indonesia's history would be lost without a trace.⁷⁷



None of these proposals saw realisation; and the two following attempts at auctioning the find were equally unsuccessful. Busy preparing this study, I no longer could follow the details of the ensuing negotiations any further, and can only note that by August 2011 salvage company and government had reached the decision to divide the collection by two. The crates of ceramics not exhibited in the so called “core collection” were taken out of their respective storage rooms and, one by one, alternately lugged to piles to the left and right of the rooms’ doors; uncrated artefacts were divided by placing every other item coming in hand into a corner, shelf or spot beforehand allotted to its respective future owner. The whole operation was finished in three days.

In February 2012 the salvage company’s share was readied for shipment;⁷⁸ during March and April media started reporting on a possible sale of the artefacts in Singapore.⁷⁹ By then, the rather informed reporting of 2006 and 2010 had elapsed, and media lamented the lost treasures of a Chinese ship, [...] foundered several hundred years ago [...] on its way to the Middle East’.⁸⁰ The reigning Sultan of the Kasepuhan *kraton* of Cirebon protested decisively.⁸¹ Online media hosted a discussion on how many and which items had been embezzled by whom to where.⁸² As the bulk of the items and any possible perpetrator had left the country for good and Singapore, no further law case was initiated.

The share of the PanNas BMKT by then had been safely shelved in the agency’s own godown in Cileungsi, Bogor. I am informed that the objects have been re-registered for at least a third time, and are ready for any further exploitation¹. A small number of the more than 900 items appropriated for the National Collection was shown in the exhibition ‘Jejâk-Jejak Karam’, held at the National Museum, Jakarta, between 2012-11-12 and 12-05.⁸³ The fate of the salvage company’s lot has not been disclosed.

Indonesia has not signed the 2001 Convention on the Protection of Underwater Cultural Heritage instigated by UNESCO,⁸⁴ and I am unaware of any steps towards an implementation of these directives. Throughout the years of my involvement in such matters I did not find much awareness of the concepts of ‘Stewardship, Accountability, Non- commercialization, Public Education, Public Data, and Preservation’ (Throckmorton 2011: 933) on the part of many Indonesian administrators of underwater finds. Yet, as stated by Green (2004 [1990]: 8), a country has every right to decide how it wishes to

dispose of its heritage’.

There is no doubt that it is ‘totally unacceptable to excavate, record the material, and then disperse the collection (Green 2004 [1990]: 10) recovered from an archaeological site. By the uncompromising standards current in the field this alone classifies the recovery of the Nanhan/Cirebon cargo as “not archaeology”. I, however, cannot find a better reasoning for the present work than that noted by M. Flecker in a recent synopsis of ‘Maritime Archaeology in Southeast Asia’ (2009: 35): and yet, over the past 40 years our knowledge of ship construction, life at sea, navigation, trade routes, general trade and ceramic trade, in particular, has been vastly expanded through [such] discover[ies]’.

(Endnotes)

1. Wells 1995.
2. Wells (1995: 38) names a sum of 15 million US\$; cf. Green 2004 [1990]: 6f. It will be seen that meanwhile at least one further shipwreck find, the Belitung cargo, broke that record.
3. Bass 2011: 5b
4. See, for instance, Babits and Tilburg (eds.) 1998; Catsambis, Ford, and Hamilton, Donny (eds.) 2011; Green 2004 [1990].
5. <http://www.underwaterarchaeology.gr/Institutions/index.htm>, last accessed 2014-01-14.
6. Bass and Doorninck 1982.
7. Bass et al (eds.) 2004; Bass, Brill, and Lledo, Berta (eds.) 2009. A third volume is still awaited.
8. Crumlin-Pedersen and Olsen [eds.] 2002.
9. See, e.g., Brandt and Hochkirch 1995; Crumlin-Pedersen 1996.
10. See the respective chapters in the two former works mentioned in fn.4 above; cf. Adams 2010: i8f.
11. For some recent offers see: <http://www.ebay.com/itm/China-Antique-Shipwreck-Porcelain-Stoneware-Ceramic-Export-Bowl-Song-Dynasty-/400645203200>; http://ceramics.chalre.com/Potshop_full_access/ps-010708.htm; <http://getasianantiques.com/kw/shipwreck-celadon-dish>; <http://www.seaantique.com/NS14001D.htm> (all last accessed 2014-01-17).
12. Pickford and Hatcher 2000.



13. Bass 2011:13T Gibbins and Adams 2001: 282; Maarleveld 2011: 931.
14. See, e.g., Burger et al. 2010; Flecker 2000, 2001a, 2008; Ward and Kotitsa (eds.) 2004. The latter is in the public domain: http://nsc.iseas.edu.sg/belitung_wreck_publication.htm.
15. Krahel et al. (eds.) 2011.
16. Vosmer 2011.
17. See, e.g., Blair 2011; Ho 2011; Lambert 2012; Trescott 2011. The controversy became topic of a recent thesis at Harvard University (Rohde 2013).
18. 'Statement on Belitung Shipwreck', 2011-06-08.
19. Cf Secretariat... 2012...: 3-4.
20. Cf. Mathewson 1998: 100
21. <http://arkeologibawahair.wordpress.com/2011/01/15/bcb-dari-situs-bawah-air-perairan-karang-heluputan-kepulauan-riau/>, last accessed 2013-09-12.
22. The unpublished video is in the archives of the secretariat of the committee regulating underwater salvage, Ministry of Marine Affairs and Fisheries, Jakarta.
23. For estimates of investments in a number of North American ventures see Throckmorton 1998: 81f.
24. Leow 2009.
25. See pgs.18f below.
26. Eg., Nelson 2010; Werner 2012-13.
27. Eg., Lu 2011: 42; Mathewson 1998:102.
28. For the former, Flecker 2002: 3, 10; for the last, pgs.19f below.
29. Taylor 2011.
30. See Section 2.3.2: 178 fn.76.
31. Mirabal 2008, 2011.
32. Imam Fauzi, secretariat PanNas BMKT, pers. comm., January 2014.
33. Winarno 2014; 'Navy Halt Treasure Raider Ship in Riau Islands', *Republika*, English Edition, 2014-01-09.
34. The salvagers claimed that the wreck was found in international waters ([http://www.xsmonitor.com/1986/0208/iporc-fhtml/\(page\)/2](http://www.xsmonitor.com/1986/0208/iporc-fhtml/(page)/2), last accessed 2013-10-11). The Geldermalsen though 'sank [...] at 0 degree 09" North latitude and 105 degrees 02" East longitude in Indonesian waters' (Nayati 1998: 143). The divers 'dynamited the almost intact wreck after salvaging the [...] porcelain so its location would remain unknown and the government from which it was stolen could not prove ownership' (Throckmorton 1998: 80).

35. Presidential Decree, Republic of Indonesia, N0.43/1989. For the various implementary regulations directly pursuant to this decree see Nayati 1998:153F, c£ Marbun 2009, 2011 (both unpg.).
36. Presidential Decree N0.107/2000; Ministerial Decree, Department for Marine Affairs, N0.39/2000.
37. Presidential Decree N0.19/2007; Presidential Decree N0.12/2009.
38. Here for both dimanfaatkan, 'exploited' and diangkat, 'surfaced'.
39. Reg.56/DJ~PSDKP/2011, Ministry of Marine Affairs and Fisheries.
40. Presidential Decree, N0.25/1992.
41. I could only find the obligation to provide accommodation to these officers on the site in the available regulations (Ministerial Decree 39/2000) and thus assume that it is a gentlemen's agreement
42. Safri Burhanuddin, until 2005 head of the secretariat of the PanNas BMKT, pers. comms., 2001-2005.
43. Koordinator ... 2010: Slide 16.
44. E.g., 'What to do about our underwater treasures', Jakarta Post, 2000-06-18; Cengkar 2010; 'Harta Karun Nusantara, Terdapat 500.000 Kapal yang Karam', Indipenden, 2013-06-03; Havid 2013.
45. Safri Burhanuddin, pers. comm..
46. Ordinance of the Finance Minister N0.184/PMK.06/2009.
47. Novianti 2010.
48. The recent yet incomplete list is found in Wahjudin 2011. Between 2000 and 2010, 59 applications for salvage licenses were filed ([http://www.jpnn.com/read/2010/05/05/63291/Sudah-59-Izin-Keluar,-untuk-Angkat-Harta-Karun-,last accessed 2013-10-09](http://www.jpnn.com/read/2010/05/05/63291/Sudah-59-Izin-Keluar,-untuk-Angkat-Harta-Karun-,last%20accessed%202013-10-09)).
49. Ridho, Edwards McKinnon, Adhyatman 1998.
50. Eg, the definition found in the Presidential Decree 19/2007, Sect.i.i. It will be seen below that these ambiguities lead to some of the legal disputes around the Nanhao/Cirebon cargo.
51. Amendments to Sects.2.2.a.-c. of the Presidential Decree 19/2007.
52. Explanatory notes to the law, Sect I.
53. <http://www.dekiflkkp.go.id/viewtphp?id=20i30ii6i64826i6yQ4i2682243225459836589i5852>, last accessed 2014-01-07; Marijan 2013. Two further salvage licenses apparently were issued in 2011..
54. Eg., Saad 2013; <http://bisniskeuangan.kompas.com/read/2012/10/13/1703144/>



- Harta.Karun.KapaLTenggelaDijarah; <http://www.suarakarya-online.com/news.html?id=333450> (last accessed 2014-01-07).
55. Safri Burhanuddin, pers. comm., February-October 2004.
 56. <http://www.abc.net.au/news/2004-11-19/argument-breaks-out-over-sunken-treasure/588348> -19 Nov 2004; last accessed 2005-11-02.
 57. See pg.14 above. Such reasoning was still on the table in 2010, a short year before the eventual split in two of the find (Koordinator ... 2010: Slide 23).
 58. Informed sources believe that the overall amount of ceramics looted before the start of official salvage operations ranges in between 10-20,000 pieces.
 59. Undisclosed source. Ministry of Marine Affairs and Fisheries.
 60. KEP-20/MEN/III/2004. Minister for Manpower and Transmigration. 2004-03-01.
 61. The foreign divers employed on the site had. been issued the same visas as held by alien workers on offshore oil rigs. However. it proved inconvenient to also invalidate the visas of the entire latter. rather substantial workforce. Ius respicit aequitatem, the authorities recalled in January 2005. and issued a new set of the old type of working permits and visas for the remaining foreign divers (F. Dobberphul. pers. comm., January-February 2005. March 2013).
 62. <http://k0ran.temp0.c0/k0nten/2004/01/14/4490/Pe11ggali-Harta-Kam11-Liar-Ditangkap>. accessed 2011-11-12.
 63. Sultan Anom (XII) Muhammad Emiruddin. since 2003 'in opposition' (http://www.worldstatesmen.org/Indonesia_princely_.statesi.html. accessed 2012-07-14) to Sultan Anom XII Elang Saladin Muhammad. The Kanoman court behind the market of the same name is the seat of one of the four princely lines of Cirebon.
 64. <http://www.tempo.co.id/hg/nusa/jawamadura/2004/11/25/^^20041125-49.id.html>, accessed 2006-01-04 and 2013-03-06.
 65. Among others, 836, S63 and S220.
 66. See Section 2.3.3, and, for the gold foil, Griffiths (forthcoming).
 67. Eg., a number of beads and smaller metal implements. As most of the objects stored in the bank vault were not re-registered in the warehouse (see Sections 2.1 and 2.3), the losses cannot be determined.
 68. Including "restorable" items and miscellaneous bulky finds like anchors or sizeable concretions and ingots, the contents of the warehouse would have filled about 35 20' containers. The location then was under guard by an armed platoon of marines of the National Indonesian Navy under orders to prevent any artefact to be taken off the premises.

69. 'Sunken treasure at centre of murky Indonesian scandal', Marianne Kearney, AFP, 2006-04-04.
70. Cf. 'Gesekan Kepentingan di Jalur Terang', Gatra, 18, 2006-03-13.
71. Minutes of Coordination Meeting, National Committee for.... 6 February 2006: Points ILz.a-c, my translation. It would be these witnesses that had reported on the 'crime of searching for, retrieving, removing, [...] items of cultural heritage ex sunken ships without license or using a false license' that became topic of Police Report No.Pol: 369/XII/2005/Siaga 111, dated 26 December 2005 and referring to Fred Dobberphul, a probable administrative starting point of the case.
72. 'Misteri Pencuri Harta Karan', Gatra, 19, 2006-03-25; c£, e.g., 'Sudah dari Awal ada Pencurian', Layar, 6, April 2006, and fn.14.
73. While the tin evidently was not bullion, peculiarities of its production process purportedly allot it a value of 30-100,000 US\$/metric ton.
74. The "Cirebon Case" found a surprisingly wide media echo. Besides in most major international newspa-pers, online news agencies and a number of TV stations, coverage of the case was found in eg, the West- falisches Volksblatt, the Kbaleej Times, the South Asian Women's Forum or the Borneo Bulletin Some German and French paper had own correspondents in the field; most international articles, however, were based on releases by AFP and the Associated Press, to which I refer the interested reader.
75. <http://nasionalkompas.com/read/2010/05/05/0931508/Bila.Lelang.Harta.Karun.Tak.Laku.>, last accessed 2013-03-08.
76. 'Cirebon Sultanate Deplores Auction', Jakarta Post, 2010-04-22.
77. 'Kolektor Lokal Harapkan Lelang Artefak per Unit', Media Indonesia, 2010-05-06, my translation.
78. <http://www.kabar6.com/tangerang-raja/tangerang-selatan/2641-harta-karun-cirebon-dipindahkan-dari-tangsel-ke-priok.html>, accessed 2012-02-08.
79. Eg.,<http://www.google.com/hostednews/afp/article/ALeqM5gXrakadHE4ixikWBxi9J18qzgYWAuEg?docId=CNG.7ce2i4ed2bf9iod9d222C782a5fc5C3e.6ei>; <http://1www.dailymail.co.uk/news/article-2i23445/5omillion-worth-treasure-discovered-i-ooo-year-old-ship-wreck-coast-Indonesia-finally-sold.html>; [http:// news.detik.com/read /2012/04/02/181659/1883215/1148/harta-karun-indonesia-abad-ke-1o-akhimya-dijual-di-singapura](http://news.detik.com/read/2012/04/02/181659/1883215/1148/harta-karun-indonesia-abad-ke-1o-akhimya-dijual-di-singapura); all last accessed 2013-03-07.
80. <http://www.merdeka.com/peristiwa/ri-rugi-jika-harta-karun-dilelang-di-singapura.html>, last accessed 2013-03-09.



81. <http://www.pikiran-rakyatcom/node/183149>, 2012-04-03, last accessed 2013-03-09.
82. Eg., <http://cetak.kompas.com/read/2012/04/10/0438446/artefak.tak.boleh.keluar.indonesia>, last accessed 2013-03-09; 'Akhirnya Harta Karun Laut itu Dijual di Singapura', Djulianto Susantio, Sinar Harapan, 2012-04-12. A number of articles on this and other cases by that media is found at <http://www.merdeka.com/tag/h/harta-karun-cirebon/>, last accessed 2014-01-23.
83. See <http://www.kemdiknas.go.id/kemdikbud/berita/828> and <http://arkeologi.web.id/articles/arkeologi-publik/2499-pameran-jejak-jejak-kamm-oleh-museum-nasional-indonesia>, last accessed 2012-02-27,
84. UNESCO 2002: 50-61, 2009.

1.2 Historic Background; Politics

The first written allusions to the area until recently known as the Malay Archipelago appear in Indian texts of the last centuries BCE: the *Mahāniddesa* commentary and a number of *Jātakas* mention a number of places that, in all probability, were situated in the western parts of insular Southeast Asia.¹ While the archaeological record of such early contacts between India and Island South-East Asia is restricted to a few Indian ceramics and beads found scattered throughout the Archipelago,² in the wake of these communications though arrived concepts of rule and faith that laid the foundations for Southeast Asia's "Indianised" societies of the second half of the first millennium CE. Apparently involving Indian personnel and erudition, this process yet neither followed large scale migrations into Southeast Asia³ nor was a naïve adoption of an Indian paragon; instead, the subcontinent's religious and political ideas supplied leaders of Southeast Asian societies with the organisational opportunities of "Indian-inspired" models of authority.⁴ Throughout the fourth and fifth centuries CE these developments shadowed closely, 'within no more than a generation or two' (Jacq-Hergoualc'h 2002: 74), the rise of coherent patterns of social and religious integration in Gupta-ruled India.⁵

These adoptions included Buddhist and Hindu mythology and institutions, and thus traditions of monumental constructions and the use of Indian scripts and administrative models. For the island of Java, the first topic considered below, our main sources of information are the remains of religious edifices

and associated administrative deeds. Most of the latter record the establishment of *sima*, 'tax-exempt territories, in which rights to taxes (but not to title of the land itself) were ceded [...] to a specific religious community attached to a specific temple' (Christie 1986: 72⁶). However, inscriptions and monuments dateable into the second half of the tenth century, the times of the Nan- han/Cirebon ship's voyage and wreckage, are particularly rare.

Even scarcer are indigenous sources on tenth-century Sumatra, the second region of interest. The island's key power, commonly named Śrī Vijaya, is touched upon in a number of accounts by Perso-Arabian writers, to which I will refer frequently. Due to the rather anecdotal character of these reports it will be necessary to draw conclusions (or, at least, conjectures) on the island's political landscape and the organisation of its polities from earlier and later sources, both indigenous and foreign.

Supplementary information is found in various short notes on "embassies"⁷ arriving at the courts of Tang and Song China preserved in the annals of the Celestial Empire, The records of the 'Five Dynasties and Ten Kingdoms', governing China between the final fall of the Tang in the first decade and the rise of the Song in the last third of the tenth century, are silent on matters regarding insular Southeast Asia. The Song annals relate the only known event involving both tenth-century Java and Sumatra, a belligerent confrontation occurring around 990. Much of the short outline of the developments in and foreign relations of the secessionist states in China's fractured south, the last subject of this section, again will have to rely on mainly anecdotal evidence.

Tenth-Century Java: Move to the East

The first decades of the tenth century saw one of the most extraordinary episodes in Java's history: the extant inscriptions infer that with the inauguration of Mpu Sindok (r.ca. 929-948) the pivot of authority had shifted from the plains of south-central Java to the Brantas river basin in the island's East.⁸ With this move Java's elite abandoned the lands that throughout the preceding two centuries were seat to Indonesia's most highly evolved Early Classical civilisation (Miksic 2004: 240), leaving behind the considerable number of monumental constructions of both religious and secular intent that had embodied the gentries' might.⁹

The scholarly debate around the causes for this relocation offers a number



of explanations.¹⁰ The most influential of these accounts¹¹ proposes increased volcanic activity and ensuing famine and disease¹² as reason. Indeed, a partial collapse of Merapi [the most active of central Java's volcanoes] occurred $<1130 \pm 50$ C y B.P.; however,

explosive Merapi eruptions occurred before, during and after temple construction [between ca. 750-900]. Some temples were destroyed and (or) buried soon after their construction, and we suspect that this destruction contributed to an abrupt shift of power and organized society to East Java in 928 A.D. Other temple sites, though, were occupied by "caretakers" for several centuries longer. (Newhall et al 2000: 9)

This shift though was not a sudden event. Besides leaving inscriptions related to land and taxes in central Java, Balitung, ruling between ca. 898-910, had already issued deeds concerned with the island's eastern quarters, where scattered remains of monumental architecture and a small corpus of inscriptions attest a hitherto independent Indianised civilization since the second half of the eighth century.¹³ His heirs' mounting concern with eastern Javanese land use¹⁴ apparently marks a 'stepwise integration of local magnates into the central court' (Kulke 1991:16): Sindok's eventual move to East Java thus is 'not [the] sudden shift of interest' (Barrett Jones 1984: 6) of an impromptu exodus. Despite the comparably short timespans of central Java's last sovereigns' respective rules and their unclear dynastic ties, 'the continuity of administration during the reign of the five kings [ruling between ca. 900 and 930] is striking' (*ibid.*): the extant inscriptions mention a number of officials who served successively under several of these rulers, and Sindok himself is noted as a dignitary under two of his precursors.¹⁵ The epigraphic record also does not divulge 'a major crisis [...] in the first quarter of the tenth century' (Hall 1985: 127, 20x1: 142) or 'incessant wars of succession (Boechari 1979b: 407¹⁶), often proposed as additional explanations for the move of the central Javanese court to the island's eastern parts.

Tenth-Century Java: Consolidation

The degree of territorial hegemony and centralisation in early Javanese polities remains an open question - at any given time in the first millennium, land charters could be issued by a wide range of frequently unrelated and

often possibly competing lords.¹⁷ This is also the case with Sindok's deeds: only four¹⁸ of the about 20¹⁹ inscriptions ascribed to his rule record *sima* expressly instigated on the sovereign's requests. Some of the religious establishments related to deeds based on non-royal initiative were, conceivably, intended as 'family investments by *nouveau riche* who were seeking to buy enhanced status' (Christie 1992b: 5); others apparently were existing ceremonial foci of East Java's established gentry that had to be integrated into the "new" administration.²⁰ While two documents of 931 and 933²¹ appear to mention grants related to military services rendered by villages, there are no unambiguous indications for large-scale belligerent confrontations.²²

Rather than forceful annexation, the extant epigraphic material seems to document a process of administrative consolidation.²³

None of the few inscriptions dated into the following 70 years of rule of the Isana dynasty founded by Sindok explicitly mentions a monarch's name.²⁴ The rulers' relationships and titles are known only from a short genealogy on a stela of 1041, erected several decades after the downfall of the dynasty's last sovereign, Dharmmawangśa (Fig. 1.2-1). While the surviving epigraphy notes a number of hydraulic constructions and religious monuments, no major building activities can be positively ascribed to any of these rulers.²⁵ Christie (1998a: 354) hypothesises that in tenth-century Java private consumption replaced public building as the main outlet for surplus wealth':

The relatively low level of patronage of the monumental arts [...] was due, almost certainly, to the fact that Java's wealth was spent on other things - mainly on large quantities of consumer goods (both local and imported) that came into the hands, not only of the *kraton* and aristocracy, but also of a growing body of moderately well-off and often socially-ambitious people. Public grandeur was, for a time, displaced by private luxury. (Christie 1992b: 4-5)

The surviving inscriptions yet draw a more ambiguous picture. Throughout Sindok's rule many a *sima* was granted to existing or projected religious edifices, today either lost or still to be identified.²⁶ The generous redistribution of wealth on the occasion of the institution of land grants is equally known from earlier central Javanese deeds,²⁷ and not only illustrates consumption behaviour: as has been argued by Geertz (1980:18-19) for the mechanics of statecraft in Bali, such elaborate festivities iterate 'the radiant



image of civilisation [...] the cultural ideal of the consummately expressive state'.

The tenth century provides the first references to the intellectual foundations of the state's ideology, the 'temples of language' (Supomo 2006) instituted through "Javanisations" of Indie epics and religious texts. An inscription of 907 mentions Java's earliest documented public reciting of the Rāmāyānā;²⁸ one of the manuscripts of Indonesia's oldest dateable literary text, the *Sang Hyang Kamahayanikan*, was composed during the reign of Sindok;²⁹ Dharmmawangśa (r. ca. 980-1006/16) is credited as patron of the first Javanese versions of parts of the Mahābhārata.³⁰ An inscription of 991 contains a first mention of the Siwasasana, 'the Old-Javanese law text, with which the name of the "king of Medang" cri Dharmmawangca [...] is connected' (Krom 1931: 230³¹) - the rulers of East Java obviously not only strived for 'society's empowering acceptance and understanding of a common culture that is centred in a ritualized court' (Hall 2005:1) through adaptation of Indie literary works, but attempted to define and institutionalise their society. Kulke (1991: 17) hypothesises that the rules of 'Sindok in the early tenth century and Airlangga in the early eleventh century' mark a notable extension and increasing centralisation of political control³² Christie (1994: 35ff) notes a number of changes in late tenth-century administrative terminology that could imply a more stratified approach in taxation, possibly instituted through an expanding bureaucracy.

Tenth-Century Java: Foreign Relations

It has been argued that 'the long-term positive pull of the Brantas delta region and its trading opportunities' (Christie 1991: 26) was one of the stimuli behind the court's relocation to the East: a proposed trade boom throughout the tenth to thirteenth centuries³³ is thought to have generated a need for easier access to and control over the sea-ports along the eastern shores of Java, the stepping stones to the fabulous Spice Islands of the Moluccas. Evidently, Sindok's and his successors' inscriptions reflect 'a greater concern with commercial and economic matters [...] and] a greater interest in the taxation of traders and artisans, and foreigners and ships are mentioned more frequently [than] in the Central Javanese ones' (Barrett Jones 1984: 6-7³⁴). In the deeds issued between the first decades of the tenth century and the

1050s Christie (1998a: 361) finds 'highly capitalized merchants and merchant associations' increasingly employed as 'royally-licensed tax-collectors' (1999: 244) — trade and traders apparently played an ever more important role throughout the reigns of the first East Javan rulers.³⁵

Sindok's endeavours with hydraulic constructions³⁶ indicate attempts at enhancing agrarian production and a stricter control over its surplus. Rice, Java's main yield and possible export, could have been used to secure a growing share in the maritime trade between the Straits of Malacca and the "Spice Islands" of Eastern Indonesia;³⁷ in still later centuries Sumatra, Malaya³⁸ and the Moluccas³⁹ imported the grain. However, none of the various *kraton* of the rulers of the Isina dynasty⁴⁰ was located near East Java's entrepot, proposedly located somewhere on the estuary of the Brantas river.⁴¹ Likewise, Java's elite obviously did not command the means for seaborne trade — the only evidently⁴² Javanese ambassador arriving at a Chinese court of the tenth century had to avail himself of the guidance [of an] owner of many vessels and a great merchant' (the *Songshi*, here in Groeneveldt's translation (i960 [1580]: 18) to venture the voyage.

At some point in the second half of the tenth century the rulers of East Java strived for an expansion of their sphere of influence. A number of inscriptions leave the impression of increasing Javanese sway in Bali;⁴³ Krom (1931: 236) assesses Java's impact on a 'rising civilisation' in western Kalimantan. The ambassador to the Song court in 992, the first recorded diplomatic contact between Java and China since 868,⁴⁴ 'related that his country was in enmity with San-bo-tsai [Pinyin: Sanfoqi; "Śrī Vijaya" (see below)] and that they were always fighting (the *Songshi*, Groeneveldt i960 [1880]: 18); a Sumatran envoy, having arrived in China in 988, on his return voyage in 990

heard that his country had been invaded by Java. He remained in Nan-hai for a whole year. This spring [992] he embarked on a vessel to Champa [today's southern Vietnam], but it was becalmed by unfavourable winds [...]. It is requested [by the authorities of Guangzhou] that an edict be sent to proclaim these circumstances to his native land [The request was approved], (the *Songshi*, Hartwell's translation [1983:174])

This conflict could not have been an ideological struggle between a proposed Hindu Java and a Buddhist Sumatra;⁴⁵ the translation of the *Sang Hyang Kamahayanikan* during Sindok's rule illustrates the co-existence



of Hindu and (Tantric) Buddhist belief; Sindok's daughter was 'devoted to Sugata (Buddha)' (Sarnowsky 2009⁴⁶); Kern (1908: 51) notes a 'Buddhist ruler, probably a successor of Mpu Sindok' mentioned in an inscription. The assault, instead, appears related to the alleged 'overseas aspirations' (Krom 1931: 229⁴⁷) of Dharmawangśa, the Isāna dynasty's last ruler. His ventures, though, were rather shortlived: the stela of 1041, our only indigenous source for Java's political history of the second half of the tenth century, also relates invasion and destruction of the East Javanese court in 1006/7 or 1016/17.⁴⁸ While Sumatran forces are not explicitly mentioned as contenders in the latter struggle,⁴⁹ it is assumed that both conflicts were 'concerned with control of the produce of the Spice Islands' (Manguin 1996: 82), for which the Javan polity's harbours must have been essential. The inscription portrays the collapse of the East Javanese polity as a *pralaya*, a comprehensive dissolution of the hitherto existing order as such, the events of 1006/7 (or 1016/17) mark the effective end of the Isana dynasty, in contemporary memory recalled as a major caesura in Java's history.⁵⁰

Sumatra: (San)foqi and al-Zābaj

Throughout the second half of the ninth until well into the thirteenth century, Chinese records report the arrival of embassies on behalf of Sumatran polities: 'the zeal they display to come to our court cannot be compared with that of other countries' (the *Lingwai Daida*, ca. 1170; Zhou Qufei 1977: 40). The ambassadors of 852 and 871 had sailed from a country named Zhanbei by the Chinese chroniclers, most likely located at Muara Jambi, the lower reaches of the Batang Hari river, where abundant archaeological finds dating from the ninth to thirteenth centuries mark a densely populated settlement;⁵¹ however, the next mission, arriving at the waning Tang court in 904, came from the lands of "Foqi".⁵² While no accounts of China's foreign relations with insular Southeast Asia during the Five Dynasties/Ten Kingdoms period have been preserved⁵³ with the first year recorded in the Song annals commences a chain of almost 30⁵³ instances of tribute being paid to the Northern Song (Fukami 2006: 2) by "Sanfoqi".

Descriptions of Sanfoqi are found in two Chinese compendia of the twelfth and thirteenth century, the *Lingwai Daida* and the *Zhufan Zhi*. Its realm is portrayed as the "most important meeting point of the maritime routes

from the foreign countries [...], in the centre of the southern seas' (Zhou Qufei 1977: 39) between Shepo (Java.) and Zhenia (Cambodia), controlling the straits through which the traffic between China and the West has to pass.⁵⁵ Its main port is on a river, secured by an iron chain as a barrier to keep the pirates of other countries in check'; the harbour's inhabitants dwell "on the water on rafts of boards covered over with reeds' (Zhao Rugua 1911: 62, 60). Such environs are recalled in the description of an "Old Haven [...], exactly the same country as that formerly named San Fo-Ch'i [Sanfoqi]' in the fifteenth-century *Yingyai Shenglan*:

The common people all live in houses built on wooden rafts which are tied up to the shore with posts and ropes [...]. If the people wish to live in another place, they take up the posts and move off with their houses, [thus] removing themselves without trouble. (Ma Huan 1970: 98-9⁵⁶)

A place in insular Southeast Asia, where people lived in houses that "float on water, built on wooden constructions like rafts¹ that are easily moved -their owners can cut [their] moorings, and go and set up elsewhere' (Buzurg, ca. 950; 1981:104)- was known to Persian and Arab sources of the tenth century as سر بزة Sribuza⁵⁷ the capital of الز باج Al- Zābaj, This realm is ruled by مهراج mahārāja, Indianised nobility thus; it is these lords who levy 'transit dues' (Buzurg 1981: 64) on the China-bound traffic passing through their harbours, and resort to violence if their demands are not satisfied⁵⁸ A similar policy still is noted in the later Chinese sources on Sanfoqi: Zhou Qufei (1977: 39) reports that If of the foreign trading vessels which pass through their dominion some do not want to berth in their realm, they inevitably send a fleet and butcher all [aboard]'.

Zābaj has an enormous population and innumerable armies' (the geographer Mas'udi, before 956; Coedes 1944: 9), Its lands extend over a distance of a thousand parasang⁵⁹ or even more' (Abu Zaid, 916; Tibbetts 1979a: 33) in the Eastern Seas: 'no one can within two years, with a ship of the utmost speed, go over all these isles, each of which is inhabited¹ (Masfudi; Coedes 1944: 9-10). Writing around 1030, the Persian scholar al-Biruni equates these regions with the islands 'known to the Indians of his day as Suvarna Dib' (Laffan 2005: 29), i.e., the "Golden Isle" of Suvarnadwipa, commonly associated with Sumatra;⁶⁰ due to the abundance of the cherished



yellow metal quarried in their realm, Zābaj's rulers are very rich' (Ibn al-Faqih, 904; Tibbets 1979a: 31), receiving] every day the revenue of two hundred *mann*⁶¹ of gold' (Ibn Khurdadhbih, after 850; *ibid*: 29⁶²).

Yet, Zābaj and its various dependencies also are 'the centre of commerce for aloes- wood, camphor, sandalwood, ivory, tin, ebony, baqamwood [and] spices of all kinds' (Abu Zaid; Tibbets 1979a: 33), products that Chinese sources note as specific exports of the Malay Archipelago.⁶³ The realm's entrepot, thus, is a bustling international mart: a Persian merchant of the mid-tenth century relates, that 'in the town where the *Mahārāja*, the king of Zābaj, lives I saw more markets than could be counted!;] in the money-changer's market I have counted 800 money changers, without counting those in other markets' (Buzurg 1981: 80).

A tenth-century anecdote about a Middle Eastern shipmaster in audience at the court of a king of Zābaj and the Land of Gold' related by Buzurg (1981: 90) explicitly mentions the custom of بر سئل Malay for "sitting cross-legged" when paying a call on the ruler: evidently, the marvelled isles of the *mahārāja* were ruled by a Malay-speaking aristocracy⁶⁴ The exact location of Zābaj's capital, however, remains unspecified. The extant Perso-Arabian sources note various possessions of the realm,⁶⁵ most prominent among which figure Kalah (Bar) and Sribuza, located '120 zam from Kalah' (Buzurg 1981: 104). The former, the site of 'the famous [tin] mines of al-Qala' (Ibn Khurldh-bih⁶⁶), generally is sought in the Bujang / Merbok Valley in today's Kedah in tin-rich Malaya;⁶⁷ a cruise of 120 zam, conservatively⁶⁸ about 1000 nautical miles, yet leads us far beyond the "Golden Isle" of Sumatra.

Abu Zaid relates that the palace of Zābaj's kings faces a small estuary which the salt water of the sea invades at high tide and which is fresh at low tide' (Tibbets 1979a: 33). Such a 'fresh-water port salted twice daily by the morning and evening tides' is still observed in Huang Xingzeng's *Records of the Audiences and Tributes of the Western Seas* (2005: 52), compiled in the early sixteenth century — here, though, it is noted as 'Sanfoqi, that the foreigners call Bolinbang (or, in Wade-Giles transcription, 'Po-lin-pang').⁶⁹

Palembang, Śrī Vijaya and Shilifoshi

The only extant indigenous records of historic events in the Sumatra of the first mil-lennium CE are a small number of inscriptions dated into the 680s,

mostly written in Old Malay and scattered throughout the island's southern parts (Map 3). A number of these mention a *Kadatuan Śrī Vijaya*, the 'Demesne of the Victorious Lord'. Consistent with Malay traditions⁷⁰ and the Chinese descriptions above, the epigraphy focuses on present-day Palembang, and especially so the environs of Bukit (Hill) Seguntang in the southwestern parts of the modern city, where fragments of statuary and remains of monumental constructions dated into the seventh and eighth centuries have been found.⁷¹ A detailed discussion of the inscriptions' contents⁷² is beyond the scope of this study; it suffices to note that the epigraphy is supposed to mark the full progress of [Śrī Vijaya's] expansion policy' (van Naerssen 1977: 31).

Such expansionism appears to be confirmed by cross-reference to short remarks in two works by the Chinese monk, Yijing, who visited the area in 671/2 and ca. 685-695. A possible reading of an inscription referring to a military expedition⁷³ is believed to be recalled in Yijing's note that 'Mo-lo-yo' (Pinyin: Moluoyu), a settlement on the Batang Hari river he had visited in 672, by his return to the area in 685 was now called Sribhoga' or had 'now become Bhoga' (Takasusus transcription for the name of the Sumatran polity; 2008 [1896]: xxx, xxxiv). Another note indicates regular communications with -if not control over- a polity named Jiecha,⁷⁴ an entrepot for India-bound maritime traffic, in all probability the Kalah Bar of the later Perso-Arabian sources. Accordingly, it is assumed that seventh-century Śrī Vijaya's target and mainstay was her Intention of establishing hegemony in the Straits of Malacca' (Jacq-Heigoualc'h 2002: 241).

Śrī Vijaya's endeavours are reflected in the extant records of embassies arriving at the Chinese imperial courts. The early seventh-century annals of the Sui and Tang dynasties log the arrival of ambassadors of a number of Maritime Southeast Asian polities; in the Celestial records of the last decades of the seventh and the first half of the eighth centuries the region yet is represented solely by missions from a country named Shilifoshi, commonly understood as the Chinese notation of "Śrī Vijaya".⁷⁶ Its first mission to China, in 670-73 was followed by several missions to the (Chinese) court to submit complaints about border officials' (Wang Gungwu 1958: 97, quoting the *Xinfangshu*) through the late eighth century; a report of 684⁷⁶ even refers to a captain of a Malayan⁷⁷ cargo vessel' (Schafer 1985 [1963]: 15) murdering a harbour official in Guangzhou. While such accounts underline the mainly



commercial character⁷⁸ of the Sumatran endeavours, there also was diplomatic exchange: Yijing recalls a visit of a Tang legate to Śrī Vijaya at around 683,⁷⁹ and regulations re the customary provisioning for ambassadors from Śrī Vijaya are mentioned in the *Tanghuiyao* for 695.⁸⁰

“Official”⁸¹ accounts of Shilifoshi's communications with the Chinese court begin only in the early years of the eighth century: ‘the first recorded mission to China was in the 12th month (January, 702) of the Chinese year 701, when envoys from Śrī Vijaya to the Tang court offered regional objects’ (Bielenstein 2005: 58). It has been argued that in the early eighth century improvements of transport logistics between southern and northern China and a number of administrative reforms triggered a considerable increase of maritime trade at Guangzhou⁸² – yet, the years following the opening of the Dayu Ling Road between Guangzhou and the Yangtze area in *ca.* 728⁸³ did not see any embassies by Shilifoshi (and, besides, any other insular Southeast Asian country) arriving at the Celestial Court (see Fig.1.3-1). The last record refers to a mission lead by ‘a son of the king of Śrī Vijaya’ (Bielenstein 2005: 59) in 742.

The reasons for the cessation of Śrī Vijaya's calls at the Tang court remains unexplained. Discontinuance of records could be due to neglect and/ or temporary failure of the imperial administration throughout the various periods of unrest in the latter half of the eighth century,⁸⁴ the result of an ensuing shift of commerce to Annam⁸⁵ and a proposed ‘trade recession of the late eighth and ninth centuries’ (Christie 1982: 441), or may indicate that ‘the trade between Śrī Vijaya and China was too well established to require diplomatic boosting’ (Wolters 1967: 231). In any case, Shilifoshi's tributary relationship with T'ang China was ‘brief (Wolters 1986: 34) and ended shortly before the outbreak of the ‘cataclysmic rebellion’ (Lewis 2009:1) of An Lushan and Shi Siming (755-762). The next recorded insular Southeast Asian missions to the Tang court are those of Heling, generally believed to represent Java, between 767 and 770. Until Zhanbei's ambassador of 852 there is no further mention of a Sumatran legation.

Except for second- and third-hand references to two letters sent to the Khalifah Muawiyah (r. 661-680) and Umar Abdul Aziz (r. 717-720) by a ملك الا مالک *malik al-amlāk*, ‘King of Kings’,⁸⁶ of the Far East, the Kadātuan Śrī Vijaya of the late seventh to eight centuries found no mention in the extant Middle

Eastern sources of the seventh and eighth centuries. Perso-Arabian mariners were trading at Chinese ports⁸⁷ since at least 650 and, hence, passing through insular Southeast Asia; descriptions of the area, however, became topic of Middle Eastern literary works only in the ninth century. The probably earliest allusion to the Eastern Archipelago fleetingly notes the anchorage of Kalāh Bār, depicted as 'the Kingdom of al-Zābaj' (the *Akhbār Al-Sīnd wa'l-Hind*, before 850; Ahmad's translation [1989: 39]⁸⁸); here, though, this locale is but a mere landfall and watering place, whence the route to China continues to Pulau Tioman and Champa, bypassing any ports in the Straits of Malacca and Sumatra. Consistent with the succession of insular Southeast Asian missions to the Tang court, there is no harbour of Sribuza worth a call; except for Fansur⁸⁹ from where the excellent quality of camphor comes' (*ibid*: 35), Perso-Arabian Sumatra of the early ninth century is a place of headhunting and cannibalism.

By then, no local power controlled the island's waterways: while Yijing and his fellow monks in the late seventh and early eighth centuries could travel freely and unharmed (and, in at least Yijing's case, 'on board the King's ship' (Yijing 2007 [1896]: xxx), a Chinese almanac of around 800 reports of piratical activity in the southern approaches to the Straits of Malacca.⁹⁰ The second half of the eighth century also saw amphibious assault and robbery along the coasts of Tonkin and Champa by Indonesian pirates' (Schafer 1985 [1967]: 64), in 767 described as having hailed from Shepo and Kunlun, 'the southern islands in general', and in 787 as armies of Java' (Coedes 1968: 91).⁹¹ The marauders to be dreaded most came in 774: as related in a local inscription, they were men living on food more horrible than cadavers, frightful, completely black and gaunt, dreadful and evil as death' (*ibid*), who eventually vanished [...] with all their stolen treasures into the depths of the sea' (Krom 1931:134) — a stark reminder of the poverty-driven piracy in unlegislated settings experienced in, for instance, the waters off today's Somalia.

Śailendran Java: Śrī Vijaya's Successor?

The last reference to a Śrī Vijaya in a Southeast Asian epigraph⁹² is a Sanskrit inscription discovered in the northern Malay Peninsula. In 775, an unnamed ruler subsidised a number of religious edifices, thus, conceivably,



'document [ing ...] Srivijayan royal activities in the Satingpra-Chaiya area of the Isthmus [of Malaya ...] a series of flourishing cities and kingdoms with established regional trade contacts' (Stargardt 2001: 338-7). However, the monarch's titles⁹³ are neither the *dapunta hiyang* of the Sumatran inscriptions of the late seventh century nor the *mahārāja* of later sources associated with Śrī Vijaya. A second, undated and unfinished epigraph on the stone of 775 mentions a *mahārāja* of a line of rulers named Sailendra; a, probably, mid-ninth century copperplate found at the 'Buddhist University' of Nalanda in today's Bihar, north-east India, refers to a certain Balaputra, a *mahārāja* of Suvarnadwipa⁹⁴ who had founded an *asrama* there, styling him as grandson of a Śailendran ruler of Yavabhumi⁹⁵. The various interpretations of the relationships between these three inscriptions are a key issue in the dispute around 'the elusiveness of Śrī Vijaya' (Jordaan and Colless 2009:1) from the second half of the eighth century onwards, leading us to Central Java, where a Buddhist Sailendra "dynasty" left a number of inscriptions and monuments.

It is conventionally assumed that eighth-century Java saw the emergence of two houses of rulers: a Hindu line, named Sanjaya after its alleged founder, and the Sailendra, a Buddhist dynasty that 'displaced the descendants of Sanjaya at the top of the power structure between AD 778 and 832' (Miksic 2004: 242⁹⁶). Following the discovery of the Wanua Tengah III inscription and its king-list, however, it is increasingly argued that early Central Java was ruled by 'only one *wangsa* [dynasty], ie. the Sailendra, members of which were adherents of either Siva or of Mahayana Buddhism' (Marwati et al 2008: II, 150⁹⁷). Conversely, various interpretations of the profusion of "rulers" (here: persons claiming privileges over territories) mentioned in the extant inscriptions have lead a number of scholars to propose the co-existence of three or more ruling houses: e.g., Jordaan and Colless (2009: 38) maintain that early Classic Java saw at least three dynasties, two of which, namely the Saivite line of Rakai Patapan and the Buddhist Sailendras were of foreign origin'; van Naerssen (1977: 39) claims that at least two or three *kratons* might have existed [... i.e.,] the rulers of the Sanjaya dynasty [...], the dynasty of Halu (Walaing) and the raka of Patapan with his Malay antecedent'.⁹⁸

The supposedly oldest extant epigraphic reference to "Sailendra" on Java is the Old Malay inscription of Sojomerto in northern Central Java, in all probability an early (?⁹⁹) eighth-century genealogy of a Saivite *dapunta*

selendra, of which only the names of his father, mother and wife are still legible.¹⁰⁰ The actual 'term *Sailendra wangsa* ["the House of Sailendra"] occurs for the first time in the inscription of Kalasan of 700 Saka (778)' (Marwati et al 2008: II, 113). Subsequent¹⁰¹ Śailendran activities in Java are indicated by a small number of inscriptions, all of them damaged to some extent, all except one written in Sanskrit and so-called Prae-Nagari script' (Jordaan and Colless 2009: 26), and the construction of Buddhist monuments. It has been argued that use of the title *mahārāja* on Java was introduced with inscriptions related to Śailendran dignitaries; however, it appears that this title was not borne by members of that house but by nobles known from other Javanese deeds who bestowed favours onto members of the Sailendrawamsa.¹⁰² The last dated Inscription related to a Sailendra (824) uses both Old Javanese and Sanskrit, and possibly shows the declining power of the Sailendras in Java' (*ibid*).

The origins of the Javanese Sailendra have been subject of lengthy scholarly dispute. It is argued that an as yet unpublished Sanskrit inscription of the mid eighth century relating the conversion of a certain Sangkhara to Buddhism notes the change of religion of the Malay *dapunta selendra* of the inscription of Sojomerto, and thus a 'turn to Mantrayana in Java in the 780s and 790s' (Woodward 2004: 353); conversely, their adherence to Mahayana Buddhism is thought to indicate relations between Śailendran nobles and Śrī Vijaya, variously proposing a "Sumatran period in Java1 (cf. Krom 1919, 1931:141-6), a "Javanese period in Sumatran history' (Stutterheim 1929) or a political alliance between Java and Sumatra under the aegis of the Sailendra dynasty' (Jordaan 2006b: 7). It is speculated that the designation Sailendra, "Lord of the Mountain (s)", continued a ritual convention present in late Funan and, successively, the northern Malay Peninsula, the site of the unfinished Śailendran inscription on the Śrī Vijayan stone of 775; their very title, religion and architectural triumphs are interpreted as direct and/or essentially Indian influence and achievement.¹⁰³ None of the extant inscriptions of the first millennium, however, plainly notes a relationship between Śrī Vijaya and the Sailendra: such a link is found only in two grants issued by Chola kings in, respectively, ca. 1006/19 and 1090, referring to a Buddhist edifice, "Sailendra-cudamanivarma-vihara', founded by a ruler of "Kataha"¹⁰⁴ who was born in the Sailendra family [...] and lord of the Sri-vishaya' (the Larger Leiden Grant; Karashima and Subbarayalu 2009: 282, 273).



About contemporary with Śailendran presence in Java are a small number of Old Malay inscriptions, all except two of which were found in northern central parts of the island (Map 3).¹⁰⁵ Often argued to mark 'Śrīvijaya's influence in the western half of the archipelago' (here, Andaya 2001: 321), none of the inscriptions yet mentions Sumatra or Śrī Vijaya.¹⁰⁶ The language here used belongs to a 'Middle Javanese [Malay] Dialect' (Kridalaksana 1987: 50), distinct from the late seventh-century Old Malay epigraphy found in Sumatra.¹⁰⁷ Some of the inscriptions are of Saivite, some of Buddhist context; only one, the Sojomeito inscription noted above, shows a possible relation to the Sailendra. Evidently, these inscriptions log the presence of speakers of Old Malay in (northern) Central Java - whether in form of activities of an independent, maritime-oriented polity in the plains and foothills to the north of Java's central mountain range,¹⁰⁸ or as a target audience [... of] traders or merchants on the overland route from the north coast to the interior of Central Java' (Jordaan and Colless 2009: 196-7) remains unexplained. The Gandasuli I inscription notes the 'remarkable fact' (Suhadi 1983: 68¹⁰⁹) that a *puhawang* -arguably Old Malay for 'captain of a commercial ship' (de Casparis 1956: 209 fn. 10¹¹⁰)- by the name of Gelis subsidised a Saivite edifice: as neither his title nor name appear in other contemporary epigraphs, he appears not to have been a member of the prevailing administrative officialdom but a private donor.

Howsoever the relations between the noble houses of western Indonesia in the eighth and early ninth centuries, this supposed 'Era of Good Feeling' (Hall 2011a: i25ff) between the various possible factions is thought to be echoed in a row of embassies by a country named 訶陵 Heling in the Chinese sources, calling at the Celestial Court between 767- 835.¹¹¹ Though its location has been widely discussed, it is 'the useable and acceptable choice' (Wolters 1967: 213¹¹²) that this toponym refers to a location on the island of Java. Christie (1995: 273) claims that Heling 'must have been centred on the north coast of Java, probably between Pekalongan and Semarang'; Cribb (2010: e.g., 3.04, 3.14) and Munoz (2006:104 Fig. 22) map this polity in Java's northern-central coastal region, where most of the local Old-Malay inscriptions have been discovered. The existence of an early harbour- (and possible palace-) site on the northern coast of Central Java has been proposed by a number of scholars.¹¹³ As seen in Figs.1.4-1 and -2, 'Ho-lings missions precede and

follow those from Śrī Vijaya', implying that 'a special relationship may have existed between the two countries' (Wolters 1967: 213).¹¹⁴

By the third decade of the ninth century, Heling's embassies were superseded by a polity called Shepo, 'in T'ang times [...] pronounced as "Dz'ia-b'ua", which admits of no other derivation than "Java"' (van der Meulen 1977: 89). The *Xintangshu* notes that 'Hel- ing is also called Shepo', and in a later section mentions Shepo as the capital of the former polity.¹¹⁵ A country under the name of Shepo appears 'already in the [Liu Song dynasty's] reports of the fifth century'; however, 'the name seems to change from She-p'o to She- p'o-p'o-ta and thence to P'o-ta' (van der Meulen 1977: 89), when its tributary career ends by the second half of the fifth century. Writing in the early thirteenth century, Zhao Ru- gua (1911: 77) relates that 'in the twelfth year *yiian-kia* of the [Liu] Sung dynasty (A. D. 435), this country [Shepo] entered into communication with China'. Seemingly unaware of the Tang records, he continues that 'after that intercourse was broken off until the third year *shun-hua* of the present [Song] dynasty (992), when [Shepo] again performed the ceremony of sending tribute to our Court'.

Sanfoqi: A Second, Śailendran Śrī Vijaya?

Wolters (1967: 214) notes that Heling's embassies 'coincide with the period in central Javanese history when the Sailendra dynasty was ruling'; the change to the designation Shepo, then, should be related to the cessation of Śailendran inscriptions on Java after 824. The possible circumstances of this change in name have been widely discussed and resulted in a number of hypotheses about Java's relations with Śrī Vijaya, the details of which are beyond the topic of this study.¹¹⁶ Surmise starts with a certain Sri Kahulunan, a Buddhist "Royal Consort" or "Queen Mother",¹¹⁷ who in tandem with a Saivite monarch issued a number of inscriptions. Identification of this figure as daughter of a Śailendran dignitary led to the assumption that the dissolution of a distinct Śailendran Mahayanist regime in Java¹¹⁸ transpired in course of a nuptial alliance between this princess and a ruler of the Sañjaya line. Cross-comparison of the titulary used in a number of inscriptions¹¹⁹ then allowed for the hypothesis that Sri Kahulunan was the sister of Balaputra, the Śailendran king of Suvarnadvipa, patron of an *āsrama* and descendant of the king of Yavabhūmi in the mid-ninth-century charter of Nalanda. Their maternal



grandfather mentioned in the latter epigraph would, as 'widely accepted' (Jordaan and Colless 2009: 43), 'almost certainly [be] the king of Śrī Vijaya mentioned on side A' (Coedes 1992 [1958]: 110) of the Chaiya inscription of 775.¹²⁰ This matrimonial alliance between the royal houses of the Sailendras and Srivijaya justified Bālaputra's claim for the throne of Sumatra. The latter, it is theorised, left Java after an unsuccessful struggle against Saivite claimants to the Javanese throne¹²¹ or an 'abortive coup' intended to secure his succession over a rival Sañjayan heir (Jordaan and Colless 2009: 29).¹²²

In any case, between 868 and 992 the Chinese Annals record no further Javanese mis-sions, neither by Heling nor Shepo: we have seen that the insular Southeast Asian embassies arriving at the Celestial Court in 852 and 871 represented a country called Zhanbei. These missions 'immediately precede¹²³ and follow the time when the Sailendra prince Balaputra was expelled from central Java [...] and established himself as the ruler of *Suvarnadvīpā* (Wolters 1966: 226). It is argued that Zhanbei's embassies represent attempts at recognition by the Son of Heaven by a 'new' Sailendra ruled polity 'in the Muara Jambi/Malayu area' (Jordaan and Colless 2009:123). Balaputra's patronage of an *āsrama* at Nalanda, then, is thought to indicate further 'political overtures towards the Palas' (*ibid*: 34), aimed at an affirmation of Śailendran Buddhist leadership in the Archipelago by the Indian polity that under Devapāla, the issuer of the charter, had reached its zenith.

A singular Old Malay epigraph indisputably dated to the tenth century, the West Javan Kebon Kopi II inscription of 932,¹²⁴ mentions the (re?)ordination of a ruler of Sunda. The language used in the text is thought to 'give evidence of Malay influence in this part of Java [...], possibly from the maritime *kraton* of Śrī Vijaya' (van Naerssen 1977: 25¹²⁵), hence indicating Sumatran authority over the Sunda Straits. We have seen that contemporary Perso-Arabian sources recall al-Zābaj's title over Kalāh Bār, the Bujang valley in Kedah, guarding the northern entrance to the Straits of Malacca: tenth-century Malay hegemony thus would have covered most of the western Archipelago.

Sanfoqi: 'Three Vijayas?'

In the Chinese records the advent of renewed Sumatran supremacy is marked by the arrival of an embassy from 佛齊 *Foqi* in 904.¹²⁶ Zhanbei, the origin of the missions of 852 and 871, re-emerges only in the eleventh

century: ambassadors of 1079 and 1088 represented a Sanfoqi zhanbeiguo,¹²⁷ suggesting that for the Chinese chroniclers of the time Malayu/Jambi was a part of the powers controlling the Straits of Malacca. In contrast to the abundant archaeological finds in both the Bujang valley and Muara Jambi, however, the third locale commonly associated with Śrī Vijaya, the vicinity of modern Palembang, did not produce the density of tenth-century monumental architecture and "trade debris" expected from a major political and economic centre.¹²⁸

Proponents of a Palembang-based Śrī Vijaya maintain that the semi-permanent riverine settlement along the Musi described in the extant Arab and Chinese accounts today would be 'deeply buried in river sediments', thus pos[ing] problems that are nearly insoluble with our current research tools' (Miksic 2004: 240), and that 'the little that may have been left to study in the middle of the bustling modern city of Palembang has been heavily looted' (Manguin 2004: 306).¹²⁹ Conversion of existing monumental architecture into new edifices has been observed at, for instance, the 'stone from earlier structures [that] was reused in later building at a sixteenth century Islamic grave Gede ing suro in east Palembang', or the 'large bricks from *stupa*-like monuments that were reused for construction work by Dutch authorities' (Edwards McKinnon 1985: 13, 25) in the late colonial era.¹³⁰ The case in point would be the extensive hydraulic constructions of Karang Anyar, a site close to the location of one of the main Śrī Vijayan inscriptions: although initially thought to be related to building activities of the later first millennium,¹³¹ closer analysis proved the works 'to have been built (or rebuilt?) by a Palembang Sultan in much later times on top of an earlier occupational floor' (Manguin 1993c: 27¹³²).

Based on surveys and excavations at Palembang throughout the 1980s Manguin (1993c: 25) is convinced that a Malay harbour city has indeed been proved to have flourished for the past thirteen centuries -with ups and downs- on the banks of the Musi River'. He argues that, while 'pre-ninth-century sites without Chinese ceramics produce practically no surface finds'¹³³ (Manguin 2004: 306), the extant inscriptions alone imply a 'political centre resolutely situated at Palembang at foundation times in the late 7th century' (Manguin 2002: 75). The considerable numbers of ceramic shards of the ninth and tenth centuries found at a number of sites support the existence of a late



first-millennium port – although ‘possibly after a still undefined gap’ (*ibid*) throughout the later eighth and early ninth centuries.

The Chinese label 三佛齊 *sanfoqi* that so consistently marks Sumatran endeavours at trade and diplomacy with the Celestial Empire has been subject of numerous assumptions. Mainstream scholarship presumes it to be ‘a slightly different name [...] instead of the more regular Shilifoshi’ for Śrī Vijaya (Manguin 2004: 308); others conclude that though there is ‘no doubt that Fo-ch’i [Foqi] represents Vijaya, it is difficult to interpret the syllable San’ (Zhou Qufei [Netolitzki, ed., transl.] 1977: 227). Some maintain that 三 *san* could be a misspelling, ‘where *shih* (for *sri*) was mistaken for an alternative character for *san* (‘3’) and then replaced by the simpler *sari* (Jordaan and Colless 2009: 182¹³⁴); others accept its literal meaning ‘three’, thus translating the term as the “Three Vijayas”, ‘a tripartite coalition’ (*ibid*: 140) of ‘parts of Sumatra or of Sumatra and the Malay Peninsula which were customarily associated with the illustrious name “Vijaya”’ (Wolters 1986: 39).¹³⁵

The first scholarly identification of this transliteration, however, cautiously stated that ‘fo-ts’i [his spelling of 佛齊 *foqi*] may represent a form of *bujai*, a spoken corruption of *wijaya* (Coedes 1992 [1918]: 18; my underscore), and it has been argued that ‘careful Chinese officials would never have used [...] the San-fo-ch’i toponym [...] to transcribe “Śrī Vijaya”’ (Wolters 2008 [1979]: 98). A number of Sinologists yet suggest that the assumed late Tang pronunciation of the word “Sanfoqi” itself ‘resembles very closely *zabaj*’ (D. Pattinson, pers. comm., Oct, 2010¹³⁶). For the Perso-Arabian observers of the tenth century, ‘in any event, enduring *Zabaj*, though not impermanent *Sribuza*, obviously served as an important coverall for the lands that lay before Cambodia’ (Laffan 2005: 30).

Beliefs, Ideology and Socio-Political Organisation

For the Chinese monk Yijing, Śrī Vijaya is Maritime Southeast Asia’s foremost centre of Buddhist learning. In the fortified city of Bhoga¹³⁷ priests number more than 1,000 [...] and] investigate and study all subjects that exist just as in [India]; the rules and ceremonies are not at all different’ (Yijing 2007 [1896]: xxxiv). He recommends that ‘if a Chinese priest wishes to go to the West [...], he had better stay here for one or two years and practise the proper rules and then proceed to Central India’ (*ibid*). As demonstrated by Chinese

monks' voyages to India, Buddhism had

travelled to East Asia along established trade routes, and swelled the pre-existing volume of trade by itself creating new religious incentives for travel, and a demand for imported religious articles. Buddhism legitimated private commercial wealth as a vehicle for serving sacred needs through generous donations, and Buddhism lubricated foreign exchange by overcoming narrow local prejudice with a radically more cosmopolitan, international, perspective. [...] Buddhism was thus in many ways conducive to the growth of trade - and trade to the spread of Buddhism. (Holcombe 1999: 280-1)¹³⁸

The Buddhism so evidently patronised by Śrī Vijaya's rulers of the late seventh and early eighth centuries¹³⁹ followed Vajrayana or Tantrayana concepts recently developed at the Yogacara school of Nalanda;¹⁴⁰ actual religious practice, however, is thought to have relied heavily on syncretism with Saivism and Vaisnavan as well as local beliefs.¹⁴¹ The extant inscriptions thus note Śrī Vijaya's ruler under the designation *(da) punta hiyang*, a indigenous 'religious title rather than a political one' (Christie 1995: 266¹⁴²), and only reports of the later ninth and tenth centuries associate leadership in Sumatra with a *mahārāja*, an evidently Indian-inspired political label. Ostensibly, early Śrī Vijaya's rulers' claims for enhanced status had to be decodeable for a not yet "Indianised" audience,¹⁴³ and only later potentates would rely on 'Indian' political terminology.

The *dapunta hiyang* of the 680s, however, thought it worthwhile to also record his "pledge of a candidate for the Bodhi, representing the beginning of his career as a Bodhi- sattwa1 (Coedes 1992 [1930]: 51) when consecrating a park, and to express associations with Tantric ceremonial (*ibid.*: 60).¹⁴⁴ Evidently; Mantrayana ritual could demonstrate superior control over both [the] human and divine [...] and therefore enhance state power to an even greater degree' (Woodward 2004: 331-2). A distinctively Sumatran expertise in Tantric procedural was still recognised in later years: a Śrī Vijayan religious expert called upon reciting a sutra 'famous among Buddhists of the *tantrayana* persuasion' (Wolters 1983: 53) in late eleventh century Guangzhou produced for his Chinese audience a perplexing but satisfactory interpretation.¹⁴⁵

Scholars have attempted to describe Śrī Vijaya's socio-political structure by the paragon of the 'stable traditions and unstable states' (Christie 1990: 44) of



other trade-based polities in the region.¹⁴⁶ It is argued that due to the limited arable terrain in their vicinity, most of these emporia initially strived for the control over economic and ritual exchanges along the river systems they commanded, enabling a successful ruler to feed eventual surplus into supra-regional trade.¹⁴⁷ The expansionist politics of late seventh-century Śrī Vijaya "added to this material and symbolic resource pool [...] the rival centers of power on the Sumatra coast and in the strait region (Hall 1985: 92), to shape the hegemony throughout the Straits of Malacca commonly associated with the realm's authority. Political cohesion was achieved through

the redistribution of a significant portion of the ruler's income from trade [...] in form of entertainment, clothing, and personal adornments provided for clients supported within the royal household or court, and status-enhancing imports presented to those in control of dependent centres. (Christie 1990: 46)

Śrī Vijaya thus is seen as a series of interlocked human relationships [...] based on patronage, loyalty, and power (Hall 1985: 79, following Wolters 1975 [1970]), enchained by a combination of force, bribery and spiritual power' (Christie 1995: 272). Such polities have been portrayed as a

patchwork of often overlapping mandalas, or "circles of kings". In each of these, one king, identified with divine and "universal" authority, claimed personal hegemony over the other rulers in his mandala who in theory were his obedient allies and vassals. [...] In practice, the mandala [...] represented a particular and often unstable political situation in a vaguely definable geographical area without fixed boundaries and where smaller centers tended to look in all directions for security. (Welters 1999 [1982]: 27-8)¹⁴⁸

Śrī Vijayan Diplomacy

Due to the virtual absence¹⁴⁹ of indigenous sources on historic events in tenth-century Sumatra, any suppositions on her political organisation have to remain as such; recorded, though, are several of Śrī Vijaya's endeavours at international diplomacy. The most forthright of such efforts, the request of a Śrī Vijayan ambassador for Chinese mediation in his country's conflict with Dharmmawangśa's Java in the 990s, has been related above.¹⁵⁰ In 1003, Sanfoqi's next envoys to the Celestial court reported of the construction of a

temple 'to pray for the long life of the emperor , and asked for a name and bells for the new edifice, anticipating that 'the emperor would show that he appreciated [Sanfoqi's] good intentions' (the *Songhuiyao*, Groeneveldt 1960 [1880]: 65). Kulke (2009b: 6) considers this mission as an attempt at 'rituo-political diplomacy, demonstrating that a war-torn Śrī Vijaya 'was most eager to win China's favour' and, possibly, support.

A cornered Śrī Vijaya of the late first millennium apparently also sought recognition through pious contributions to the rising Chola court in southern India. I noted above the copperplate grants of ca. 1006/19, donating the tax-incomes of a village to 'meet the necessary requirements of [... the] vihira which is being built by Cūlāmani-varman,¹⁵¹ at Nagapattinam, a major seaport of the Chola realm. This lord of Srivishaya', his son Maravijayottungavarman, the Ādipati of Katāha 'born in the Śailēndrā family', and a certain I Jday adity awarman who in 960 and 962 had sent the two first missions to the newly inaugurated Song court, are the only Sumatran (and, as indicated by 'Kaṭāha', Malayan) rulers of the tenth and early eleventh centuries known by name from both Indian and Chinese sources.¹⁵² The amiable relationship between the Chola and the polities along the Malacca Straits though were soon overshadowed by the rapid rise of the Indian realm's political and economic clout during the reigns of Rajaraja I (985-1014) and Rajendra I (1012-1044¹⁵³): growing participation in the trade between India and China, as evidenced by the great success' (Kulke 2009b: 8) of the first official Chola mission to the Song court in 1015, apparently defied the commercial interests of Sanfoqi, hitherto the most active of all tributary trading partners of the Celestial Realm.¹⁵⁴ These challenges climaxed in a massive seaborne raid along the Straits of Malacca noted in two Tamil inscriptions dated to the end of the 1030s,¹⁵⁵ 'an ambitious manoeuvre with a pretext to remove hindrance from the trade route [...] blocking] direct maritime links between Indian and the Song markets' (Kulke 2009b: 1-2). The main prize of the raid was 'Sangama Vjayottungavarman, the king of Kaṭāram' (Karashima and Subbarayalu 2009: 279), who, according to Coedes (1992 [1918]: 6), 'was at the same time the king of Sriwisaya'.

The list of the conquests made during the Chola foray is our only contemporary source for the possible extent of the Sanfoqi/Sriwisaya/Śrī Vijaya of the early eleventh century. The various place-names it includes have



been equated with various locations¹⁵⁶ situated on the Malay Peninsula and the eastern shore of Sumatra; as some of the names resemble designations mentioned in Zhao Rugua's thirteenth century list of dependencies of Sanfoqi (1911: 62), it has been argued that the two inventories outline the maritime empire associated with the designation Śrī Vijaya. The Chola list, though, leaves it open as to whether all of Rajendra I conquests belonged to a single polity - if so, it would seem that the ruler of Kataram seized during the raid was its principal representative.

The places mentioned by Zhao Rugua, however, are expressly subject to Sanfoqi; the list includes Balinfeng, a proposed Chinese transcription of Palembang, but not Zhanbei or Moluoyu, i.e. Jambi/Malāyu. The *Songshi* even entitles the ruler of Sanfoqi as "Zhanbei", arguably so because 'the author had heard the name of Radja Djambi [... and] mistaken the name of the country for the name of the king' (Groeneveldt 1960 [1880]: 63 fn. 5). Wolters (1983: 51) argues that after the Chola raid "'Sriwijaya" may not be the appropriate name of the overlord's centre: epigraphic references to "Sriwijaya" cease with the Chola inscription of 1030-1031, while Yuan sources (1260-1368) abandon the name "San-fo-ch'i" in favour of "Malayu" and "Palembang". In 1079 and 1088, thus, insular Southeast Asian ambassadors to the Song court were noted as representatives of a Sanfoqi-Zhanbei.¹⁵⁷ These records apparently reflect the move of the centre of political gravity in the Straits of Malacca to iambi, a shift that is confirmed by 'the archaeological record showing] that the volume of trade declined sharply in Palembang during and after the nth century, and increased conversely in the Batang Hari sites' (Manguin 2002: 84).

It remains unanswered when a proposed Palembang-based Śrī Vijaya lost her authority. The majority of scholars speculates that 'the centre of political dominance shifted from Palembang to Malayu's capital at iambi around 1080', to enter the 'twilight' (Manguin 1996c: 102) of a gradual disintegration of the Śrī Vijayan maritime empire' (Kathirithamby-Wells 1990: 7); others claim that after the 1025 raid for the next century a Chola viceroy governed the Straits of Melaka from a base in Kedah; Srivijaya no longer existed' (Miksic 2010: 24¹⁵⁸). The colophon of an eleventh-century Tibetan Buddhist manuscript allegedly ascribes its composition into 'the reign of Chudamanivarmadeva, of Sri Vijayanagara, in Malayagiri, in Suvamadvipa' (Coedes 1968: 323 n.61¹⁵⁹).

If we assume that this ruler was the same as Culamanivarman, the king of Kitaram' of the Chola copperplate of 1006/19 mentioned above, then this sovereign not only founded the Buddhist temple at Nagapatfinam, but also was patron of the manuscript's author, the Sumatran prince and Buddhist sage Dharmakirti. We would suspect Dharmakirti's illustrious pupil Atisa Dipankara Shrijnana, a prominent Buddhist scholar who between 1012 and 1025 resided in Sumatra and from 1040 onwards lived near Lhasa, to be related to the translation of the extinct version of the text into Tibetan.¹⁶⁰ If so, at least "Śrī Vijaya's" intellectual centre had shifted to the Batang Hari over basin already before the Chola raid, speculatively as a repercussion of her confrontation with Java in the 990s,

Tenth-Century China: Five Dynasties and Ten Kingdoms

The "official" dates given in the Imperial Histories for the Wudai Shiguo, the 'Five Dynasties and Ten Kingdoms' between the final fall of the Tang and the rise of the Song Dynasty, 907-960, relate only part of the tale. The *Jong* twilight of Tang splendor¹ (Hucker 1975:146) began with the cataclysmic events of An Lushan's and Shi Siming's revolt (755-762) and the ensuing warlordism, propelled by quasi-autonomous *jiedushi*, court-appointed 'military governors' who yet claimed command over their very succession;¹⁶¹ much of the political acumen that allowed the rise of the Song dynasty was instituted during the Later Zhou (951-960).¹⁶² The last of the Ten Kingdoms, Wuyue, was incorporated into Song rule only in 978.

A first date of consequence for the present discussion is the sack of Guangzhou by the rebel army of Huang Chao the 'peasant's hero' (Schafer 1985 [1967]: 28) and final nail in the coffin of the Tang Empire¹⁶³ - in 878-9. The ensuing slaughter of thousands of foreigners residing in a city that for centuries had been China's main seaport apparently undermined her commercial role for the decades to come: between 877 and 904 the Tang annals record no embassies representing the lands of the Southern Ocean. Foqi's mission of the latter year went through a harbour in Fujian.¹⁶⁴

The Tang Dynasty officially ended with the accession to the Celestial Throne of Zhu Quanzhong, the former ally and eventual executor of Huang Chao and *éminence gris* behind the last two emperors of Tang. Quanzhong's Later Liang Dynasty lasted for sixteen years and was supplanted by four



equally short-lived dynasties of both Chinese and Shat-uo Turk origin. The endless intrigues and struggles between supporters and opponents of the various contestants for the Mandate of Heaven have led it to be described by contemporaries as an 'age of chaos',¹⁶⁵ saturated with the mayhem of incessant warfare. Nonetheless, the Five Dynasties initiated 'an era of robust state building that laid the foundations for unification under the Song' (Smith 2009: 4¹⁶⁶).

China's south saw the rise of a number of smaller yet more stable 'kingdoms', ruled by 'Hereditary Houses' of various former warlords. Some of these maintained pro forma relations with the northern dynasties; others openly contested the northern claims for overlordship by proclaiming their own "empires"; most sent intermittent "tribute" to the courts of the Five Dynasties. While these states were 'not above their own political intrigues and fratricidal strife', throughout most of era they 'were spared the regular chaos that so disrupted life in the north' (Clark 2009:135), and maintained (and often enhanced¹⁶⁷) the established systems of bureaucracy and administration inherited from Tang times.

Of interest to the present study are the three 'empires' of, from west to east, Nanhan, Min and Wuyue, which divided among themselves most of China's southern seaboard (see Map.4), Min, controlling modern Fujian, was the most short-lived of the three. By 926 her rulers had elated themselves from commissioners and princes to kings, and in 933 declared Min an empire. The realm promptly drowned in a series of regicides and ensuing civil wars, and in 945 fell prey to invasions by her neighbours, Wuyue and Nantang.

In its early years, this small state apparently profited from the devastation of Guangzhou: Foqi's embassy of 904 inspired the ruler of Min to 'summon the barbarian merchants from overseas' (*the Xin Wudaishi*, Schafer 2006 [1954]: 78) to trade at his seaports at Huangqi, Xiamen and Quanzhou. Development of this commerce was one of the objectives of the warlord Liu Congxiao, who in the 940s took over southern Fujian and her ports Zhang-zhou and Quanzhou. The latter was to become the main port of the Southern Song; while in the tenth century the city 'seems to have been especially prosperous as a result of [seaborne] commerce, [... it] could not yet compare with Canton in the empire of Han' (Schafer 2006 [1954]: 77).

Nanhan: The Realm of the Baghbur

The 'Empire' of Nanhan owed its rise to the 'Hereditary House' of Liu, a line of sinicised 'chieftains of one of the many non-Chinese tribes that lived in the far south' (Clark 2009: 153¹⁶⁸), who throughout the troubled years following Huang Chao's revolution had remained loyal to the waning Tang court. Liu Yin, the first de facto ruler of the realm, in a time 'abounding' in emergencies [...] frequently realized exploits [in Lingnan], and accordingly came to possess the Nan-Hai [area]¹⁶⁹ - through, reportedly in 904 or 905, bribing Zhu Quanzhong to secure the post as commissioner of, roughly, today's Guangdong.¹⁷⁰ In 911 his younger brother Yan was elevated to Prince of Nanhai; in 917, Yan proclaimed himself 'Emperor of Great Yue' and discontinued payment of tribute to the court of the Later Liang. By 918 the name of the dynasty was changed to 'Han', known to posterity as Southern ('Nan') Han.

Already Liu Yin had courted a number of 'esteemed worthy gentlemen' of the late Tang bureaucracy who had fled the turmoil of the north; trusting that the new empire 'might have somewhat of orderliness and precedence, therefore use was made of all of these' (*the Xin Wudaishi*, Schafer 1954: 350) in Yan's administration. The establishment of a regime modelled after the paragon of the fallen Tang empire¹⁷¹ created the 'sole exception' (*ibid*: 351) from the disorder ruling the fragmented Celestial Realm of the first decades of the tenth century. Described as 'a man of sharp mind' (Ouyang 2004: 538), Yan did not hesitate to display his new-won might:

He carried out the punishments of knife and saw, of limb disjunction, and of disembowelling and disboning. Whenever he looked on at the killing of a man, he could not overcome his pleasure: unawares he worked his jolts and dripped saliva, gaping and sucking, so that the people took him to be a veritable sea-basilisk or dragon-clam. More-over, he took pleasure in lavishness and prodigality, and assembled all of the valuables and treasures of Nan-hai [here, apparently: the 'Southern Seas'¹⁷²] for the purpose of making halls of jade and basilicas of pearl, (*The Xin Wudaishi*, Schafer 1954: 352-3¹⁷³)

Yan's capital, 'colorful and insubstantial' Guangzhou (Schafer 1985 [1963]: 15), in the early years of his reign thus took on something of the appearance of a sophisticated metropolis' (Schafer 1985 [1967]: 28) of a cosmopolitan



and commercial quality, a result of the large numbers of foreign merchants residing there' (Miles 2002: 47). His successors, however, were interested more in securing the throne through fratricide than in administering affairs of state and commerce.¹⁷⁴ Under the brutal rule of Liu Cheng (r. 943-958), the Nanhan "empire" reached its greatest extent only through the wit of its generals and its 'crack force of Gigantic [War] Elephants';¹⁷⁵ Cheng's successor Chang (r. 958-971) left governing to eunuchs and a sorceress, to 'play wantonly with palace maidservants, Persian girls and such like in the women's quarters and not come forth again to attend to affairs' (*the Xin Wudaishu*, Schafer 1954: 364).

In 970 Nanhan was overrun by a Song army; Guangzhou fell to the invaders in March 971, but not before the empire's eunuchs, fancying that destroying the city and its treasures might deflect the Song troops, scorched 'storehouses and warehouses, palaces and basilicas, without exception' (*the Xin Wudaishu*, Schafer 1954: 368¹⁷⁶). Liu Chang attempted escape with more than ten oceanworthy vessels, brimming with precious gems and imperial concubines' (Ouyang 2004: 547), yet found himself betrayed by one of his eunuchs who surrendered the fleet to the Song army. Conceding defeat, Chang 'was removed to Kaifeng [and] lived in obscure luxury until his death in 980' (Miles 2002: 46).

Wuyue: Ceramics and Commerce

Zhejiang, the lands to the south of the lower Yangtze that formed the core of tenth-century Wuyue, is one of the oldest centres of the manufacture of Chinese export ceramics. Industry-scale production of these "Yue Wares" was under way by at least the ninth century; the tenth century saw peak outputs, for both exports and tribute purposes.¹⁷⁷ It will be seen in Section 2.2.1 that most of the ceramic wares in the Nanhan/Cirebon cargo hailed from Zhejiang kilns.

Wuyue proved the most stable of the Ten Kingdoms. Its ruling house was established through the exploits of the daredevil Qian Liu, a connoisseur of 'jade sashes and rare horses' (Ouyang 2004: 566) fond of drink and gambling.¹⁷⁸ Inaugurated as Prince of Wu in 907 and King of Wuyue in 923, until his death in 932 Liu remained an outwardly loyal and frequently honoured¹⁷⁹ vassal of the various rulers of the Wudai dynasties, thus sparing his realm much of the

plight that affected his neighbours. His heirs were not given to the dynastic disputes that regularly coloured succession in other Chinese polities of the times; instead, they 'devoted their lives to the clever and the crafty' (Ouyang 2004: 571). Wuyue's last ruler, Qian Chu, even earned himself a reputation as poet and patron of Buddhism.¹⁸⁰

Hydraulic works and promotion of agriculture and industry, a major concern of Wuyue's rulers, advanced their lands into the most prosperous of the Ten Kingdoms.¹⁸¹ The realm's stable political conditions and affluence made Wuyue an attractive partner for both regional and international trade: under Qian Chu's rule, in her harbour at Hangzhou 'ships were jammed together so tightly one could not see an beginning or an end to them' (*the Wudaishi bu*, Clark 2009:182). Much of this commerce would have been bound for Japan and Korea,¹⁸² although some 800 nautical miles from Guangzhou, the first and foremost port of call for vessels from the Far South, Wuyue nevertheless attracted sufficient trade in foreign luxuries to include Middle East and South and Southeast Asian products in her tributes to the courts of the Five Dynasties and the Song.¹⁸³ At least some of these goods would have been were transshipped cargoes: 'Qian royals' took their tolls from the 'merchants from Lingnan and the Southern Seas' (Ouyang 2004: 571) that frequented the ports under their control.

Wuyue's most important export was her ceramic produce. Zhejiang stonewares are the most frequent of the ceramics found in early medieval horizons throughout Southeast Asia and the Middle East¹⁸⁴ and feature prominently in the tributes sent by Wuyue to the courts of the Northern Dynasties and the Song.¹⁸⁵ Kerr and Wood (2004: 53of) argue that most of this production was private enterprise; there yet also were 'a small number of tribute kilns which operated under official supervision' (Ruan 1994: 5), mainly manufacturing the highly esteemed *mise celadon*.

Besides pottery, sericulture appears to have been a notable pillar of Wuyue's economy. In 931 her tribute of pongee to the Later Jin contributed 10.5 per cent of all of the court's revenue in such fabrics; in 938, Wuyue even provided nearly one-third of the northern empire's income in silk.¹⁸⁶ Though rarely emerging in archaeological horizons, especially artful damasks and silks were in great demand throughout Southeast Asia and the western Indian Ocean, and thus would have been another of Wuyue's potential exports.¹⁸⁷



Wuyue's diplomatic efforts for independence heavily relied on the opulence of her offerings to the Northern Dynasties. The rise of northern power under the Later Zhou and the Song forced the Qin family to multiply its endeavours, and throughout the last years of his reign Qin Chu nearly bankrupted his own kingdom to offer tribute to the north' (Ouyang 2004: 571-2).¹⁸⁸ A man of the arts rather than of arms, he yet avoided a final military confrontation with the Song and surrendered his sovereignty peacefully in 978.

The Song: Reunification of the Celestial Realm

After nearly five decades of indecisive warfare over China's northern planes, the reu-nification of the Celestial Empire commenced with the administrative reforms and successful campaigns of the first two emperors of the Later Zhou (951-960). By 958 Zhou armies had pushed their strongest competitor, the Nantang, south of the Yangzhi and formally reduced to vassal status; however, attempts at crushing the Northern Han and their allies Liao were shattered by the untimely death of emperor Shizong in 959. The discontented army in 960 exhorted general Zhao Kuangyin to claim the throne of the last (child-) monarch of Zhou, thereby declaring the founding of the Song Dynasty. To posterity known by his temple name Taizu, the new emperor continued the Zhou rulers' policy of strengthening central authority and their military endeavours to reconsolidate Imperial China.¹⁸⁹

Instead of assaulting his more powerful northern neighbours Bei Han and Liao, Song Taizu concentrated his early endeavours on the weaker southern kingdoms. The years 963-966 saw the invasion of Nanping, Chu and Later Shu; throughout the campaign the Imperial troops 'behaved brutally, slaughtering surrendered troops, raping, and looting' (Lau and Huang 2009: 226), leaving behind a belt of scorched earth where turmoil and revolt reigned. Unrest also spread into Nanhan's north-western domains, now part of the new border with the Song.¹⁹⁰

The rise of a restored imperial authority appears to have attracted Southeast Asia polities: in 958 and 959, Champan ambassadors to the Later Zhou became the first embassies of a Southeast Asian polity recorded in the Celestial Annals since 904, and at least four Sumatran missions, as we have seen now noted under the title 三佛齊 *sanfoqi*, the 'Three Vijayas', called at the new capital in Kaifeng between 960 and 963. However, the campaign against Nanping and Shu and

the ensuing turmoil throughout southwestern China brought this short series of Southeast Asian legations to the Celestial Throne to a temporary end. Instability in Nanhan and the ostensible ineptness of her last ruler (*the Xin Wudaishi* comments on his indifferent reaction to the loss of Nanhan's northern provinces with 'such was the measure of his stupidity!' [Ouyang 2004: 547]) apparently prompted many a mission from the southern ocean to switch its focus to the court of the Southern Tang.¹⁹¹ by 972 Taizu had to decree that 'in the future, [these] countries should no longer submit presents to Jiangnan [the Southern Tang], but send them to the Song court' (Kurz 2011:101).

Such unsettled conditions who, if not the legitimate Son of Heaven, was endorsed to receive foreign legates and their tributes? began to change with the Song victory over Nanhan in 971. As most of the newly 'pacified'¹⁹² areas shared the basic administrative model of the Song, integration into the reunited empire was not a remodelling of current structures but a demotion of the existing bureaucracy from an independent to a dependent status.¹⁹³ Consequently, only about four months¹⁹⁴ after the fall and devastation of the Guangzhou, 'in the 4th year of Kaibao [971] the government reopened the Offices of Maritime Trade in Canton' (the *Songshi*, Verschuer 1995: 6): garnering both the allegiance of foreign lands and the revenues of seaborne trade for the Song ruler now could become a concern of his administration. The long series of notes on the arrival of stately missions and, in at least the case of Śrī Vijaya (Sanfoqi), private traders offering their fidelity and tributes preserved in the Song records accordingly leads us to questions concerning the nature of such diplomacy and commerce, the topic of the next section.

(Endnotes)

1. Coedes 1968: 16-7; Sarkar 1981; Wheatley 1973 [1961]: i77ff.
2. E-g., Ardika 1991,1996; Basa 1992; Beilina and Glover 2004; Glover 1996.
3. These contacts, however, left a significant genetic imprint on the island of Bali (Hoogervorst 2012: 54) - but almost certainly not through frequent and recurrent Indian operated shipping: 'by contrast, evidence for early seafaring from Southeast Asia is strong' (Smith 1999: 6).
4. Eg., Brown 1996; Hall 1985, 2011; Kulke 1991; O'Reilly 2007.
5. Smith 1999: liff.
6. 'Ninety percent of Old Javanese inscriptions concern the investiture of land grants'



- (van Setten van der Meer 1979: xvii). For the nature of such inscriptions see, e.g., Barrett Jones 1984: 59b or Rahardjo 2002: 84b
7. The character of such missions will be discussed in the following section.
 8. This assumption is commonly based on a change in a standardised formula related to the rulers' court: see, e.g., Barrett Jones 1984: 5; Boechari 1979b: 473; Krom 1931: 196. De Casparis (1988: 51), however, notes that in at least one of Sindok's inscriptions a Central Javan formula is used: 'the absence in Central Java of any dateable archaeological data between c.925 and 1450 [is] a much stronger argument in favour of the conclusion that the royal residence was transferred from the centre to the east of the island soon after 0925'.
 9. De Groot 2009 [2010]: Chpts.4-7 *passim*.
 10. For a recent overview see Hall 2011a: 141b
 11. Eg. Boechari 1979b; Christie 1991: 26-7 fn.10, 1998a: 351-2; Coedes 1968: 128; Kinney et al. 2003: 45; Marwati et al. 2008: II, 184
 12. Mentions of a possible 'terrible, pest-like, contagious disease' are discussed in Krom 1931: 207-8.
 13. Barrett Jones 1984: 2; Krom 1931: 146-9, 160-2; van Naerssen 1977: 55-9,
 14. For a comprehensive discussion of the inscriptions by Daksa (910-919), Tulodong (919-924/7?) and, especially, Wawa (924/7-928) see Barrett Jones 1984.
 15. Barrett Jones 1984: 3-5; Boechari 2012 [1962]: 78; de Casparis 1986b: 50-1; Krom 1919: 9-14, 1931: 194-202.
 16. For a detailed discussion of this position see Marwati et al. 2008: II, i66ff.
 17. See, e.g., Barrett Jones 1984: *passim*, and *espc.* Chpts.2 and 3; Boechari 2012 [1963]: i08f, 1979b: 477-8; de Casparis 1986b; Christie 1986; Damais 1949; Kulke 1991: 12-8; Weatherbee 2000: 348ff.
 18. Cungglang (929), Linggasutan (929), Sumhut (933) and Anjukladang (937).
 19. Kinney et al. 2003: 46; Krom 1931: 207f; Marwati et al. 2008: II, 185\$.
 20. See, e.g., the various requests of a Rakryan Hujung for support to his (as yet unidentified) ceremonial complexes at Pangawan and Himad (Marwati et al. 2008: II, tSgff).
 21. Waharu IV and Sumbut (Marwati et al 2008: II, 193!).
 22. The argument that Sindok won Java's throne through a victory over 'a Malayu-based army of Śrī Vijaya' (de Casparis 1958: 8; Hall 2011a: 137) invading East Java is singularly based on the reference to an unidentified cenotaph in the inscription of Anjukladang (937) and not supported by other readings of the deed (eg., Boechari

- 2012 [1963]: 106; Marwati et al. 2008: II, 188).
23. Marwati et al. 2008: II, 195.
 24. Marwati et al. (2008: II, 196-7) mention three, Rahardjo (2002: 540-1) lists four inscriptions. A group of three illegible inscriptions found in the vicinity of today's Madiun might belong into this corpus. Krom (1931: 222-4) knows of a further epigraph by Lokapala; his opinion that the date on the extinct Majapahit copy, \$782, is a writing mistake for \$872, is not supported by other scholars (see, e.g., Rahardjo 2002: 536).
 25. Cf. Krom 1931: 217-9; Marwati et al. 2008: II, 195-6; Stutterheim 1930: 305ff. The only monument definitely bearing a tenth-century date is the 'bathing-place' Jalatunda on the western slopes of Mt Penang- gungan (Bosch 1948; Bosch and de Haan 1965; Kinney et al. 2003: 51ff; Stutterheim 1937). On the monuments surrounding the spring of Belahan, another candidate for a tenth-century construction, see de Haan 1924,1925; Jordaan 2007b; Kinney et al. 2003: 63ff; or Resink 1967.
 26. Eg., the as yet apparently unresearched remains of a brick temple in the vicinity of today's Nganjuk, Can- di Lor, that could be related to the Anjukladang inscription (Marwati et al. 2008: II, 195); or Candi Sanggari- ti, possibly noted in to the Sangguran inscription of Wawa executed by Sindok (Suwardono 2013).
 27. Eg., Barrett Jones 1984: 32-7; de Casparis 1950; van Naerssen 1937: 4s6ff; Rahardjo 2002: 84f
 28. Cf., e.g., van Naerssen 1937: 460-1; Supomo 2006: 323. The importance of the epic for Javanese statecraft is illustrated in 'the belief that the ideal characteristics of a ruler, called *astabrata* in the Rāmāyānā, should be taken from a combination of specific characteristics of the gods of the Lokapala' (Rahardjo 2002: 382).
 29. De Casparis 1978: 27; Kinney 2003: 46; Woodward 2004: 345. On the text itself see, e.g., Kats 1910 and Jong 1974.
 30. Juynboll 1912; Robson 2008; Supomo 2006; Zoetmulder 1974:95f
 31. For the Siwasasana. see Creese 2009: it remains undetermined, which parts or version of the text are implied here; cf. Sudarma 2010.
 32. Cf. Rahardjo 2002: 111-2, 118.
 33. Cf. Wade 2009; Christie 1998a, 1999.
 34. Cf. *ibid* 23\$, espc, 37-42; Hall 1999 [1992]: 208-10,
 35. Christie 1999: 242-5 discusses these merchants associations; cf., e.g., Hall 2004: 224b Wade 2009:172-3. I will return to conjectures on the organisation of tenth century trade in the following section and in the concluding chapter of this thesis,



36. Hall 2011a: 138b van Setten van der Meer 1971: 32b 134.
37. Kulke 1991:19.
38. Zhao Rugua 1911: 61 (Śrī Vijaya), Sjf (Malaya), 82f (rice production of Java).
39. Evers 1988: 93; Van Leur 1967 [1955]: 210.
40. For possible locations see Boechari 1979b: 476; de Casparis 1988; Marwati et al. 2008: II, 185b A concentration of inscriptions possibly associated with Dharmmawangśa's *kraton* is found in the area of today's Ma~ diun, about 100 km from the nearest shore (see fn.24 above).
41. Barrett Jones 1984: 40b Christie 1998a: 360b Marwati et al. 2008: II, 219b
42. Hartwell (1983:182) notes a Javanese embassy of 971 to the Southern ('Nan') Tang that out of deference was forwarded to the Song court Neither Bielenstein (2005: 64!) nor Wong (1979: Set 12) mention this mission, Hartwell's note appears to be related to 'goods from Champa, Java and Arabia [that] had been sent to Jinling', the capital of Nantang, in 971 (Kurz 2011: 101, referencing to the *Xu zizhi tongjian changbian*). I could not consult a copy of the *Yongluo Dadian*, Hartwell's source
43. Krom 1931: 232b Marwati et al 2008: II, 199. The fate of the Isana dynasty still today is topic of ritual performances in Bali (Young 1982 passim, espec. 476-9).
44. A list of references to insular Southeast Asian embassies to the Celestial Court is found in Fig.1.3-1.
45. Krom 1931:218ff.
46. Cf. Witasari 2009: 73.
47. 4/ Cf., e.g., Hall 1985:126,128; Ras 1992:149-50.
48. The event is detailed in Krom 1931: 238ff. Since the first reading of the inscription, the date of the de-struction of the East Javan court has been topic of discussion: eg., de Casparis at first proposed the reading \$938 h 016/7] (1958: io), but later returned to Kern's (1885, 1913; 191?) original reading of 8928 [1006/7] (1999:1-2). Kern himself in 1913 noted the date in his transcription as 8928 (pg. 6n); but gives 8938 in the translation of the text (pg. 614-5). The latest published reading known to me of the Sanskrit text and com-parison to its Javanese version relates the date as \$938 (Witasari 2009: 204U).
49. Boechari (2012 [1963]: 111) notes that "there is not a single word in the Calcutta, stone [containing the 1041 inscription about the events] which suggests the role of Sriwijaya in the praJaya-episode, and Haji Wurawari [the destroyer of Dharmmawangśa's kraton]^ is listed among the kings subdued by Airlanga'.
50. De Casparis 1958: icf; Marwati et al. (eds) 2009: 201 £

51. Eg., Bottenberg 2010: 53ft; Edwards McKinnon 1985: 25f; Tjoa-Bonatz, Neidel, and Widiatmoko 2009.
52. Eg., Bielenstein 2005: 59; Wang Gungwu 1958:123; cf. Fig.1.3-1.
53. The absence of detailed contemporary Chinese histories which would contain such notes has been explained with the example of the Southern Tang, where 'under moral pressure of the new Sung empire [...] the high minded [local] historians burned their own drafts' (Schafer 2008 [1954]: xi).
54. Fukami notes that 'it is difficult to ascertain precisely how many' missions were noted in the Song annals,
55. Zhou Qufei 1977: 39-40; Zhao Rugua 1911: 60-2. Wolters 1983 discusses a small number of supplementary Chinese sources.
56. Ma Huan visited the site in course of Zheng He's fourth and fifth voyage, and thus in all probability here is not quoting earlier Chinese sources.
57. Buzurg [op.dt] writes *i jijj*. Sarira; Tibbetts (1979:112) notes that 'the earliest one to mention the place, Abu Zaid, gives the correct reading
58. See the deplorable fate of Ishaq, an Oman trader, who declined to pay such taxes: 'the ruler [of Sribuza] sent men to assassinate him by night, and took his ship and all his properties' (Buzurg 1981: 61f).
59. The Persian *farsakht* 'a measure as much as a far-seeing man can look out (Houtum-Schindler 1888: 586), or, 'varying] at different times and places between 14,763 and 22,146 English feet (about 2-43 to 3-64 nautical miles)? (Moody 1952: 263).
60. For critical discussions of this designation see, e.g., Laffan 2005; Meulen 1974; Wheatley 1973 [1961]: 177ft
61. A weight unit used 'in particular in the Persian East, where it weighed between 260 *di^hani^h* (= 816.5 g) and 2,080 *dir{- 6,656 g}*' (Rebstock 2008: 2261).
62. ... that then 'was melted into an ingot and thrown into a pool of water' (Laffan 2005: 28); this account is variously repeated by several Arab authors throughout the following century: cf. Tibbetts 1979a.
63. Eg., Wheatley 2009 [1959]; Zhao Rugua 1911: 61.
64. Cf. Mahdi 1995:171.
65. For a critical list see Tibbetts 1979a: 103.
66. Here, Wheatley 1973 [1961]: 218.
67. For an overview of the various interpretations of the extant Arab sources on Kalah see Tibbetts 1979a: n8ff; cf. Allen 1991; Jacq-Hergoualc'h 2002:193\$; Wheatley 1973 [1961]: 273-281.



68. Taking in account the variable winds and nautical obstructions in the Straits of Malacca, here counted as V3 of the astronomical zam (Grosset-Grange 1975: 445f).
69. Cf. Ma Huan 1970: 98.
70. Discussed in detail in Wolters 1975 [1970].
71. Eg., Bottenberg 2010: 446 Edwards McKinnon 1985; Manguin 1993c: 25k
72. See, e.g., Coedes 1992 [1918, 1930]; Zakharov 2009.
73. Kedukan Bukit, found 'at the foot of the hill of Bukit Seguntang' (Coedes 1992 [1930]: 45); Hall 2011a:113b Kulke 1993:174. The extant text of the inscription mentions a naval expedition 'in search of magic power' (Coedes translation of *siddhiyatra*, 1992 [1930]: 46) starting at some unidentified estuary and an ensuing 'solemn and joyful procession' [*ibid.*: 47]. Cf de Casparis 1982.
74. For the first supposition see, e.g., Wheatley's (1973 [1961]: 41-2) and Takakusu's (Yijing 2007 [1896]:xxxiv) translations of Yijing's statement; for the second Wolter 1961: 419, and espc. his fn.13).
75. 'The(se) Middle Chinese syllables, whose modern Chinese descendants are pronounced Shih-ii-fo-shih, presumably represent some cognate of Sanskrit Śrī Vijaya' (Schafer 1969: 225, correcting Welters' [1967: 21- 2] explanations of the scholarly history of tills interpretation); comp. Goeff Wade's judgement that 'the old Hokkien pronunciation of shi-li fo-shi (uttered si-li fut/ but-se\$ was a potentially acceptable rendering of Srivijaya' (Laffan 2005: 31). Mahdi (pers. comm., December 2012) argues that "in all probability [Śrī Vijaya] was pronounced as Seri Bijay a or Bejaya (thus, Bisaya, Arab Sribuza, etc; Chinese fin Shilifoshi and San Foqi was, too, pronounced as ʃ). Cf. Coedes 1992 [1918]: 18-9; Jacq-Hergoualc'h 2002: 234.
76. Wang Gungwu 1958: 75-6; Wolters 1967:153.
77. In the Chinese sources styled "Kunlun", indicating speakers of the language in use in Bhoga (I-Tsing (2007 [1896]: xli, 1,31-2); c£, eg., Robson 1998: 229.
78. The economics of "tributary trade" are discussed in more detail in the following section.
79. The precise 'circumstances of the mission are unknown' (Wolters 1986: 34 fn.138); cf, e.g., Yijing 2007 [1896]: xxxvi; Wolters *ibid.*: 21; 1967: 209, 231.
80. Eg., Joordan and Colless 2009: 251; Wolters 1967: 231, 337 fn.115. Wang Gungwu (1958: 80, fa. 39), however, argues that this note 'may not be taken to mean that there were missions from these countries [mentioned in the edict] that year, but only that their missions had come before'.
81. Here distinguishing between general references to legations of such polities in the

- Chinese accounts and the actual record of an embassy arriving at the Celestial Court cf. Wolters 1967: 231.
82. Wang Gungwu 1958: 78b
 83. Wang Gungwu 1958: 79; Wang Zhenping 1991: 13; cf. fn. 27 in Section 1.3,
 84. Eg., the An Shi rebellion in 756-63 and the sack of Guangzhou in 758. The correlations between recorded missions and China's internal affairs will, again, be discussed in the following chapter.
 85. Schafer 1985 [1963]: 16; Wang Gungwu 1958: 79-82.
 86. Proposedly the Arab translation of *mahārāja*. The letters and their possible background are discussed in Fatimi 1963; cf. Azra 2006: issff
 87. The particulars of Perso-Arabian navigation has been a topic of lengthy scholarly dissertations somewhat apart from the topic of the present study: cf Hourani 1963 passim, espc. 46-50; Tibbetts 1957: 6f; Wang Gungwu 1958:124-7; Wolters 1967: Chptio; and the following section.
 88. Tibbetts (1979: 26) notes that 'the text appears in a clearer form in the same passage in Ibn al-Faqlh,i where Kalih Bar 'is a kingdom belonging to Zābaj'.
 89. Barus, on the north-western coast of Sumatra (Guillot et al. 2008).
 90. Wang Gungwu 1958:104-5, Wolters 1975 [1970]; 10.
 91. Cf. Mills 1951: 8; Wang Gungwu 1958: 96. Krom (1931:134) claims that all these maritime raiders were an identical people; Mahdi (1995:170) notes that still in the thirteenth century Javaka ("Javanese") described Malay people. It has been proposed that coincidently with these raids 'the Sailendras of Java' for some time may have established 'some claim over Cambodia' (Coedes 1968: 92); for 'a romanticized account' (*ibid.* 93) of 'a young and hasty prince [...] of Qmaf demanding the head of the *Mahārāja* of Zābaj and the latter's retaliation that is argued to echo these events, see Tibbetts 1979a: 34-6.
 92. For the next appearances of the appellation Śrī Vijaya in Choja inscriptions and Buddhist manuscripts of the first half of the eleventh century see pgs.39 and 4ji below.
 93. The inscription mentions sn wijayendraraaja, snwijayeswarabhupati and siiwijayanrpati (Coedes 1992[1918]: 4, 23ft
 94. Supposedly 'refer[ing] to Sumatra and parts of the Malay Peninsula' (Jordaan and Colless 2009: 53). The inscription is the first mention of Suvarnadvīpa In an authentic record of known date'(Sarkar 1981: 317).
 95. Here presumably an Indian alias for the island of Java. For the "labels" Yava-, Java-,



- Jaba- see Laffan 2005; Mahdi 1994a: iS/f, 1994b: 469^{n.111}. A comprehensive discussion of the inscription is found in Bosch 1925.
96. This 'conventional' view is upheld by the mainstream of scholars and repeated in standard textbooks: e.g., Coedes (1966 [1962], 1968), Krom (1931: chpts.4-6 passim), Miksic (ed 1996, 2004), Taylor (1999 [1992]: 176-8), or Kinney (2003: 45).
 97. Cf. Boechari 2012; Kusen 1994; Sundberg 2003, 2006a: 111-3; Christie 2001. A comparison of the two known lists of rulers and reigns of pre-900 Java is found in Jordaan and Colless 2009: 37.
 98. Cf. Zakharov 2011: 513ff and pg.27 above. Van Naerssen (1977: 38) expressly excludes 'the Sailendra kings' from his list 'apparently of foreign origin, they were not entitled to dispose of land and labour'.
 99. " The date of the inscription is widely debated. see, e.g., Boechari (1966: 243); Christie (1995: 273); Jordaan and Colless (2009: 194); Marwati et al. (2008: II, 118), Suhadi (1983: 67).
 100. Cf. Boechari 1966, 1986; Marwati et al 2008: II, u6f. For a recent overview of Śailendran inscriptions in Java see Zakharov 2011: 506-8.
 101. De Casparis (1950:1-11) notes the inscription of Hampran/Plumpungan as the possibly first Śailendran epigraph, and construes a relation to the 775 inscription of Ligor/Chaiya; Marwati et al. (2008: II, 135-6), observe the different script used, the absence of royal titulary and the unclear religious background
 102. Cf. fa98 above: e.g., the Karangtengah inscription of 824, where a certain Rakai Patapan Pu Palar, a descendant of the legendary Sanjaya (Rakai Garung, r. 829-847?: de Casparis 1950: 24-50, 105-7) donates funding for a temple built by a Śailendran noble; or the inscription of Kalasan, noting a monument erected on the request of an unnamed "Jewel of the Sailendra Dynasty" and sponsored by a *Mahārāja* Panamkarana (possibly Rakai Panangkarang, r. 746-784; cf. de Casparis 1950: loof). A summary of the various interpretations of the latter inscription is found in Zakharov 2011: 507.
 103. Summaries of the diverse scholarly positions are found in, e.g., Briggs 1950, Jordaan 1999, or Zakharov 2011; for a very concise recent overview see Degroot 2009 [2010]: 6-9.
 104. Proposedly the Kalah of the Middle Eastern sources (e.g., Jordaan and Colless 2009:24, 218-9; Meenakshisundararajan 2009:171-2; Shanmugam 2009: 209, 212).
 105. For lists and brief discussions of the inscriptions see Jordaan and Colless 2009: i94ff

or Suhadi 1983.

106. Eg., Jordaan and Colless 2009:196.
107. Cf. de Casparis 1952: 51f; Malidi 2005.
108. See Christie (1994: 28f). Degroot (2009 [2010]: 69), however, notes that based on the extant inscriptions 'there are not enough grounds to state that northern Central Java formed an independent Malay seafaring state until 824 A.D. nor that it was, at that date, incorporated into the Javanese kingdom of Mataram'.
109. Suhadi's 'navaka (sea captain) named Luwara' (1983: 68) in the Manjusrlgrha inscription apparently is a misreading of (Dang) Nay aka Diranda Luwara (Rāhardjo 2002: 591; comp. e.g. de Casparis 1956: 227-8). For a recent transcription and translation of the inscription see Kusen 2011.
110. De Casparis (1950: 94), however, also offers a possible second meaning: 'perhaps [...] a magic-religious functionary [...] related to the airspace'.
111. Again, the overall number of missions is a point of discussion see Bielenstein 2005: 65; Wang Gungwu 1958:123; Wolters 1983: 62. I here follow Wang Gungwu's and Wolters' explanations.
112. For an overview of the scholarly discussions around Heling see *ibid.*: 213f; or van der Meulen 1977: 87-91.
113. Eg. van Orsoy de Flines 1949, Soekmono 1967, Wisseman 1977b.
114. Comp. Wang Gungwu's (1958: 96) observation that the long break' of Holing's embassies after 674 'coincides with the rise of Srivijaya, and then apparently also with the extension of Sailendra power towards Central Java', and Woodward's (2004: 336) impression that Sailendran monumental architecture reflects Sumatran Tantric beliefs.
115. Cf. e.g. Groeneveldt 1960 [1880]: 13f van der Meulen 1977: 89; Wolters 1967: 216.
116. For the established interpretation see Coedès 1968: 87f 107-9; for overviews Boechari 2012 [1982b]: 407- 16 and Jordaan and Colless 2009 *passim*, *espc.* 35ff.
117. For the first assumption see, e.g., de Casparis 1950: 83ff; for the second Jordaan and Colless 2009: 36T
118. I.e., if such a regime actually bore tangible political weight see fns.98 and 102 above.
119. Eg., Boechari 2012 [1982a, b]; Bosch 1952, Jordaan and Colless 2009: 43.
120. For a possible genealogy and the respective inscriptions see, *inter alia*, Bosch 1952: 123,
121. For possible contenders see de Casparis 1956: 294.
122. Based on a different reading of an inscription of 856, Zakharov (2011: 509), however,



- questions the very occurrence of any belligerent events involving Balaputra,
123. Jordaan and Colless (2009: 50) explain the first mission with Balaputra's 'rule over Sumatra as a viceroy during the reign of his father. that preceded, his final expulsion from Java,
124. I here follow the dating given by eg, van Naerssen (Naerssen and Longh 1977: 25) or Marwati et al (2008: II, 381): Bosch's reading of 942 (1941: 50) does not comply with a simple conversion of 854 Saka (see, e.g., <http://www.foumiilab.ch/documents/calendar/>, last accessed 2011-06-14).
125. Arguing that the patron of this investiture, rakryan, bears 'an Old Javanese title denoting a member of the landed nobility', Jordaan and Colless (2009:197Q) though hypothesise that the inscription, just the same, could, mark an extension of Central/East Javan sway over a 'target population familiar [...] with Old Malay'.
126. See Fig. 1,3-1 and pg.31 above,
127. Eg., Fukami 2006: 2,11 fn.i; Zhou Qufei 1977: 40; cf. fn.157 below.
128. Cf, e.g., Bronson 1979; Bronson and Wisseman 1978; Jordaan and Colless 2009: 6ff; Stargardt 2001: 314ff. For a recent overview see Bottenberg 2010: 44ff.
129. Cf Miksic 2011, 2012; <http://sai11s.k0111pas.c0m/read/2009/09/03/09453321/isti.rp.3.miliar.pembt1m.harta.kamn.penuhisungaimusi>, last accessed 2011-06-12,
130. Manguin notes, too, a 'propensity of the local business community to build its factories and housing estates on top of past remains' (2008:14) that in the last decades bulldozed better part of the architectural heritage of the sprawling modern city of Palembang.
131. See, e.g., Edwards McKinnon 1985: i5f; Utomo 1985.
132. Cf Manguin 2008: 4-5.
133. See the following section: Chinese ceramics started to be exported in considerable numbers only from the ninth century onwards.
134. Cf. Zhou Qufei [Netolitzki, ed., transL] 1977: 227; Sastri 1940: 273.
135. ... the composition of which are often randomly chosen according to a given author's aspiration and comprehension: eg., Hall (1985:112) notes the three components of this polity as 'Palembang, Jambi and Malayu'; Suleiman (1977:10-1) sees it as Palembang, Jambi and the Minangkabau Highlands; Jordaan and Colless (2009: 140) argue for Kedah, Jambi and Palembang
136. See fn.75 above Cf. Laffan (2005: 31): according to 'personal communications with [...] Geoff Wade' san-fo-qi (uttered sna-fut/but-zut?) was "an acceptable rendering of Zābaj".

137. Takakusu's transcription for 'Foshi'.
138. I cannot unanimously follow Sen's arguments that (early) exchange between India and China 'centered on Buddhist and otherworldly activities' (2004 [2003]: 12): Chinese and Indian religious emissaries evidently travelled in the wake of merchants,
139. Not only Yijing, but a number of Chinese Buddhist monks were 'received very favourably' (I-Tsing 2007 [1896]: xlv) and supplied with means of maritime transport and, possibly, credentials to their further destinations by Śrī Vijaya's court. Even 'one of the five most distinguished [Indian Buddhist] teachers of [Yi~jing's] day, Sakyakirti' (Miksic 2010:10) was 'present in Srihoga' (Yijing 2007 [1896]: 210) during Yijing's visit. Cf Kern 1931: 107!?!; Wolters 1986 *passim*.
140. Miksic 2010:12; cf. Bosch 1925: 536ff; Cocdcs 1992 [1930]: 60-1; Woodward 2004: 335ff.
141. See, e.g., de Casparis (1982: unpg.); de Casparis and Mabbett 1999 [1992]; Miksic 2010 *passim*, and *espc.* 1-5. Even 'the allegedly devout Buddh[is]t' Balaputra in a panegyric on the occasion of his bequest of an *asrama* at the "Buddhist University" of Nalanda is eulogised in apparent Saivite terminology (Sundberg 2006b: 30). About 100 km upstreams from Palembang lies 'the second largest [archaeological] site of South Sumatra' (Bottenberg 2010: 49), the Hindu temples of Tanah Abang.
142. As it involves an indigenous rather than Sanskrit word for "god", [*da~punta hiyang*] perhaps testifies to development of a sacral quality already in megalithist kingship' (Mahdi 2008:133 fh.68); cf. Boechari 1966: 245-6; de Casparis 1956: 9 fh.52, 240 61,175,
143. The only indication of Buddhist influence in Śrī Vijaya's "foundation inscriptions", pronouncing her sway over Indigenous polities, 'is an oblique reference to Tantric practices in the central Telaga Batu stone' (Christie 1995: 266): the texts rely mainly on elaborate 'traditional oaths and threats of dire consequences' (Hal! 1999 [1992]: 201), with 'nothing particularly Buddhistic in all this' (de Casparis 1956: 30).
144. See Woodward 2004: 335 for a somewhat different interpretation.
145. See Wolters *op. cit.*; Heng 2008: 32.
146. Christie (1995: 272) explains Śrī Vijaya as "a less stable, more primitive version of the multi-port Sultanate [...] of Malacca of the fifteenth century", thus, 'recognizably the lineal forebear of the nineteenth-century "Malay" states of the same coast' (Christie 1990: 44); cf., eg. Manguin 2002 *passim*, Andaya's (2001, 2008) search for cognitive ethnic foundations of "Malayness"; or Wolters' discussion of the relationship between Malacca and Śrī Vijaya (1975 [1970] *passim*).



147. For a discussion of the structure of such 'upstreams-downstreams' relations see eg. Bronson 1977 or O'Reilly 2007: 47-51.
148. For an application of this model onto Śrī Vijaya see Kulke 1991: 7-12, 1993; or Manguin 2002: 8ff. Christie (1995: 268), however, warns that Kulke's 'use of the term mandala to describe the structure of Srivijaya very much reflects Welters' general model, but may give undue prominence to a word used only once, and in a very ambiguous context; c£ de Casparis' (1956: 18 fa 10,11), Woodward (2004: 353) cautions: 'Although the religious usage of the word "mandala" (a circle of deities) and the political usage (a neighbouring or vassal state) bear a relationship one to the other, the term has become so overworked in Southeast Asian historiography and has become so imprecise in meaning that it might best be avoided'.
149. For a recent overview see Griffiths 2011, 2012, A nearly unintelligible inscription of (purportedly) 997, Hujung Langit, and the unreadable inscription of Tanjung Raya, provisionally dated into the tenth century, both found in the upper reaches of the Wai Semangka, Lampung, have been variously (and sometimes fancifully) interpreted as echoes of Javanese-8ri V ijayan relations (e.g., de Casparis 1978: 24; Guillot et al 2008: i6ff; Munoz 2006: 207-11). However, their actual context has yet to be clarified (Griffiths 2011:141), and their very location questions a relationship with eastern Sumatran polities.
150. See pg.30 above; c£ Heng 2009: 82f.
151. The Tamil text of the Larger Leiden Plates; Karashima and Subbarayalu 2009: 275; cf. pg.39 above.
152. Coedes 1968: 131,14ft; Hartwell 1983:172ft; Susanti 2009: 229c
153. The overlapping of the reign-dates of Cola kings indicates the appointment of a successor as co-regnant crown prince' (Hall 1978: 88 fn. 51).
154. Śrī Vijaya's attempts to belittle the status of the Chola 'even before the first embassy from the South Indian kingdom reached the Song court in 1015', possibly a 'political manoeuvring' to maintain 'dominance in the Straits of Mellaca' vis-à-vis a new competitor, are discussed in Sen 2004: 224f, 2009: 6gf.
155. The date of the inscriptions is subject to discussions. Nearly all scholars, however, agree that the raid took place in between 1024 and 1026. Translations are found in, e.g., Karashima and Subbarayalu (2009: 279O and at http://www.whatisindia.com/inscriptions/south_indian_inscriptions, VOI.II.1.20 (Tanjavur temple) and VOI.III.4.207 (Tirukkalar Plates). The validity of allusions to a previous Chôla naval raid pro-posed for around 1017 are discussed in e.g. Jacq-Hergoualc'h 2002: 355-6; cf.

- Sen 2009:68-9.
156. See, e.g., Coedès 1968:142-3, 1992 [1918]: 8-19; Jordaan and Colless 2009: 207ff; Krom 1931: 250-3; Wheatley 1973 [1961]: 200-1.
157. Zhao Rugua [Hirth and Rockhill, ed] 1911: 65 fn.12, 66 fn.18; Hartwell 1983: 176; Wolters 1966: 225.
158. Robson (1998: 235) points out that a Nepalese manuscript from 1015 notes Buddhist statuary 'at Srivija- yapura' and in Kedah, while 'in another manuscript of the same work from 1071 [..] both Srivijaya and Kedah have disappeared from the list of important Buddhist sanctuaries', thus relating the revision to the devastation of the various polities along the Straits of Malacca in course the Chola raid
159. Cf. Sarkar 1986: 40; Wolters 1986: 39, Jordaan and Colless (2009: 100), however, question the validity of Coedes source, while Robson (1998: 235), though not referencing his source, ostensibly confirms the existence of 'another version [that] adds the detail' of 'in Malayagiri in Vijayanagara'.
160. Cf.e.g., Gurugana Dharmakarama 2010 [1974; 1983]; Miksic 2010: 23-4, Robson (1998: 235) argues that Atiśa left Sumatra due to 'the impending danger' of the Chola attack of 1025/26.
161. See, e.g., Lewis 2009: 58ft; Peterson 1979; Pulleyblank 1976.
162. Lewis 2004: lxii.
163. Fong 2006; Giles 1925: 309-16 (and 337!? for a contemporaneous source on the destruction caused by the rebellion); Lewis 2009: 7of; Somers 1979: 727ff.
164. Wang Gungwu 1958: 88.
165. Here, Ouyang 2004:15.V.
166. Cf. Wang Gungwu 1963.
167. See, for instance, Nanhan's policy in northern Vietnam, where 'local military rulers [were replaced] with civilian prefects and magistrates, thereby avoiding the emergence of regional warlords of the sort that had brought about the collapse of the Tang1 (Miles 2002: 47).
168. See, however, Miles 2002: 45 for a possible northern origin of the Liu family.
169. *The Xin Wudaishi*, Schafer's translation (1954: 348); cf. Ouyang 2004: 536.
170. Schafer 1954: 348 fn.6.
171. Clark 2009:153^ Miles 2002: 49, j6f; Ouyang 2004: 538^ Schafer 1954: 343!.
172. For various usages of the term see Wang Gungwu 1958: passim.
173. For Yan's creativity in excruciations see his "'Living Hell" (Shengdiyu a torturing facility replete with boiling cauldrons, "iron beds", and instruments for gouging human flesh



- (Miles 2002: 51).
174. See the descriptions of their reigns in *the Xin Wudaishu* Schafer 1954: 357§; Ouyang 2004: 540ff.
175. Miles 2002: 46; Schafer 1954: 361. The Nanhao were 'the only nation on Chinese soil ever to maintain a line of elephants as a regular part of its army. (Schafer 1957: 290). This proboscidean cavalry was eventually crushed by the Song general Pan Mei with concentrated crossbow fire in the battle of Shao, 971-01-23 (Nossov and Dennis 2008: 35; Schafer 1954: 368, 1957: 291).
176. Cf. Lau and Huang 2009: 227; Ouyang 2004: 547.
177. E.g., Gray 1984: 30; Kerr and Wood 2004: 529b Ruan 1994: 3.
178. See his early years: Ouyang 2004: 56if.
179. Among many other accolades, Qian Liu was the only potentate of the Wudai Shiguo awarded with the title "esteemed patriarch", 'reserved for the few officials most revered by the emperor' (Worthy 1983: 22).
180. Li 2005: 105; Zhuru 2010: 105.
181. Clark 2009: 173f.
182. So 2000: 34k Worthy 1983: 34ff.
183. Clark 2009: 185^ Worthy 1983: 29k
184. See, e.g., Cheng 1984: Chpts. V and VI; Gray 1984: 25ft; the respective articles in Ho (ed.) 1994; Kerr and Wood 2004: 716ff; or Miksic 2009b.
185. For a list of Wuyue's ceramic tributes see Kerr and Wood 2004: 530.
186. Worthy 1983: 29-30.
187. Cf. Guy 1998; Lee 1995.
188. Cf. Worthy 1983: 33.
189. Eg., Lau and Huang 2009; Standen 2009.
190. By 965, the 'utter bedlam' of the times had even spread to Jiaozhi (*the Xin Wudaishu*, here Ouyang 2004: 546; cf. Schafer 1954: 367).
191. See Wade 2005: 6f for various foreign imports forwarded by Nan tang's rulers to the Song court
192. The "official" expression for "conquered" used in the Celestial Annals: see Ouyang 2004: passim.
193. See Kurz 2011: mff and Ouyang 2004: 503 for the example of Nantang; cf. Clark 2009; Lau and Huang 2009.
194. Sen 1996: 260.

1.3 Historic Background: Trade

Maritime contacts throughout the eastern Indian Ocean and the South China Sea conveyed not only the Indian ideologies that substantiated medieval Southeast Asian po-tentates' authority, but also the 'status enhancing imports' (Christie 1990: 46) that marked a ruler's affluence and facilitated exchange with services and loyalty. Among the earliest of such objects were kettledrums and other metal implements of mainland Southeast Asian origin that by the second half of the last millennium BCE were traded widely throughout the islands bordering the South China and Java Seas.¹ This commerce went hand-in-hand with the diffusion of novel metal-working, weaving and agricultural techniques and increasingly complex funeral rites involving imported grave-goods that mark an increase in social stratification.² However, the small and scattered corpus of archaeological remains discovered to date leaves 'the major cultural changes which are presumed to have taken place at this time virtually undocumented' (Bellwood 2007: 268).

Seaborne communications could rely on the experience of about two-and-a-half millennia of migrations of speakers of Austronesian languages throughout the Pacific, arguably 'one of the most phenomenal records of colonization and dispersal in the history of humanity' (Bellwood 1999 [1992]: no). By the first centuries CE Austronesian settlers had reached virtually all islands between Sumatra and Central Polynesia, and, as evidenced by the distribution of distinctive pottery and tools, developed far-flung maritime exchange networks throughout the Western Pacific.³ Such ventures had become achievable through the Austronesian "invention" of sailing vessels with outriggers and floats, 'the most seaworthy and manoeuvrable craft devised by man until recent times' (Murdock 1964:124), and the development of sophisticated navigation.⁴ Based on an analysis of the morphology of extant outriggered vessels, Doran (1981: 91) proposes the existence of 'an Indonesian centre of boat complexity at [...] perhaps 1000 to 500 BC', immediately preceding the intensification of communications throughout the South China Seas of the late first millennium BCE, indicating that much of the initiatives for maritime contacts lay with people from insular Southeast Asia.

The western limits of these migrations are marked by linguistic⁵ and genetic⁶ evidence for the settlement of Madagascar by speakers of



Austronesian languages by, at the latest, the second half of the first millennium. The existence of sea-borne communications throughout the Indian Ocean of the early centuries CE is evidenced by the dissemination of plants, especially the Asian banana (*Musa spp*)⁷ and, arguably, various Southeast Asian cultural traits to East Africa.⁸ The presence of outriggered vessels along the shores of south-eastern Africa suggests that this traffic was propelled by Southeast Asian mariners. These contacts 'continued until after the introduction of Islam in Southeast Asia' (Raso- loson and Rubini 2004: 456).

Although sea-based activities like fishing and trade played an important role in the Austronesian economic arsenal, the apposite setting for maritime exploits, the swamplands and mangrove forests lining the littoral of much of insular Southeast Asia, are an essentially hostile environment. Airries (2003: 85f) argues that the less than favourable soil conditions in the waterlogged and riverine coastal forests 'would allow for only 'small pockets' of cultivation, preventing dense settlement of better part of the immediate coast. Even today the majority of the immediate coastal lowlands but 'support low populations, since they are fairly infertile [...] and hard to bring under irrigated and terraced rice' (Bell wood 1985:12). Most of the indigenous megalithic (hence, largely, "pre-Indic"⁹) complexes commonly associated with higher population densities are found in foothills and inter-mountainous valleys, sites more promising for horticulture and farming.¹⁰ Unsurprisingly, an analysis of Austronesian spatial terminology demonstrates that their major 'orientational axis is related to the annual changes in precipitation' (Liebner 2005a: 308), and thus to cycles of agricultural production. Where conditions allowed settlement of the littoral, however, 'only the sea provided opportunities for expansion, and outwardlooking, highly mobile communities developed' (Glover 1979: 183-4). These formed the nuclei of the trading "emporia" and entrepots so momentous in the ensuing centuries.

Chinese Sources: "Embassies" and "Tributary Trade"

Written sources on these maritime contacts only commence with Chinese records of "embassies" and "missions" of insular Southeast Asian origins to the court of the Liu (or, Former) Song Dynasty (420-479 CE; Fig.1.3-1). These and later records of the Celestial administration are 'necessarily unbalanced, slanted toward a more Sino-centric state-level perspective' (Heng 2009: 72),

and in most instances are directed at a propagandist 'creation of a favorable political image of officialdom, and of a frugal and honest government' (Wang Zhenping 1991: 27). Apropos commercial pursuits, the records are strongly coloured by a 'Confucian antipathy toward mercantile activities' (Sen 2004: 152).

In Confucian worldview the Son of Heaven was the predestined ruler of all mankind; the arrival of foreign missions, unavoidably attracted by his 德 *de*, a 'set of ethical principles' underpinning the emperor's universal magnanimity (Chan 2008: 78¹¹), thus corroborated his omnipotence. In consequence, foreign sovereigns were considered potential subjects who held their offices only as "acting" or "probationary" rulers until they were recognized by an emperor and their territories thereby theoretically accepted as subordinate units' of the Celestial Empire (Bielenstein 2005: 5-6). Such "legations" or "embassies", then, represented subservient populations that longed for an enunciation of their submission 'into the charmed circle of the Chinese state' (Fairbank 1942: 133).

An integral part of this act were the various particulars of their reception at court.¹² The most renowned of these was, probably, the 'calisthenic ceremony' known as kowtow, 'the rite above all others which left no doubt, at least in the mind of the performer, as to who was the superior and who was the inferior in status' (Fairbank 1942:134). The emperor, on his part demonstrating his universal munificence, would respond to this public display of obedience by enfeoffing the applicants with positions in the realm's administration; his bureaucratic apparatus recorded a sometimes more, sometimes less detailed note on the proceedings in the Celestial Annals.

Naturally, these ritual enactments of dominance and deference were only possible between (representatives of) "governments": in the Celestial documents they are described as diplomatic affairs among ruler and ruled. As such, "vassals" were obliged to furnish "presents" and "tribute", the palpable token of submission expected from any subdivision of the Celestial Empire; in return, they were entitled to receive "gifts" and "salaries". The Emperor's intrinsic benevolence dictated ample recompense to any offerings to his magnitude - if, as now and then detailed in the Celestial records, the "tribute" was tallied in tons of spices and aromatics, its ceremonial exchange with generous reimbursements compares better to a commercial transaction



than a demonstration of obedience.¹³ Chan (2008: 71) contends that 'the emperor's lavish excessive reciprocation of tribute "bought" the loyalty of the vassal states', and we indeed are left with the impression that 'the important thing to the rulers of China was the moral value of tribute!;] the important thing for the barbarians was the material value of trade' (Fairbank 1942:139).

Yet, some of her visitors saw China as an address for diplomatic endeavours. The empire's potency in meeting such requests though is perhaps best illustrated by the proposal of an ambassador of the 'Southern Indian State'¹⁴ in 720 'to attack the Arabs with war elephants, infantry, and cavalry', supposedly a plea for help in the struggles for Sindh:¹⁵ the emperor conferred titles onto the envoys and blessed their troops, yonder in India, and 'thereby felt that he had incorporated the Indian army into the Chinese military organization, and thus had done his part against the Arabs' (Bielenstein 2005: 75¹⁶). It accordingly has been argued that for any more distant "government" the political gains of a submission to the Celestial Empire were inconsequential:

[They] did not have to reckon with China as a great power, and they did not have to pay homage to the Son of Heaven. All they wanted was Chinese goods. If their envoys went through motions which signified submission, this was no more than smart business practice. (Bielenstein 2005: 6)

The Chinese themselves were not unaware of such motives. The *Wenxian Tongkao* (1317), for instance, notes that envoys from fifth- to sixth-century Gantuoli, a country in southeast Sumatra, offered tribute because 'they sought the advantage of trade and the imperial presents, but they did not come because they really had a sentiment of their duty'.¹⁷ Managing exchange through a nominal ambassadorial setting yet remained a permanent factor in the Celestial Realm's foreign relations¹⁸ that obviously generated sufficient profit, political and commercial, for the involved parties. Many a private entrepreneur was integrated in and ready to comply with these arrangements: even the Dutch East India Company of the seventeenth and eighteenth centuries readily accepted a role as Chinese vassal for the sake of fluent commerce.¹⁹ In the later first millennium, most of the seaborne "embassies" recorded as representing 'the lands of the Arabs' would have been clandestinely private and essentially commercial transactions veiled

as diplomatic errands²⁰ - tellingly, none of the various merchants regularly sailing to the China of Buzurg's times claimed to represent the Abbasid Caliphate or any of the various Middle Eastern emirates of the tenth century (1981: *passim*).

The overall expectations heeded by such legates, however, are perhaps best delineated in a message by a ruler of Java in 430, unmistakably pronouncing his dual objective of fostering trade and fortifying his political position by formalizing [his] tributary dependency on China' (KR Hall 2004: 222):

My country once had a large population and was prosperous [and] never bullied the other countries. But now the situation is different and we have become weak. My neighbours vie with each other in attacking me. I beg Your Majesty to extend Your protection from far. I also hope that there will be no trading restrictions which will affect the coming and going [of our merchants]. I hope that you will instruct the Canton officials to send back my ship and not permit them to rob and hurt [my traders]. I wish thereafter to send missions every year. (The *Liu-Songshu*, as quoted by Wolters [1967:1151])

How such a relationship was perceived in tenth-century Southeast Asia is aptly expressed in a dispatch sent by the ruler of Champa in 992:

I have received the Emperor's conferred gifts of trained fine horses, banners, and military weapons. The neighbouring countries have heard of this, and know that I have received the grace of the Great State. They all fear Heaven's might and dare not plot harm. Now our country is at peace [...]. If it were not for the Heavenly virtue of the Emperor in offering us protection, how would this have been possible! [...] The spread of Heavenly majesty has strengthened our land (The *Songhuiyao*; Wade 2005:11-2)

Chinese Sources: Frequency of Records

The Javanese ruler of the 430s proposed to send embassies on a yearly basis; the intervals between the arrival of ambassadors noted in the extant records yet are less regular. Fig. 1.3-2 shows one possible reason: in times of political unrest -insurrections, uprisings, struggles for succession or supersession of dynasties- only erratic records of foreign relations were kept; during reigns of "successful" rulers and, hence, periods of functioning



administration, more visits of missions were noted²¹ The turmoils of war would have made the month-long journey from the southern ports to China's capitals in the north²² hazardous - however, even the reportedly 'flourishing trade' during the Nanqi Dynasty (479-502; Is it not this what happens when *tê* is employed in cherishing distant peoples?'²³) left no records in the Celestial Annals.²⁴

Equally striking is the small number of records of foreign visits throughout the first half of the eighth century, the peaceful years under Tang Emperor Xuanzong that mark the 'second blossoming of the dynasty' (Reischauer and Fairbank 1960 [1958]: 157²⁵). The century's early years²⁶ saw the construction of the Dayu Ling Road, the first permanent thoroughfare between China's southern coast and the northern plains; however, this acutely practical advance in transportations²⁷ is not reflected in increasing numbers of ambassadors arriving at the Celestial Court (Fig.1.3-3). Although an eyewitness in 748 could describe the 'argosies of the Brahmans, the Persians, and the Malays, their number beyond reckoning'²⁸ in the harbour of Guangzhou, between 700 and 750 only four Insular Southeast Asian embassies called at the court, three of which made the way north without the benefits of the new road. It would seem that even during this most cosmopolitan era of early medieval China extensive commerce took place without the obligation to dispatch repetitive missions to the throne, hence without the proposed mutual gains of tributary trade. Wolters (1967:167) infers that

not every mission can be explained as an aid in commerce. Nor can it be assumed that, when a trading kingdom was not frequently sending missions, its trade with China was declining. The contrary interpretation is more likely. [...] The reason [for nonappearance] must have been that [such a country] was so powerful that it could trade without interference from rivals and therefore had no need to remind the Chinese of its existence by frequent missions.

Yet there were reasons for a tour to the Celestial Court. In concord with the messages by the rulers of Java and Champa, Heng (2009: 26) argues that

the occurrence of missions suggests that they were more likely occasions spurred by diplomatic [...] motives and not necessarily dispatched primarily as commercial exchanges to be conducted at state level The points of time at which they occurred, which often coincided with important

political changes [...] suggest that such diplomatic missions were more likely to have been attempts by the key polities in the Malay region and the Malay Archipelago at establishing, in the eyes of the Chinese courts, their political hegemony over the respective subregions.

Where the records noted the volume of the tribute presented by such missions, it is apparent that the bulk of goods one would expect to have filled the sailing vessels the embassies had taken to China was not presented to the court. The most opulent tribute mentioned in the Chinese Annals of the later tenth century is that of the Javanese legates of 992: although they had arrived on a large ship',²⁹ the ambassadors offered less than three metric tons (t)³⁰ of sandalwood, tortoise shells, aromatics and spices. In 1029 and 1030, Champa's largest recorded tributes to the Northern Song amounted to not more than 2t;³¹ even her lavish offerings of 1155, now to the court of the Southern Song in the port city of Hangzhou, did not exceed 45t,³² much less than the (at least) 150t of carrying capacity of an average long distance ship of the times.³³ Clearly, considerable portions of the foreign argosies' cargoes were marketed through other channels than the ritualised exchange at court.

Trading in China,: Confucianism and Jobbery

An Arab merchant has left us an eyewitness account of the custom procedures at the port of ninth-century Guangzhou:

When the sailors enter [China] from the sea, the Chinese hold their goods and store them in godowns, and leave them under the custody of police for six months till the last sailors come in. Then, 3/10 of the goods is taken [as duty] and the remaining part is restored to the merchants. Then, whatever the government wants to take, [they] buy at the highest price and pay the amount immediately, and in this transaction they do not act unjustly. (The *Akhbār Al-Ṣīnd wa'l-Hind*, before 850; Ahmad's translation [1989: 46])

Such state-managed trade was a constant feature in the empire's economic policies. In official Chinese perception private merchants and their activities were

a disturbing factor, and as a potential danger to the established order [...] advocate[s] of a materialist attitude diametrically opposed to and fundamentally repugnant to the ethical precepts of Confucianism [...]



They] also provided the population with a model of a possible means of social advancement based purely on the acquisition of wealth, which was an alternative to the officially acceptable ladder of advancement through civil or military services [... hence,] an unstable element in society, and very difficult to control effectively. (Twitchett 1968: 65)

Celestial governments throughout the first millennium and beyond accordingly strived to uphold 'strict control over markets [... and] very close surveillance over the movements of merchants' (*ibid*: 70). These measures ranged from comprehensive regulations for the layout and operation of actual marketplaces to attempts at stabilising prices and state monopolies for vital commodities like horses, salt or iron. While an increasing monetisation of the growing urban society and the decentralisation of power throughout the late Tang to early Song periods made state control of commercial activities gradually less feasible³⁴, the ensuing administrative adjustments did not necessarily mark a change in the Confucian concept of a trader's social status. 'Official contempt for merchants' still coloured the Song administration, and the literatus Li Gou (1009-1059) could label traders, who did not produce anything but were wealthy still, as 'parasites' (Lewin 1973: 160).

Most of the Celestial Empire's maritime imports were made up of the Strange and the Precious³⁵ an "expression from the *Suishu* to refer to the whole gamut of tropical goods' (Jacq-Hergoualc'h 2002: 64) meant for consumption by the mighty and wealthy. In spite of Confucian philosophy and excluding extravagance of prodigal emperors and their entourage, the holy atmosphere of the various ceremonial functions at the Celestial Court required the liberal use of odoriferous gums and resins (Schafer 1985 [1963]: 155),³⁶ most of which were the produce of foreign lands and, as such, commodities of trade. Acquisition of these luxuries through purchase meant direct participation in commercial affairs, and thus would oblige the court to 'display a covetous disposition to the world, [...] befoul the pure atmosphere of the times and corrupt the divine imperial task of transformation through virtue'.³⁷ The early Tang court, accordingly, 'had no intention of directly controlling the trade by itself (Wang Zhenping 1991:16). An edict of 661 outlines the practice:

Every year in the fourth month the Directorate of Imperial Workshops would send the southern coastal prefectures certain goods to be used as capital for trading with foreign merchants. "Barbarian" ships usually

arrived in Chinese ports during the monsoon season, which started around the fifth month and continued to the early ninth. The period of ten days after the arrival of a foreign ship was reserved for "official purchasing", during which time commoners were prohibited from trading with the ship owner. [...] Foreign goods acquired through "official purchasing" were [then] transported to the capital and handed in to the Directorate of Imperial Workshops, which would select seasonal items for use in the imperial palace, (*ibid*: 19)

These procedures were not administered by immediately court-appointed officials: harbour dues, tax rates and procurement of goods through the "official purchasing" were 'decided single-handedly by the prefect' (*ibid*: 32) and his respective staff. The same practice, already in use before Tang rule, was applied at all markets along the empire's borders, and was designed to augment the annual local tribute extracted from the various provinces and prefectures of the Celestial Empire.³⁸

Confucian attitude alone was not the only factor affecting these administrative ap-proaches. Given the three to six months' voyage from the capital to the empire's southern ports in the ninth century, Imperial authority over the lands at China's southern seaboard depended on the obedience of local officials.³⁹ As documented in the accounts on the performance of their respective bureaucracies, this very distance, geographical, ethnical and ethical, left room enough for more lenient interpretations of the mechanisms of a 'strict control' of trade: the decentralised supervision of foreign commerce apparently cultivated 'a corrupt officialdom which appeared with monotonous regularity but at unpredictable intervals' (Schafer 1985 [1967]: 28), for whom last year's caprice was next year's policy' (Schafer 1985 [1963]: 24). Wang Gungwu (1958: 73ff) argues that during the prosperous and peaceful decades of early Tang rule maritime trade became increasingly concentrated on the port of Guangzhou, and that in chorus with the accelerating economy, the local officials' venality multiplied.⁴⁰ 'A dramatic climax to a period of great prosperity and brazen corruption' (*ibid*: 76) was reached in 684, when

the governor of Kwang-chou, Lu Yiian-jui, was killed by the K'un-lun⁴¹. Yiian-jui was ignorant and weak; (his) officials [...] were licentious and extortionate. When merchant vessels came, these officials appropriated (the goods for themselves) without stop; so the foreign merchants complained to Yiian-jui. Yiian-jui asked for cangues, and wanted to punish



them [...]. The group of foreigners were very angry. Then a K'un-lun (man) came straight into the office with a sword hidden in his sleeves and killed Yiian-jui and more than ten people around him before he escaped [...] (The port officials) gave chase, but (it was) too late, (*ibid*, quoting the *Zizhi tongjian*⁴²)

Trading in Tang China: The Shibo Shi

It is frequently proposed that by the end of the seventh century the long-standing problem of Guangzhou officials being involved in the trade in a clandestine manner' (Heng 2009: 24) prompted the Celestial Court to expand the administrative supervision of maritime commerce at Guangzhou. An early⁴³ attempt at a more rigid regulation of China's mercantile-diplomatic affairs might have been a decree of 695 that formally regulated the *chengliang*, "food provisions", for the return voyages of foreign emissaries.⁴⁴ Notably, the edict was issued in the rule of Empress Wu (690-705), who, though 'execrated by later Chinese as a despotic usurper of the most ruthless character [...], ruled very capably' (Hucker 1975:143) and attempted to strengthen the court's 'authority against a defiant bureaucracy' (Lewis 2009: 38).⁴⁵

The advent of direct involvement of the Tang court in maritime commerce is marked by a reference to the appointment of a *shibo shi*, a "Superintendent of the Shipping Trade",⁴⁶ sometime before 714/5' (Wang Gungwu 1958; 78). Often explained as an attempt at rearranging the administrative procedures for foreign trade ventures vis-a-vis vitiated local executives⁴⁷ this official's duties though were not those of a chief customs office' or [...] the head of the port office' - his sole task was to acquire exotic goods for the court' (Wang Zhenping 1991: 25, 26), Throughout the eighth century, such a 'purchasing envoy' [*ibid*: 30) held

only an empty title. He had no real power to issue instructions [to local officials]. He merely could accomplish the performance of supervising duties in a careless manner, as if he kept his hands cupped all the time. As a practice, the commissioner neither kept any official records [of his activities] nor maintained a permanent office. (Wang Zhenping 1991: 31, quoting a memorial from the reign of Dezong [779-804])

The Tang Annals know of only two persons who ever held this title.⁴⁸ Zhou Qingli, appointed commissioner in 714, probably was tasked with the procurement of foreign luxuries needed for the Inauguration of three Imperial

sons to their fiefs planned later that year:⁴⁹ neither the "official purchasing" nor the annual tribute expected from Lingnan apparently could guarantee a supply capacious enough to assure the court of a prompt realisation of the quantities of imports that were considered to befit the occasion. Nonetheless, Qingli failed to observe the fine balance between necessity and profusion and was eventually rebuked for cozening the emperor with rare and curious foreign trash') thereby distracting the Son of Heaven from his celestial task of 'showing examples of frugality to the people' (Kuwabara 1928: 8, quoting a court official's memorandum on the matter).⁵⁰

The fate of the second known *shibo shi*, Lu Taiyi, has been read as an indication for a power struggle' (Sen 1996: 254) between the commissioners and the local authorities that routinely managed sea-borne trade. Taiyi had possibly been sent to Lingnan to reorganise a maritime commerce that, as described presently, had collapsed in course of the An-Shi insurgency (755-762); in 763 he yet toppled the local governor, purportedly motivated by his 'resentment against the prefect's surveillance of his purchasing' (Wang Zhenping 1991: 30) and his intentions 'to monopolize maritime profits' (Chin 2009 [2004]: 67). The events though do not confirm the alleged authority of such an official: Lii Taiyi staged his exploits by fabricating an imperial decree to commandeer a group of soldiers who eventually plundered Guangzhou.⁵¹ Taiyi's abortive exploits underline that

to assert that the "commissioner" for trading with foreign ships in the T'ang dynasty had already assumed the duty of administrating maritime trade [...] is a misunderstanding of the primary sources, resulting from treading back the function of *shih-po shih* during the Sung dynasty into T'ang. (Wang Zhenping 1991: 27, 31)

With Gao Xianzhi's two western campaigns (747-751), the Tang Empire saw its greatest expansion; with the battle of Talas (751) it had arrived at its watershed. The outbreak of the An-Shi revolt in 755, then, marked the outset of the gradual 'breakdown of the institutional framework of the early Tang' (Lewis 2009: 58) and ensuing fragmentation of the Celestial Realm that was to beset China until the rise of the Song Dynasty. The enormous social, political and economic crisis of the 750s and -60s soon affected China's international trade. In 758 the discontented residents of the foreign quarters



of Guangzhou, 'joined by ships of the *Ta-Shih* (usually identified as Arabs or, less precisely, merchants from Western Asia)' (Whitehouse 1973: 46), crossed the Pearl River for the Chinese precincts of the town, where they 'pillaged the godowns, burnt the buildings and then escaped by sea' (Wang Gungwu 1959: 79, quoting the *Jiutangshu*).⁵² In retaliation, in 760 Tang troops massacred thousands of the foreign citizens of Yangzhou, the major market of south-eastern China and an important transshipment point for overseas imports.⁵³ Throughout the years 755-763, the *Celestial Annals* note only the arrival of one evidently seaborne⁵⁴ mission (by Sri Langka in 762) at the Tang court. Overall, since the 750s the number of recorded South and Southeast Asian embassies dropped markedly, and did not recover until the rise of the Song Dynasty (Fig.1.3-3).

These events appear to have had repercussions in Southeast Asia. As seen in the previous section, the last \$ri Vijayan ('Shilifoshi') embassy in 742 was followed by series of missions on behalf of Heling and, later, Shepo (both Chinese appellations for Java) between 767 and 860/73. They also parallel reports of amphibious raids on the coasts of Vietnam and piracy in the Straits of Malacca and coincide with a considerable increase in the volume of Perso-Arabian shipping to China, illustrating a disruption of a proposed Sumatra-based maritime hegemony.⁵⁵

In China, the decline of maritime trade fostered contention over its dwindling revenues. The case of Lü Taiyi's attempt at pocketing Guangzhou's commercial proceeds in 763 has been mentioned above; the efficacious endeavours at reorganisation of Guangzhou's customs administration⁵⁶ under governor Li Mian (769-771) reflect the other side of the struggle for the decreasing profits that, prior to the immense disaster of An Lu-shan's and his compeers' insurgencies, had arrived so abundant and regularly. As much as Li Mian's efficient administration is discernable in Figs.1.4-2 and -3, so are the ensuing events: the 773-776 revolt of Ge Shuhuang, a former military prefect of Xunzhou who took Guangzhou as his headquarters, and the mutiny's aftermath⁵⁷ are clearly symptomatic of the unfolding disintegration of Tang administration and rule.

Despite various attempts at reform, throughout the last years of the eighth century both state revenues and control contracted progressively.⁵⁸ In China's ports, the 'tribute' and 'seasonal offerings' demanded from the

ever-more autonomous regional governors lead to additional and strictly irregular' (Wang Zhenping 1991: 14) taxes levied on foreign merchants, the yields of which, 'aimed at gaining imperial favour' (*ibid.*: 13 fn.53), were forwarded directly to the Son of Heaven. Such procedures proffered leeway for personal ambitions: notoriously, the 'nabob' Wang E, governor of Guangzhou and Lingnan between 795 and 800 brazenly enriched himself through the exaction of hapless foreign merchants⁵⁹ and dispatched the surplus to 'various powerful ministers and members of the royal family [...] to secure his position in Lingnan' (Chin 2009 [2004]: 67) and preclude later prosecution. Predictably, no embassies of Maritime Southeast Asian polities to the Celestial Court were recorded during the final five years of the eighth century.

Trading in Tang China: The Ninth Century

The later eighth and early ninth centuries saw various risings of local commanders and their (temporary) suppression during Tang Muzong's Yuanhe Restoration. These uprisings confronted the court with challenges more imperative than effective administration of trade. Only in the second decade of the new century did representatives of Insular Southeast Asian polities call again at the Tang court. An imperial decree of 834 documents increasing attention to the administration of China's overseas commerce, illustrating ninth-century's formal attitudes towards foreign trade and traders:

The foreign ships from the South Seas are come from distant countries, expecting the merciful treatment of our kingdom. Therefore the foreigners should of course be treated with kindness, so as to excite their gratitude. We hear, on the contrary, that of late years the local officers are apt to over-tax them, and the voice of resentment is said to have reached to the foreign countries. Needless to say, we are striving to lead a life of frugality and abstinence. How should we desire curious, foreign things? We are deeply sorry that foreign peoples should feel uneasy or that the present mode of taxation is too heavy for them. We should show lenience, so as to invite their good-will. To the foreigners living at Lingnan, Fu-chien, and Yang-chou, the viceroys of these provinces should offer consolation, and except for the already fixed anchorage-duties, the court-purchase, and the regular presente, no additional taxes should be inflicted on them, so they may be allowed to engage freely in trade.⁶⁰



The century, thus, saw the introduction of a novel approach in the supervision of maritime imports:

Under the new system, ship owners were required to hand in all their cargoes to the Chinese authorities, who would charge them a transportation fee known as *po-chiao* for moving their goods to a government warehouse. The merchandise would be stored for several months until the last ship arrived at Kuang-chou at the end of the monsoon season. This practice was apparently aimed at pricing foreign goods in accordance with the supply and demand of the year, thus preventing their prices from shooting up. To comply with this practice, foreign merchants had to stay in Kuang-chou and postpone conducting their business, and because of this the Chinese authorities usually provided them with everyday necessities during their stay. (Wang Zhenping 1991:19-20)

These approaches, described by the Arab mariner quoted above, apparently strived to create a consistent commercial ambiance that could both ensure a dependable supply of imports to the court and assure the 'honesty in the port and city authorities [that] may have been one of the greatest encouragements to the Nanhai trade' (Wang Gungwu 1958: 84). Application of the novel administration is apparent in the slight rise of the number of embassies noted in the Celestial Annals in the later years of the first half of the ninth century. The new policy probably also encouraged an increasing privatisation of commerce: although no records for the particulars of commercial transactions with Southeast Asia are available, this period saw a first heyday of the Perso-Arabian maritime trade, generally a private enterprise, with China,⁶¹ and we know that 'between 839 and 907 all trade with Japan was private trade' (Deng 1997: 261). Between the late eighth century and the rise of the Song, China's administration obviously had divined that

where before commerce had been considered something fundamentally undesirable which, since it was after all a necessary evil, had to be strictly controlled and kept within limits, it was now accepted that since trade could neither be suppressed nor adequately controlled, the best solution was to exploit it as a source of revenue. (Twitchett 1988: 206)

Such a policy would support Chan's (2008: 74) suggestion that 'as foreign military threats increase and/or the imperial empire weakens, the emperor will choose more proefficiency foreign trade policies and more pro-market

domestic commercial policies', characterised by a more lenient approach towards private enterprise and moderated taxation.

The latter half of the ninth century saw the inexorable collapse of Tang authority. Overseas trade in the southern provinces came to a virtual standstill when Huang Chao's army on its march south in 878/9 besieged and conquered Guangzhou⁶² and eventually slaughtered the foreign inhabitants of the city by the thousands.⁶³ Writing in the early years of the tenth century, Masʿudi accordingly relates that for the 'Muslim ships from Siraf and Oman [that used to] come to the mouth of the river of Khanfu [Guangzhou] with their merchandise and cargo [...] today Kalah is the terminus where they meet the ships which come down from China' (Tibbetts' translation, 1979a: 37). Other sources inform us that no new supplies of the ever-present Chinese cash arrived at late ninth-century Siraf, a main Middle Eastern terminus of this trade.⁶⁴

Trading in China: The Five Dynasties and Ten Kingdoms

With the final collapse of the Tang in 908/7, China's southern ports fell under the rule of the various quasi-independent realms of the Shiguō, the Ten Kingdoms'. Chinese sources available in translation do not detail the particulars of these polities' overseas diplomacy and commerce, and until a Champan mission of 958 no visits of legates from the Southern Seas were noted in the official records of foreign relations, the preserve of the contested Celestial Court in the north⁶⁵. The fate of contemporary chronicles kept by southern polities that possibly contained such notes has been explained by the example of the Southern Tang, where 'under the moral pressure of the new Sung empire [...] the high minded historians burned their own drafts' when the kingdom fell to the Song Dynasty in 976 (Schafer 2006 [1954]: xi).

Already under late Tang rule the responsibilities of Guangzhou's customs administration included 'collection of taxes, registration of names of foreign merchants and enforcing the laws on export of contraband products' (Sen 1996: 254⁶⁶). One would assume that the esteemed worthy gentlemen' of Tang edification chosen by Liu Yan as mainstay of Nanhan's government⁶⁷ continued such policies, thus instituting a considerable degree of governmental control, if not a monopoly, over the seaborne trade frequenting the port. The extant sources, however, contain no direct references to such



offices.⁶⁸

Liu Yan's stem and prosperous government did not fail to attract the international commerce that had been disrupted so dramatically by the massacres of 878/9. The Jiu and Xin Wudaishi narrate that under Nanhan rule 'Kuang-chou amassed the precious goods of the South Seas' to construct the lavish residences of the Liu family,⁶⁹ one of which was even 'fitted with dragon pillars engraved out of aloeswood' (Miles 2002: 48), a coveted import from the Southern Seas. Writing about 950, Buzurg (1981: 77-8, 84) knows of Middle Eastern merchants who again ventured to 'Canton, the Capital of Great China', where 'the Baghbur, the ruler of China' prided himself with elaborate parades and a garden of 'flowers and leaves made of silk, [...] so well done that anyone would have no doubt that that they were real trees and flowers'. The profits taken from Nanhan's ample 'trade in luxuries' (Wang Gungwu 1958: 88) not only went into the 'halls of jade and basilicas of pearl'⁷⁰ erected in the nation's capital: from among his copious treasures, Liu Chang, the realm's last ruler (958-971), was 'particularly fond of a Persian girl whom he styled "Seductive Pig"' (Schafer 1954: 364, fn.5). Evidently, in the first half of the tenth century both foreign trade and people had again found their way to Guangzhou.

Nanhan's leading role in maritime commerce was, however, not uncontested; the apparent prosperity of Wuyue's ports and neighbouring Min's endeavours to 'summon the barbarian merchants from overseas' have been noted in the previous section. Under Liu Congxiao, who since the fall of Min in 945 controlled southern Fujian and her ports, Quanzhou and Zhangzhou, pottery, copper and iron were shipped in abundance to foreign countries,⁷¹ the returns of which allowed to 'present impressive amounts of precious exotic goods to the court' of the Later Zhou (So 2000: 33). It could have been just such competition that enticed Liu Cheng of Nanhan (r. 943-958) to 'deploy to the high seas a force [...] of warships to commandeer the gold and the silk of merchants' which in the early 950s financed the construction of his numerous palaces (Ouyang 2004: 543).

Little of this hard-pressed commerce between Chinese ports was carried by foreign shipping. Throughout the troubled times of the Wudai Shiguo, most of the tributes paid by southern polities to the northern courts went by sea⁷² and 'doubtless[ly] these routes were used by ordinary traders as

well' (Schafer 2006 [1954]: 76). Although many of Wuyue's envoys 'died by maelstroms at sea each year' (Ouyang 2004: 571) and much of the tribute sent by Min to the Later Liang (907-923) was lost,⁷³ along China's eastern coasts the authorities all established trade offices for commerce with the people' (*ibid.*: 254), an indication for a considerable volume of regional -and, hence, locally operated- seaborne commerce. Such maritime trade appears to have connected the various southern domains:⁷⁴ the 'Qian royals' of Wuyue 'also pilfered the precious commodities of merchants from Lingnan' (*ibid.*: 571).

Foreign traders arriving from the south would have made Guangzhou their first and foremost port of call.⁷⁵ As the city was the capital of the secessionist Nanhan, supervision of this traffic seems to have been a more personal affair than in Tang times: the Arab visitor of the mid-tenth century admiring the silken flowers in the palace gardens did so on express invitation by the realm's unnamed ruler; Liu Yan often bade merchants 'to ascend to his palaces and basilicas, where he showed his wealth of pearls and jade' (the *Xin Wu- daishi*, Schafer 1954: 354). The Song administration's decision to open the empire's first (and until 989 only⁷⁶) "Office for Commercial Argosies" at Guangzhou in the very year of her fall to the new overlords⁷⁷ corroborates the port-city's leading role in overseas traffic.

Throughout the more than five decades of struggle for control over Northern China only two Southeast Asian missions, sent by Champa in 958 and 959 to the Later Zhou,⁷⁸ were recorded in the annals. The disruption of contacts between the various Asian polities and the northern courts appears due to the turmoil afflicting the war-torn lands north of the Yangzi, yet could also indicate a conscious choice of the Imperial chroniclers: 'In a chaotic age like the Five Dynasties, the fact of [embassies] coming to court in no way reflects the quality of governance [... in such times], in fact, the frequency of their visits is nothing of which to be proud' (Ouyang 2004: 15.v). The missions arriving at the court of the Later Zhou, however, reflect the appeal of a strong central government: the Śrī Vi- jayan (Sanfoqi) embassy of 960, the first foreign legation arriving at the Song Court, possibly intended to pursue Champa's success.⁷⁹

Trading in China: Song

With the inauguration of the Song dynasty commences a long series of



documented embassies from a wide range of Southeast and South Asian as well as Middle Eastern polities and traders.⁸⁰ The temporary gap in the records between 963 and 970 coincides with the Song campaigns against the small states at Nanhan's northern borders (963-966) and the final invasion of Nanhan: the devastation of the lands between Guangzhou and northern China would have made the trip to Kaifeng a precarious undertaking.⁸¹ In addition, in 964 the Song emperor declared a prohibition on trade with the states to the south of the Yangzi, in the course of which commerce between the northern empire and the harbours in China's southern seaboard came to a standstill.⁸² As related in the previous section,⁸³ with the conquest of Nanhan the Song government promptly realised Guangzhou's economic potential, and in less than half a year after fall and devastation of the city had reestablished the bureaucratic frameworks administering foreign trade.

Between 971 and 990, when fighting broke out between Java and Śrī Vijaya,⁸⁴ at least nine further representatives of insular Southeast Asia are mentioned in the extant records.⁸⁵ Until the Javanese embassy of 992, all of these were entered under the heading (San)Foqi. Two arrivals in 980 and 986 were expressly noted as a private merchant and 'a master of ships' (Hartwell 1983: 173), both of whom had hailed from Śrī Vijaya. One of these traders, professedly blown of his course, arrived at Chaozhou, about 200 nautical miles east of Guangzhou; it though was decreed that his ship's cargo had to be forwarded to Guangzhou,⁸⁶ obviously to register the goods at the administrative offices for trade with foreign argosies.

The records of private enterprise underline two aspects of early Song management of foreign commerce: (i), registration of imports from the Southern Seas had to take place at Guangzhou; (ii), the court was notified of any arrival of foreign vessels, be it official missions or private trade. This policy continued and extended the Song bureaucracy's comprehensive supervision of domestic commerce through state monopolies on 'industrial products, tea and salt' (Lewin 1973: 152) that had been introduced to control prices, supply and demand through exchange with and stockpiling of grain.⁸⁷ Until well into the 990s the 'Offices of Maritime Trade' in Guangzhou thus 'instituted a total monopoly over the trade in foreign products', purportedly through 'ritualized state-level exchanges' (Heng 2009: 40, 39⁸⁸).

The various Chinese records do not ascertain which of the above

embassies fulfilled the benchmark of such formalised relations, the audience at the Song court. Bielenstein (2005) and Wong (1979) assume that all records of missions describe an actual reception by the emperor; contrarily, Heng (2009: 79) argues that of all of the various Sumatran embassies in the first millennium only those of 960 and 990 were 'clearly stated to have been presented to the Song court [...] an indication that most of the Srivijayan missions were received at Guangzhou'. Hartwell (1983:172Q adds at least the legation of 971 and the 'Srivijayan Master of Ships, Po-chu Chin-hua' of 985, who attended banquets at the Hall of Great Brightness in the Celestial Palace. As noted above, however, we know for those embassies where the amount of presented goods has been recorded that not all of their vessels' cargoes was submitted to the court, and thus would have been marketed through other means than the ritualised tributary exchange.

The Song annals record the names of a number of the legates calling at court. In the case of Śrī Vijaya's missions, the ambassador of 971, Li Hemo, apparently also represented the Arab embassy of that year; the luckless Pu Yaduoli, caught in the middle of the Java- Sumatran conflicts of the early 990s, had already in 983 been 'sent [by] the King of Śrī Vijaya', yet in 995 and 998 was noted as an Arab master of ships' (Hartwell 1983:173C i95f). It has been proposed that "Pu" represents the Chinese transcription of Arabic "Abu";⁸⁹ "Pu", though, is also an indigenous title common in insular Southeast Asian inscriptions of the first millennium.⁹⁰ In at least Sanfoqi-Zhanbei 'there [were] many people whose names begin with Pu' (the *Songshi*, Groeneveldt 1887:188) - whether, as proposed for the inhabitants of Champa and Hainan bearing this name,⁹¹ they were Muslims or just addressed with this honorific remains open to discussion. The relationship between Śrī Vijayan and Arab ambassadorial personnel, however, is apparent. Given the generally private character of Perso-Arabian trade,⁹² the persons in question thus not necessarily represented genuine diplomats: based on an analysis of the presents bestowed on these legates, Heng (2009: 79) assumes that most of 'the Srivijayan tribute missions in the late tenth century were probably dispatched as a means of carrying out trade exchanges with China', hence not primarily political endeavours.



Merchants and Sailors — Trade and Ships

Chinese attitudes to trade and traders have been described above; in Hindu India, merchants were subject to 'the ancient and persistent Brahman tradition which disparaged those who engaged in trade and accorded them a subordinate position in the caste hierarchy' (Boyden 1958: 231), and maritime activities were 'often discouraged and associated with impurity' (Hoogervorst 2012: 190).⁹³ Accordingly, only low caste Hindus opted for a profession of seafarers' (Basak 2014: unpg.), leaving much of the maritime trade to their Buddhist countrymen.⁹⁴ Judged by their involvement in diplomatic affairs, in insular Southeast Asia and the Muslim lands prominent merchant-sailors (as will be seen presently, such were the likes of Pu Yaduoli and Li Hemo) had a better social standing.

In early medieval Sumatra and Java, "masters of seagoing merchant ships" were, apparently, referred to by the Old Malay word *puhawang/ puhavam*.⁹⁵ The shipmaster Gelis' donation to a Saivite edifice, a privilege typically reserved for the ruling classes commemorated in an inscription of 827, has been noted in the previous section;⁹⁶ in connection with *vaniyaga* and *banyaga*, local spellings for 'trader' in Sanskrit, the title is also mentioned in the Śrī Vijayan Telaga Batu/Sabokingking inscription of the late seventh century and the Javanese inscription of Kamalagyan of 1037.⁹⁷ Damais (1960: 25!) finds a 'p'o- ho-wang' [Pinyin, *pohewang*] in the *Songshi* record on the Javanese mission of 992, here possibly related to the 'large ship'⁹⁸ the mission had boarded to reach China.⁹⁹ This ship was not Javanese, but belonged to an 'owner of many vessels, and a great merchant, [who] had come many times to his [the Javanese ambassador's] country, [so] that he now availed himself of his guidance to come to court and bring tribute' (the *Songshi*, Groenveldt 1887: 144¹⁰⁰)— The vessel's proprietor, noted in the annals by the name Zhang Suyi, had felt bold enough to 'memorialize a petition [to the Song court] announcing intention to present tribute' (Hartwell 1983: 182) — another, then, of the prestigious merchant-sailors who were involved in the diplomatic relations between foreigners and the Celestial Realm of the late tenth century.

A common and persistent motif in descriptions of this maritime commerce is 'the large number of traders, the bustle on shipboard and in the harbours, the trading voyages with hundreds of merchants' (Van Leur 1967 [1955]: 66).

On board of the vessel that in 412 took the Buddhist pilgrim Faxian from India to China were 'more than 200' crew, merchants and passengers;¹⁰¹ the numerous traders travelling with Sindbad to his imaginary islands depict the veracity of tenth-century eyewitness accounts;¹⁰² in 1331, Friar Odoric finds on an insular Southeast Asian vessel 'good seven hundred souls, what with sailors and with merchants' (Yule [ed.] 1866: 73). It is not easy to tell apart passengers, businessmen and crew: on many of the long-distance traders observed by the early European intruders into the Eastern Seas, the ship's 'commander and crew carr[ied] on trade on their own account alongside the transport of people and goods' (Van Leur 1967 [1955]:67).

A Chinese source of the late eleventh century¹⁰³ reports:

Sea-going ships are several tens of ch'ang in breadth and depth. The traders divide the space by lot among themselves and store their goods therein. (Each) man gets several feet (of space for storing his goods) and at night he sleeps on top of them.

In Chinese vessels, allotting such spaces could follow the bulwarks that divide their hull into crosswise "compartments";¹⁰⁴ the reference to traders sleeping on top of their goods indicates that these compartments would have been filled "vertically" from the bilges to deck level. The fifteenth-century *Maritime Law of Malacca* also speaks of *petak*, 'divisions in the hold', that are rented out to the *kiwi yang banyak*, the 'many merchants' travelling on board Malay-built ships.¹⁰⁵ While the text does not provide detailed explanations regarding the configurations of these divisions, the word *petak*, a 'part of a space that has been divided by partitioning',¹⁰⁶ yet indicates actual 'compartments' or 'sections'¹⁰⁷ in the vessel's holds. These *petak* could refer to bulwarked compartments in vessels built in the South China Sea Tradition', a Chinese-Southeast Asian hybrid' shipbuilding technique developed in thirteenth-century Southeast Asia;¹⁰⁸ however, ships constructed by more indigenous methods were also partitioned, here but by 'tiers of lashed thwart' instead of solid bulwarks (Flecker's 2002:139-40¹⁰⁹).

It is obvious that many a ship's cargo space was 'not occupied solely by the vessel's owners' (Heng 2008: 14), but that trade ventures relied on the participation of many. In-dividual ownership of and access to freight consignments is most evident in the event of danger: Sindbad's (and



Buzurg's) fellow traders jettisoning their cargoes in bad weather emulate the 'merchants [who] took their bulky goods and threw them into the water' when a storm hit the ship that in 412 carried Faxian to Java (Legge 2010 [1886]: 111-2). Before the cargo of a Malay vessel was to be jettisoned, 'a general consultation shall be held [...] and those who have much and those who have little must agree to throw overboard in proportion' (the *Maritime Law of Malacca*-, Raffles' translation [1818:145]).

A Bugis maritime code of the seventeenth century expressly details 'charter fees', advance payments for space aboard a ship, that were calculated in fractions of the value of the consignment of goods a trader wished to convey, in amounts varying by destination.¹¹⁰ Both this law text as well as the maritime code of Malacca mention a wide range of people joining such ventures: there are genuine charterers of *petak* and merchants whose consignments of goods are too small to demand such a space; various members of the crew who are remunerated through complimentary use of compartments in the ship's hold, maintain percentages of the cargoes of others or are merely waged; and there is the master of the ship and his officers, all of whom could have shares in cargo space or actual freight. The organisational patterns of Asia's maritime trade obviously necessitated highly individualised agreements that revolved around cargoes of multiple consignments, owned by distinct individuals and stowed in clearly separated spaces in the hold.

Aptly described in the *Maritime Law of Malacca*, overall command of these arrangements lay with the master of the ship:

Let every man obey the *Nakhoda* [the ship's master, captain'], agreeably to the authority conferred upon him, by the Sultans of the land from time immemorial, for he is the Raja while at sea, and, although he may be young, he shall be as an Orang tua [parent, elder], or have the authority of age, and administer the law accordingly [...] Whoever does not admit this authority offends against the law. (Raffles' translation, 1818: 132-3)

'Aboard ship comparable to a king',¹¹¹ this commander and possible owner¹¹² of a vessel held a wide authority. He was the first to pick cargo space; he allotted compartments and shares in the freight to traders and members of the crew; he claimed the lion's share of chance finds¹ of valuables.¹¹³ When coming into port; he alone [was] permitted to trade for the first four days; after that, the supercargoes [the *kiwi* merchants holding *petak*], for two

days; after that, the crew may trade' (Winstedt and De Josselin De Jong 1956: 56). He also was authorised to impose a wide range of penalties, from fines to death, over anyone aboard ship¹¹⁴ Although being burdened with the overall responsibility of the vessel's safety, this master of a ship' was not the person in charge of navigation and seamanship: at least in the Malacca code this is the duty of pilots and officers of the watch¹¹⁵ The shipmaster's main responsibilities, then, were supervision and execution of both the commercial and juridical affairs of a joint trade venture. It is reasonable to assume that a *puhawang* of the first millennium would have commanded comparable duties and privileges.

Management of mercantile and navigational matters aboard a ship are not all there is to successful maritime enterprise. The construction of a seagoing vessel has always been a major technical and financial undertaking, involving both highly specialised knowledge and intricate social relationships.¹¹⁶ Of equal importance and similar complexity would have been procurement and marketing of suitable cargoes. In the case of trade with China, the extensive governmental control over and monopolistic approaches to seaborne commerce executed by the Celestial administration appear to contradict the particularised organisation of the foreign traffic frequenting the empire's ports: whether or not organised as joint undertakings, the Chinese administration obviously expected the ships' masters to represent the enterprise. In the case of the evidently privately owned Śrī Vijayan vessel that in 980 made land at Chaozhou instead of Guangzhou, the *Songshi* refers only to a certain Li Fuhui, who 'had loaded [a] ship[s?]¹¹⁷ with spices, aromatics, pharmaceuticals, rhinoceros horn and ivory' and was informed that 'his cargo was all to be sent to Kuang-chou' (Hartwell 1983: 173¹¹⁸). Still in the more liberal days of the early twelfth century¹¹⁹ the Celestial authorities preferred to deal with a single representative for the joint trade ventures arriving at their ports:

On large vessels, which take several hundred people aboard, and on small crafts, where a little over a hundred is taken aboard, the head is appointed out of the richest merchants and so are his deputy along with assistants. [The] Shibosi ['office for overseas commerce'] then issues a written authorization for the head to subdue his travelling companions to obedience. (The *Pingzhou ketan*, Alimov 2010: 33)

Such regulations did not apply to official embassies: for at least three of



the "official" state-missions of tenth-century Champa the *Songhuiyao* notes presents offered by individual members of the legations.¹²⁰

Foreign relations, commercial and diplomatic, were not only conducted by represent-atives of the actual ships arriving at China's harbours. Heng (2009: 36, 78) assumes that already in 905 Liu Yin, then still governor of Guangzhou, appointed a member of the Śrī Vijayan mission to the waning Tang court of 904 as spokesperson for the foreign community at the port city. In later centuries such 'foreign headmen' were mainly tasked with legal affairs.¹²¹ On the occasion of at least a number of Middle Eastern audiences at the Song court of the tenth century, however, the Arab representative residing at Guangzhou possibly also acted as agent for shipmasters.¹²² The *Pingzhou ketan* accordingly tells us that 'the foreign headman is used as the channel for tribute dispatched by foreign traders' (Heng 2008: 28). Permanent representatives at the port would have also been expedient in both marketing and procurement of commodities that were not exchanged through the "official" governmental channels.

Commodities: Aromata

The *Songshi* contains a list of the goods traded 'in or about 999':

They were gold, silver, Chinese cash, coined money, lead, piece-goods of all colours, por-celain-ware, cotton, fabrics, incense and scented woods, rhinoceros horns, ivory, coral, amber, strings of pearls, steel {*pin-t'ie*}¹²³, shells of turtles, tortoise-shell, cornelians, *ch'o ku shell*¹²⁴, rock-crystal, foreign cotton stuffs, ebony and sapan wood. (Zhao Rugua [Hirth and Rockhill] 1911:19)

The list 'mingles together import and exports and refers to trade in general' (Bielenstein 2005: 98), but except for a number of curiosa and Middle Eastern glasswares comprises most of the items mentioned in notes enumerating the goods exchanged at court audiences. Prominent in the surviving records of Chinese imports are the various aromata, an indispensable part of any courtly ceremony intended to celebrate the presence of the royal afflatus" (Schafer 1985 [1963]: 156)¹²⁵ hence the most important of the goods and commodities in Song maritime trade' (Wong 1978: unpgj. In 963; the presents of a Champan envoy to the ruler of the Southern Tang included

one rhinoceros horn, two elephant tusks, 30 liang¹²⁶ of "dragon brain" camphor, 10 jin¹²⁷ of green "dragon brain" camphor, 30 jin of frankincense, 30 jin of gharu wood, 70 jin of lesser quality gharu wood, 50 jin of "stone-pavilion" gum, 100 jin of white sandalwood, 70 jin of lac, 20,000 nutmegs, three pieces of "dragon brain" real camphor, 50 jin of pinang,

plus a dozen pieces of cloth", mainly embroidered silks from Java, and Champa itself (the Songhuiyaa, Wade 2005: 7-8). At least three quarters of the about 801 of goods listed as presents of the Śrī Vijayan mission of 1156 to the court of the Southern Song¹²⁸ were genuine aromatics; to these might be added about 6.51 of sandalwood, a substance that could serve as both incense and material for exquisite furnishings.¹²⁹ Under early Song rule such aromatics were a genuine monopoly of the state, held by the *Xiang Yao Ku*, the Incense arsenals". A proposal 'to open a sales outlet and sell larger quantities of incense and precious items for heightened prices against gold and cloth' (Lewin 1973:152) filed in 977 indicates that not much of these luxuries saw circulation in regular markets.

The growing involvement of southern Sumatran polities in the international trade of the later first half of the first millennium was, arguably, related to Chinese demands for Southeast Asian substitutes for Middle Eastern and Indian aromatics.¹³⁰ However, the very marker of an integration of insular Southeast Asia into world markets were the "fine spices" clove, nutmeg and mace, until the eighteenth century exclusive¹³¹ cultivates of a restricted number of islands in the eastern parts of the Malay Archipelago (see Map 2). Despite a number of claims for the presence of cloves in early archaeological finds¹³² or their mention in texts of the first centuries CE,¹³³ unambiguous references to the spice in written sources appear only ca. 500 CE,¹³⁴ corresponding with an escalation of insular Southeast Asian shares in the China trade.¹³⁵ Nutmeg and mace become a common topic only in writings of the tenth-century.¹³⁶ Still in the second millennium, procurement of these commodities remained a virtual monopoly of 'Indonesian' merchant-sailors: until the early fifteenth century European and Middle Eastern travellers and geographers as well as the compilers of Chinese compendia are yet uncertain about the precise location of the enchanted islands of the spices' origin.¹³⁷



Commodities: East African Slaves?

Another Chinese import, the 'Sengzhi slaves' presented by a number of insular Southeast Asian missions to the Tang court¹³⁸ marks the eastern and western limits of Asia's first-millennium trade and its "procurement zone". These exotic beings, characterised by their strength, gentle disposition and curly hair, hailed from 'islands beyond the sea' where they

live on raw food; when caught and fed on food cooked with fire, it purges them daily and this 'is called "changing the bowels". Many during this treatment sicken and die, but if they do not they may be reared and become able to understand human speech. (The *Pingzhou ketan*, here in Hirth and Rockhilfs translation [Zhao Rugua 1911: 31f])

Though not providing us with such detailed explanations, a small number of Javanese inscriptions¹³⁹ lists a people called jenggi' who are entitled to be kept as slaves' (Robson 2007: 6). Given the Chinese description of the colour of their skin, as black as ink' (Zhao Rugua *op.cit*), such poor creatures could represent both Papuan and East African stock,¹⁴⁰ Not much is known of first-millennium commerce in the former; the latter, however, were a celebrated commodity of Perso-Arabian merchants who obtained them from the lands of Zanj, the coasts of eastern Africa¹⁴¹ The remarks opening this chapter noted Austronesian voyaging and migration to south-eastern Africa in the first centuries CE, a traffic still reported by early Portuguese sources that know of "Sumatran" and "Javanese" sailors frequenting Madagascar¹⁴² Buzurg informs us about an Eastern people called Waqwaq, who in 945

came with a thousand small boats and violently attacked the town of Quanbalu [Pemba in Zanzibar ...]. When the Waqwaq arrived, the people asked them why they had come there and not elsewhere. They said it was because the land had trade goods useful in their country and for China, such as ivory, tortoise-shell, panther-skins and ambergris, and because they wanted to obtain Zanj [slaves], for they were strong and easily endured slavery. [...] If these men spoke the truth and their report is correct, when they say they had come from a year's sail away, this would confirm what Ibn Lakis said of the Waqwaq Islands - that they lie opposite China, (1981:103¹⁴³)

These Waqwaq would be the same folk who at some unknown date before the thirteenth century

arrived in ships with lots of people and took control of the island [of Aden]. They used to come up from Madagascar, taking in Aden in one go in one monsoon [...] these communities with these rulers died out and this route fell in disuse. There is no one left in our time [the thirteenth century] who knows what had happened to them, nor how many they were, nor how they were. (Smith 2008:137-8)

Chinese awareness of these connections might be echoed in the label 'Kunlun Ceng- qf, used in the twelfth century compendium *Lingwai daida* to designate Madagascar *kunlun* evidently represents "Malay" peoples and languages¹⁴⁴ while *cengqi* 'transcribes the Arabic word Zang [Zanj]' (Zhou Qufei [Netolitzki] 1977: 238). It will be seen in Section 2.3 that a number of the non-ceramic commodities in the Nanhan/Cirebon cargo cover at least the northern segments of these extensive lanes of commerce.

Commodities: Ceramics

Ceramics, the bulk of the freight found on the Nanhan/Cirebon ship and other wrecks, are rarely a topic of the Chinese sources. Most of the goods seaborne merchants of the late eleventh century sleep upon are "chinaware, small packed into larger ones in such a way that there is no room to spare [in the hold]' (the *Pingzhou ketan*, Alimov 2010: 33). But while the Song Annals note ceramics 'among China's most important maritime exports at the turn of the eleventh century' (Heng 2009:172), in the extant accounts of the objects exchanged on the occasion of audiences of Southeast Asian embassies at court there is just a single reference to 'white porcelain' given to the Śrī Vijayan mission of 962,¹⁴⁵ Ceramics apparently were rarely used as state gifts', and particularly the green- glazed stonewares dominant on both tenth-century shipwrecks¹⁴⁶ and in contemporary terrestrial sites throughout insular Southeast Asia¹⁴⁷ 'did not seem to [have been] very much in fashion with the rulers of the Song dynasty' (Wong 1978: unpg.).

For people outside China, however, 'high fired ceramics were the cellphones and iPods of their day, that is, highly sought-after, high technology products' (Rehfuss 2006:1), an article in constant demand throughout Southeast Asia and beyond:

For a villager in Southeast Asia, a prosperous merchant in Iraq or an Ottoman Turk, Chinese, Japanese, Thai and Vietnamese ceramics were durable, beautiful and exotic. They represented an extraordinary



improvement over the low-fired pottery available locally. Kings and princes collected them as prestigious objects to impress rivals and subjects. Borneo headmen used them to hold water, wine and the bones of ancestors. Nothing else was so practical. (*ibid*:3)

The possibly earliest reference to Chinese export ceramics in the Middle East are the Two hundred pieces of Imperial porcelain, including basins and bowls and other things the like of which had never been seen before at the court' of Harun al-Rasid (r. 786- 809),¹⁴⁸ in 796 forwarded to the Caliph by the governor of Khorasan, who would have obtained them via the silk road. Chinese ceramic technology of the time far surpassed the possibilities of the Middle Eastern potter,¹⁴⁹ and increasing demand for high-fired stonewares soon triggered increasing imports.¹⁵⁰ Volume and weight as well as their cheap buying cost made specifically utilitarian ceramics the perfect bulk cargo for the Middle Eastern China-trade: the Arab or Persian Belitung ship, foundered on a return voyage from China in the 840s, carried at least 80,000 pieces of stoneware.¹⁵¹ On the Chinese end, the growing demand stimulated increased production in the realm's southern provinces.¹⁵²

Southeast Asia attracted even greater volumes of such imports.¹⁵³ It will be seen in the following chapter that some of these ceramics apparently were destined for the consumption of the rich and powerful. However, ceramics do not feature in the lists of presents found in inscriptions describing *sima* ceremonies,¹⁵⁴ indicating that even imported pottery was not valued as particularly luxurious items. Besides their domestic usefulness, ceramic vessels certainly had ceremonial functions¹⁵⁵ - due to the virtual absence of textual sources and a present lack of research into their concrete usage and significance, appraisals of their purpose and import in a Southeast Asian context yet remain conjecture.

Commodities: Volume

The same is valid for an assessment of the volume of medieval seaborne commerce. Agius' extensive efforts at estimating the sizes of medieval ships (2008: 218ff) demonstrate that even the average dimensions of sea-going trading vessels, the first parameter of the such an effort, is difficult to measure based on written sources alone. The few wrecks of Southeast Asian ships for which such estimates are available¹⁵⁶ appear to confirm the lower figure of

Agius' proposed range of 200-5001 of cargo-carrying capacity. It will be seen that the Nanhan/Cirebon vessel held a load of somewhere in between 225-3001. Not all ships would have had the volume of a full-grown Chinaman: an average of about 1501 of cargo capacity seems to be more realistic. This number still is the double of Śrī Vijaya's 801 of tribute to the Southern Song in 1156, and about four times of the roughly 401 of presents by Champa in 1053 and 1055.¹⁵⁷

Estimates of the frequency of international traffic are even more problematic. Few records provide us with more than the general notion of 'many ocean-vessels which came several times a year' (here, the *Liangshu*, Wang Gungwu 1958: 49). The thirteenthcentury Persian traveller, Ibn al-Mujawir, counts seventy to eighty ships yearly calling at Aden, a major western terminus of the Indian Ocean trade;¹⁵⁸ under the successful and 'lenient administration' of Li Mian (769-773), Guangzhou in a booming year attracted 'more than forty' vessels (Wang Gungwu 1958: 81). In the tenth century, 'the loss of [a mere three] ships and their cargo, of officers, captains and well-known merchants aboard' was regarded as a noteworthy contribution to the 'decline of Siraf and Saymur', until then the most important ports in the Persian Gulf and on the western coast of India (Buzurg 1981: 98). These numbers are far from the generally assumed 'hundreds, if not thousands, of such ships plying the islands and mainland ports of Southeast Asia in the tenth century' (Gordon 2009: 58). Instead, they support Lewin's view that based on the recorded tax incomes 'there could not have been a great volume of foreign trade throughout the first decade of the Northern Song' (1973: 155, 158ff¹⁵⁹). I will attempt calculations of a more pragmatic nature in Section 4.2; the two following chapters will look at a cargo and craft involved in this trade.

(Endnotes)

1. Eg., Bellwood 1985: 271 ff; Higham 1996, 2004; Solheim 1992: iggff.
2. Ardika 1996; Bellwood 1999 [1992]: i26ff, 1996; Christie 1995: 244f
3. Cf. Allen and White 1989; Bellwood 1999 [1992]: lzgff, 2006; Hall 1999 [1992]: i8sf; Kirch 1991: i46ff, 1997; Spriggs 1984; Tykot and Chia 1996.
4. Eg., Ammarell 1999; Gladwin 2009 [1970]; Horridge 2006; Lewis 1994 [1972]; McGrath 1988.
5. Eg., Adelaar 2006, 1995, 1994; Dahl 1951, 1991.



6. Cox et al 2012; Hurles et al. 2005; Tofanelli et al. 2009.
7. Eg., Blench 2009, Neumann and Hildebrand 2009, De Langhe et al. 2009, Lejju 2006, Mbida et al. 2000.
8. Eg., Binsbergen 2012: 2-5; Blench 2010: 243; Dick-Read 2006 (espc. 39-45), 2008 [2005] (espc. chpts. 13,16, 17,19-21); Jones 1964 (but see Heins' (1966) reply); Hall 1999 [1992]: 186; Hitchcock 1992: 64!; Hornell 1934-
9. Though often enough related to a 'Buddhist-cum-megalithic cultural mix' (Wisseman Christie 1995: 279), the proposed 'commemorative or funerary' (Glover et al. 1979: 253) function of Southeast Asian megaliths undoubtedly sets them outside an Indianised context; see, too, Bellwood 1985: 292ff, van Heekeren.
10. Cf. Higham 2004: 53; Edwards McKinnon 1993; Sukendar 1985; Suryanegara et al 2007.
11. For a comprehensive discussion of the concept of *de* and its relevance to the Southeast Asian polities of the first millenium, see Wolters 1975 [1970]: 21-38.
12. For a description of Tang and Song practice see Schafer 1985 [1963]: 26-28.
13. The considerable efforts made by the Chinese officialdom to entertain ambassadors throughout their travels to and stay at the court could have been a motive in itself on 'the occasion of the voyage of the Earl of Macartney to the Qianlong Emperor <i>793</i> the catering for the ambassador alone more than compensated for the sumptuous British state-presents' (Huang Xingzeng 2005: 18 fn.66).
14. Having "only vague knowledge of the political borders of India' (Bielenstein 2005: 72), the Chinese divided the subcontinent into Northern, Southern, Eastern, Western and Central states; cf. Wolters 1986: i6f
15. ... a war that only ended with the Battle of Rajasthan in 738; cf. Javed 2009: 13b; Kennedy 2008: 302ff; Khushalani 2006: passim,,
16. For the first millennium, I know of only one Chinese attempt at intervention on behalf of a foreign supplicant, namely, the troops sent in 678 with the son of Sassanid Persia's last ruler to 'reinstall him as king of that country', recently fallen to the Arabs. The Chinese expeditionary force though was 'diverted to another purpose in Central Asia', and the task remained unaccomplished. (Bielenstein 2005: 254).
17. Groeneveldt's translation (1960: 61).
18. For an overview of the official Chinese standpoint see Fairbank and Teng 1941: i38ff.
19. Eg., Blusse 2013; Rahusen-De Bruyn Kops 2002; Wills 1984.

20. For the nature of Perso-Arabian maritime trade to China see, eg. Barendse 2002; Hourani 1963, Kuwabara 1928,1935, Margariti 2007; Morley 1949; Sheriff 2010; or Smith 1995.
21. Thus, e.g., occurred the peak of Insular Southeast Asian missions to the Liu Song during 'the peaceful and booming years of the yuanjia era (424-453)' (Theobald 2000-) in the reign of Wendi, the longest regime of the dynasty, while the unsettled conditions under his ephemeral successors resulted in a significant drop of records; all except one record of "embassies" to the Liang Dynasty were noted during the reign of Wudi, who, in stark contrast to his debauched heirs, was 'a competent and kindly ruler, concerned with efficient government' (Bielenstein 1996-7, I: 209).
22. Gauged by Schafer's (1985 [1967]: 22-4) assessment of a 'rather leisurely journey' of a government official and his family in 809 and a probably swifter 'trip into exile' in 815, still in the ninth century the voyage from Loyang or Chang'an to Lingnan took three to six months.
23. Wolters 1975 [1970]: 25-6, quoting the Nanqishu.
24. Wang Gungwu 1958:121; Bielenstein 1996-7, II: 86ff; and Fig.1.3-2.
25. Cf, e.g., Lewis 2009: 40ft; Schafer 1985 [1963]: 8f.
26. The actual date of the construction is unclear. Schafer (1985 [1963]: 17, and *ibid* fn.90 for his sources) sees This great work achieved in 716', while Wang Gungwu (1958: 78-9) argues for 728, when a Tang edict ordered the opening of the road.
27. Her proud builder had claimed: The various countries from across the sea may now daily transport their merchandise, so that the wealth can, on the one hand, meet the needs of the treasury and, on the other hand, satisfy the demands of the [...] Yangste Kiang and Huai Ho areas, (the Quantangwerr, Wang Gungwu 1958: 79)
28. Schafer 1985 [1963]: 15, quoting the Buddhist priest Jianzhen.
29. Hartwell 1983:182, quoting the Yuhai and the *Songshi*, cf. Bielenstein 2005: 65.
30. Around 4 500kati (1 kati equates ca. 0.6 kg); Bielenstein 2005: 65; Kuwabara 1928: 27; Wong 1979: Sect 12.
31. Wade 2005:16,17; Wong 1979: Sect2.
32. Wade 2005: 24; Wong 1979: Sect2,
33. For this estimate see pg.83 below.
34. See, e.g., Brook 1981: i66f; Twitchett 1966: 205 ^ 1968: Sgff.
35. For a. comprehensive listing of such imports see Bielenstein 2005: 82ft
36. Cf. Wang Zhenping 1991:15: imported indulgences (among which aromata were the most important) were not only 'an essential of the luxurious lifestyle of the royal



- family members', but "court audiences, ceremonies for worshiping the imperial ancestors, and the lavish granting of gifts to loyal officials, foreign rulers and their envoys consumed quite large amounts of these foreign goods'.
37. A statement by Lu Zhi, advisor to Tang Dezong, regarding plans for the establishment of a "Commissioner for Trading with Foreign Ships" in Annam in 792; Sen 1996: 253, Wang Zhenping 1991: 33.
 38. See, for instance, Twitchett 1996: 22iff
 39. Wang Zhenping 1991:17.
 40. ... not a recent problem, however: as portrayed by Wang Zhenping [1991: 8-9] at the case of a regional inspector of Jiaozhi prefecture, today's Guangdong and Annam, already under Han rule 'such administrative involvement manifested itself mainly in corrupt behavior'.
 41. For the term 'Kunlun', commonly thought to indicate "Malay(an)", see fn. 77 in the preceding chapter.
 42. Cf. Chiu 1973: 63.
 43. Kuwabara (1928: 5-6) argues convincingly that a Ming source describing tax regulations allegedly introduced in 643 is erroneously dated and actually refers to Song Dynasty practice
 44. See, e.g., Li (2006: 41); Schafer (1985 [1963]: 26).
 45. It has been claimed that as 'a merchant's daughter, Wu Zhao had a natural proclivity toward commerce [... and] as a ruler [...] displayed none of the traditional Confucian anti-entrepreneurial bias' (Rothschild 2008:161). 'To curb the wide spread of corruption' at China's main port, she appointed 'Wang Fang-ch'ing [...] a rare example of selflessness in stark contrast with the greed of his colleagues and predecessors [... as] area commander of Kuang-chou' (Wang Zhenping 1991:18). Fangqing 'held the post for several years without exploitation (of the merchants)' (Wang Gungwu 1958: 76, quoting the Xintangshu)} and very likely was involved in the formulation of the edict
 46. Schafer (1985 [1963]: 23), most likely closer to the original *shibo shi* translates the title as 'Commissioner for Commercial Argosies': 'Shi [...] is used as a verb "to trade". The graph bo refers to "large oceanic ships", and shi can be translated as "envoy" or "commissioner"' (Sen 1996: 252); cf. Wang Zhenping 1991: 25.
 47. Eg., Hcng 2009: 24-5; Wang Gungwu 1958: 78,10of.
 48. Wang Zhenping 1991: 27.
 49. Wang Zhenping 1991: 26.

50. Zhou Qingli's accomplice in these indulgencies was, purportedly, a Nestorian monk (cf. Sen 1996: 253; Wang Zhenping 1991: 28): the otherwise spotless commissioner apparently intended to justify his choice of fineries for the upcoming revels by relying on the judgement of a 'greatly virtuos [...] lofty-minded priest [who] had abandoned all worldly interest' (Kuwabara 1928: 7, quoting a Chinese Nestorian inscription).
51. Wang Zhenping 1991: 29. The *Zizhi tongjian* reports that 'he soon was crushed' (Wang Gungwu 1958: 81).
52. Chin (2009 [2005]: 66) notes that 'further information about this incident is not available, but probably it was ultimately caused through the corruption of local officials in charge of maritime affairs'.
53. Chiu 1973: 62; and Wang Gungwu 1958: 80 fh. 45 for other possible reasons. For Yangzhou's role for foreign trade see e.g. Schafer 1985 [1963]: iyf.
54. The two Persian missions in 759 and 762 and the three embassies of the 'black-robed' Arabs, i.e., official representatives of the Abbasid court, in 758, 762 and 763, had probably arrived via the Silk Road, and may have been linked to Abbasid military assistance in tackling the An Lushan revolt (Bielenstein 2005: 358).
55. See Figs. 1.4-1, -2 and Section 1.2: 244.
56. For instance, he 'abolishjed] the old practice of *jianyue*, or collecting precious commodities samples from foreign merchants' (Chin 2009 [2004]: 68) that previously had 'offered unscrupulous low-ranking officials and clerks an opportunity to extort valuables from foreign merchants and to force them to offer bribes' (Wang Zhenping 1991: 32). Cf. Schafer 1985 [1967]: 35.
57. The general charged with quelling the uprising 'punished many of the fellows of the trading ships who had supported the Huang affair [...] and] confiscated their valuable property worth several millions of strings (of cash), and kept it for himself, sending nothing as tribute' (Wang Gungwu 1958: 81, quoting the *Xin-tangshu*); cf. Chin 2009 [2004]: 70.
58. Hucker 1975:190; Lewis 2009: 6of.
59. When eventually returning to the north, his riches vied with the public treasury (Schafer 1985 [1967]: 36).
60. So's translation (1995: 447); cf. Kuwabara 1928: 13.
61. See Abu Zaid's comment that 'sea-traffic at that time [851] was regular because of the great exchange of merchants al-iraq and those countries [India and China]' (Hourani 1963: 76). For the private nature of Per- so-Arabian maritime trade see



fn.20 above.

62. For sources on the events see fh. 163 in the preceding Section,
63. The various numbers cited in the Arab sources (Mas'udi even notes '200,000 Muslims, Christians, Jews and Zoroastrians' [Taher 2003:114]) are probably exaggerated: 'According to [the Xmtmgshu], it says the whole population in Canton at that time was not more than 221,500. Huang Chao, in this case, could not have killed 120,000 to 200,000 as the Arabs reported' (Chiu 1973: 70). One is reminded of the 'upwards of thirty thousand dead [who] lay on the field of battle' (Al-Makrisi, as cited at Halsall 1996-2010) of La Forbie (1244), 3 fight attended by about 22,000 combatants.
64. Christie 1996: 268; Tibbetts 1979: 37.
65. See, e.g., Kurz 2011; Ouyang 2004; Schafer 1954, 2006 [1954].
66. Cf Chin 2009 [2004]: 64f; Twitchett 1966: 222f; Wang Gungwu 1958:101; Wang Zhenping 1991: 19f
67. See Section 1.2: 51.
68. Clark 2009:185.
69. Here the Jiu Wudaishi, in Clark's translation (2009:184); cf Wang 1958: 86 and pg.52f above,
70. *The Xin Wudaishi* Schafer 1954: 353.
71. 'A biography of Liu, preserved in a local genealogy' (So 2000: 33).
72. Clark 2009: 88f; Ouyang 2004: 570; So 2000: 34!; Worthy 1983: 22.
73. Schafer 2006 [1954]: 76.
74. Clark 2009: i8if.
75. See, e.g., Chin 2009 [2004]; So 1995, 2000: 37k Wang Gungwu 1958: 56f.
76. See Sen 1996: 256; So 2000: 45.
77. See Section 1.2: 55! and below.
78. Bielenstein 2005: 40-1; Wang Gungwu 1958:123.
79. Heng 2009: 77k Wang Gungwu 1958: 88f.
80. Bielenstein 2005; Hartwell 1983; Wong 1979; and Figs.1.4-1-3.
81. Cf pg.55 in the previous section.
82. Kurz 2011: 95; Lewin 1973: 154.
83. Pgs. 55f.
84. See Section 1.2: 30f.
85. The lists of embassies available to me leave a number of inconsistencies about the actual dates and contents of the Chinese records: see, eg., fh.42 in the previous

section, and below.

86. The Songshu, Groeneveldt 1887:189; Hartwell 1983:173.
87. See, e.g., Lau and Huang 2009: 26of; Lewin 1978: isoff, i73ff.
88. Cf. So 2000: 42ff; Wheatley 2009 [1959]: 313.
89. See, e.g., Wade 2009: 232b, Zhao Rugua (Hirth and Rockhill) 1911: 64, n.3.
90. See, eg., Barrett Jones 1984; Casparis 1950; Zakharov 2009, 2011.
91. Wade 2009: 233.
92. See fn.20 above.
93. 'Aristoboulos and Megasthenes draw our attention to orthodox Indian views, which consider sea journeys as a crime. Baudhayana mentions samudrasamydha [sea-voyaging] as the first (worst?) of crimes that are punished by loss of caste' (Arora 2005: 69).
94. For the case of the eastern Indian seaboard see Tripathi 2011.
95. Discussions of this term are found in de Casparis 1956: 21 if; and Manguin 1986:199.
96. One of the "Malay" inscriptions in Java: see Section 1.2: 4of.
97. For the former see de Casparis 1956: isff and Zakharov 2009: passim., for the latter, Christie 1998a: 360.
98. See fh.29 above.
99. The section of the record relating this detail appears to be corrupted by both the translator at the Song court and its later translators to English and French (see Damais op.cit; and Bielenstein 2005: 6 for the general Chinese approach at such translations).
100. Though often described as a 'Chinese from Kien-khi' (here, Groeneveldt's translation \op.cit\), this shipmaster almost probably was not Chinese: the Song administration in 976 had announced severe penalties on Chinese-operated overseas trade; 'the ban was reiterated in 994 and the penalties for the offense made harsher' (Heng 2009: 40).
101. Faxian 2010 [1886]: 111,113
102. Cf. Agius 2008: 29, 223f; Buzurg 1981: passim.
103. The *Pingzhou ketan*, Hirth's and Rockhill's translation (Zhao Rugua 1911: 31). Cf. Alimov 2010: 33; Heng 2008:14.
104. See Section 3.1: 22of.
105. Winstedt and DeJosselin De Jong 1956: §10, 39 (Malay), 54 (English); cf. Raffles 1818: 139k
106. The Kamus Dewan Bahasa Melayu, online version, entry *petak*, my translation.



107. <http://kamusbahasainggris.com/>.
108. Flecker 2007; Manguin 1983, 1993b: 265[^], and Section 3.1: 222.
109. See Section 3.1: 232.
110. Matthes 1869: 44ff.
111. The Bugis maritime law; Matthes 1869: 58-9.
112. The manuscripts used by Winstedt and De Josselin De *Jong* (1956) assume that the 'captain' is the owner of the vessel. The Bugis code, however, mentions the possibility of the shipmaster not being the owner (Matthes 1869: 4gf), and Raffles' 'Macasar Manuscript' (1816: i34) states that 'the owner of the Prahu shall be as the Rija, the Nakhodah as the Bendahara ('treasurer')'.
113. The Malacca Code, §§3, 4 (Winstedt and De Josselin De *Jong* 1956: 34-5 [Malay], 52 [English]).
114. In the Malacca Code, for instance, §§2, y, 18, 19 (Winstedt and De Josselin De *Jong* 1956: 32f, 38[^] 43! [Malay], 51f, 53, 56 [English]). The Bugis maritime law even states the master's right to execute a nobleman who had killed a commoner without good cause (Matthes 1869: 59).
115. A list of their duties is found in §1 of the Malacca Code; the pilot's tasks are detailed in §9 (Winstedt and De Josselin De *Jong* 1956: 32, 37! [Malay], 51, 53 [English]). Cf. Sec.II of the Bugis law, describing the navigational tasks of the jurumudi, the 'steersmen' (Matthes 1869: 49Q).
116. Not much is known of the actual organisation and performance of medieval shipyards, be they in the Indian Ocean, Southeast Asia or China (see, eg., Agius 2008: i42ff; Kimura 2010, 2011a, b; Manguin 1980, 1985a, b, 1995; Wang Gungwu 1958: i06ff). For the best studied case of "contemporary traditional" (for my usage of this term see Section 3.1: 217) shipbuilding in insular Southeast Asia, the boatbuilding industries of South Sulawesi, see Horridge 1979; Liebner 1992, 1993, 2004; or Felly 1975.
117. Except for words related to people, Chinese nouns do not denote singular and plural Bielenstein (2005: 83) uses the singular 'ship' in his version of the events.
118. Cf Groeneveldt 1887:189.
119. The eleventh century saw an increasing liberalisation of China's policies for foreign trade: see Chan 2008: passim, Heng 2009: 43K
120. Bielenstein 2005: 41 f; Wade 2005: 7; Wong 1979: Sect2.
121. See, eg., Chiu 1973: 60; Heng 2008: 28f
122. See Bielenstein 2005: 360[^] Hartwell 1983:196[^] cf. Heng 2009: y8f for the possibility

of local Śrī Vijaya agents acting as representatives to the Song court

123. 'Literally, "hard iron"; possibly carburised crucible "steel" (see Section 2.3.6: 205).
124. 'Probably a large white shell of the cockle kind, plentiful in Sumatran waters. The term is sometimes translated "mother-of-pearl".'
125. Cf fn11.36 above
126. The Chinese ounce of 37.3 gr. Underlined amounts denote aromata.
127. The Chinese catty, about 600 gr.
128. The Songhuiyao, as detailed in Wong 1978: Sect 11. The weighed cargo was measured at about 120000kati (ca 721), of which 102 000 kati (ca 601) were aromatics. I estimate the unweighed goods (steel swords, glasswares, sugar, rhinoceros horns, etc.) not to exceed 8t
129. Schafer 1985 [1963]: 137.
130. Wolters 1967: Chapters 7-13. For the most noticeable of these, the true Southeast Asian camphor *Dryobalanops aromaticus*, see Donkin 1999 or Ptak 2002. The trade in aromatics not only included genuine Southeast Asian products: see Section 2.3.7: 213 for re-exports of Middle Eastern frankincense from Śrī Vijaya.
131. Donkin 2003: xviii and his *Chpti*, passim, Newcomb 1963: i3of; Turner 2005: xxif, 26f
132. The only révisable claim of an early archaeological find, proposed cloves in a late third-millennium settlement on the upper Euphrates (Buccellati 1983:19; Liggett 1982: 9, 10 Pl.5.), seems to be a misidentification of myrtle, 'a typical Mediterranean plant, widely cultivated [... that] at first glance may appear to resemble clove [except that] the buds of myrtle have five petals, while those of the dove have four' (Vœu 2011:171).
133. Pliny's *caiyophyllon*, the clove' of later sources, is an Indian 'grain which bears a considerable resemblance to pepper, but is longer and more brittle' (Plinius 1999 [1855]: 12.15), thus not the typical nail-like spice with its well-known analgesic effect described in the fifth century. Neither first-century *materia medica* the *Periplus of the Erythraean Sea* nor the custom lists of Alexandria mention cloves or nutmegs (Dioscorides 2000; Huntingford 1980 [1976]; Miller 1989 [1969]; Schoff 1912; Tomber 2007; Vincent 1809). References to 'Han' officials freshening their breath with cloves lead to Chinese sources of the tenth century (see, e.g., Gauler 1987; Hoogervorst 2012:162ft; Ishizawa 1995: 12; Schafer 1985 [1963]: 17ft; cf. Ptak 1993: 4),
134. Donkin 2003: passim; Kätzer 2006-; Turner 2005:11 off; Zhang 2005; <http://www.oldcook.com/en/me-dieval-spices>, last accessed 2012-03-13.



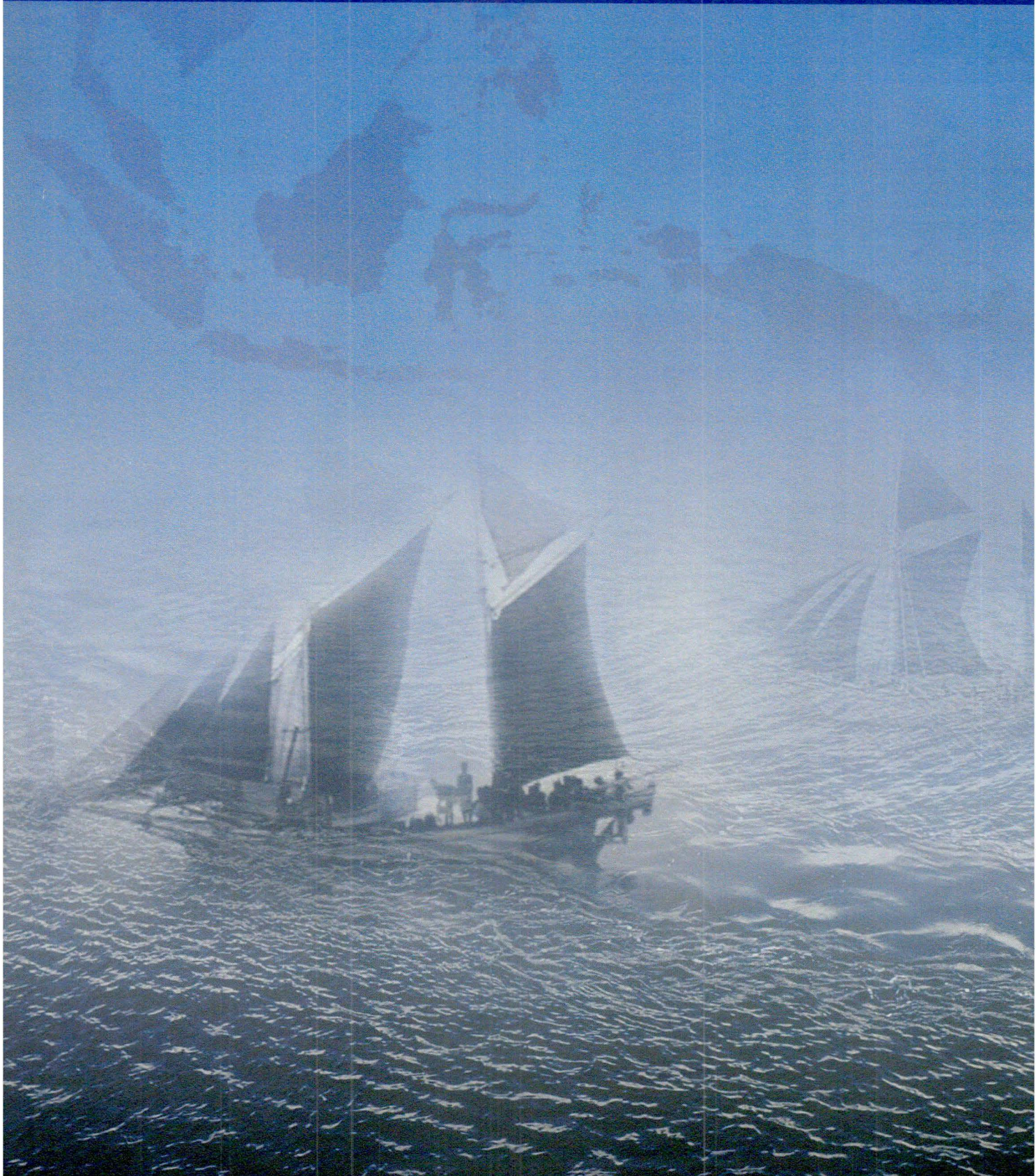
135. See Wang Gungwu 1958: Chpts.1V, V; Welters 1967.
136. McCabe 2009: 288-9.
137. Jordanus 1863; Ma Huan 1970; Polo 1921,1958; Suarez 1999; Tibbetts 1971, 1979; Varthema 1963; Yule 1866.
138. 'From 670 to 742, Srivijaya included two midgets and two "Sengzhi women" in its regular tribute mis-sions to the Tang court, while in 813, 815 and 818, the kingdom of Heling (usually identified as being in Java) sent tribute missions to the Tang including four "Sengzhi slaves", "five Sengzhi servant boys", and two Sengzhi women respectively' (Yang 2006: unpg.; cf. Hornell 1936: 3066.
139. Two stone inscriptions from Surabaya, 1021, and Simpang, 1034; the copperplates of Plumbangan, 1141; Kemulan, 1195; and Gunung Butak, 1294 (Brandes 1913: LVIII, LX, LXIX, LXXIII, LXXXI).
140. Derideaux 2005: 'Note on the Inscriptions found on Java'.
141. This trade, using "product" from East Africa, began in earnest in the eighth and ninth centuries' (Pearson 2008: 85). €€ Section 2.3,7: 212.
142. Adelaar 2006: 12; Manguin 1993a.
143. Cf Mauny 1965.
144. See Section 1.2, fn. 77.
145. Bielenstein 2005: 59; Wong 1978: Sect 11.
146. Besides the present ship, the Intan and. Karawang wrecks (Flecker 2002; Liebner 2009c, d, 2010).
147. See, for Instance, Edwards McKinnon 1979,1981,1985, 1995; Heng 2009: ijffi; Lam 1985; Manguin 1992, 1993c; Southeast Asian Ceramic Society (ed) 1979.
148. The Ghaznavid historian BayhaqI, 1059; Whitehouse 2011.
149. For Persian attempts at copying Chinese ceramics see Hallett 2011; Whitehouse 2011
150. Guy 2011: 2of; Whitehouse 1978: i6ff.
151. Flecker 2001a, 2008.
152. Heng 2009:174ft; Kerr and Wood 2004: 653ff.
153. See fn.147 above.
154. Barrett-Jones 1984: 22f; Christie 1992: passim.
155. See Section 4.2: 306.
156. Flecker 2002: 1286; Mathers and Flecker 1997: 67F
157. For the former see pg.79 above; for the latter two missions, Wong 1978: Sect2.
158. Margariti 2007:115.

159. Cf. Wheatley 2009 [1959]: 311F



The Siren of Cirebon

A Tenth-Century Trading Vessel Lost in the Java Sea



2 The Cargo

The analysis of the cargo of a sunken ship differs in a number of ways from an examination of a terrestrial site. The principal distinction is absence of an extended time-depth: a shipwreck records 'a single event in time [...] almost like a tomb' (Green 2004 [1990]: 4- 5), but not the protracted sequences of human activities commonly found in sites on land. Green though notes a major difference to a burial - sinking and abandonment of a ship are hardly ever intentional, and a shipwreck site thus 'contain[s] all the material that was on board the ship [...] including] the usually simple domestic wares belonging to the common seaman, trade goods destined for the markets of the world, and the fittings of the vessel itself. Hence, the scope of possible interpretation is limited to the brief time-frame enclosed in the configuration of the ship, her equipment and freight and the personal belongings of crew and passengers, shortly before and during the cataclysmic moments of her foundering.

The Nanhani/Cirebon site appears to be one of very exceptional' cases of 'the most straightforward wrecking situation [...] that in which a ship simply fills with water [and] sinks to the bottom intact' (Muckelroy 1998: 278). Her hull and cargo apparently were (relatively) quickly buried under a layer of sediment that prevented excessive deterioration and ensuing dispersal. As a consequence, the site presented a second distinction to a terrestrial one: a high density of objects confined in a rather small space. As detailed below, all-in-all about 500,000 items were retrieved from approximately 1200 m² of sea bottom. Although not all were and could be logged individually, the available data still contains more than 150,000 records for type, material, categorisations and positions of retrieval of single objects. Compilation process and reliability of these records will be topic of the first section of this chapter.

The two following sections will examine, respectively, the ceramic (2.2) and nonceramic (2.3) cargo of the Nanhani/Cirebon wreck. The stipulations regarding the length of this study do not provide room for a comprehensive discussion of all items unearthed; the choices here made follow the foremost objective of my inquiries, namely, integrating the unfortunate voyage of the ship into our limited knowledge on tenth-century Southeast Asia's commerce and socio-political affairs. The interested reader may find additional information in the database on the DVD accompanying this thesis.¹



Wrecking Process

The aim of an analysis and interpretation of this data should be a 'recreation of the remains of [the] sunken vessel and the people and processes that influenced it' (Steffy 1998: 214). The ship herself, eventually emerging under 2-3 m of cargo and debris, will be discussed in the Sections 3.2 and .3; in the present chapter I shall attempt to examine composition and conformation of her payload and, where information is available, traces of human activity on board. The primary vectors to be considered are possible loss and damage during the foundering of the ship and her post-depositional disintegration and fragmentation. Here, 'although in varying degrees, the same factors are operative on every [underwater] site' (Muckelroy 1998: 268). The Nanhao/Cirebon wrecksite bears close resemblance to the 'typical situation [... of] the famous "amphora mound" of a classical wreck in the Mediterranean' [*ibid*: 278-9], indicating that the ship's foundering, in all probability, was caused by swamping.² The processes governing this type of wreckage are comparably well researched.³ While the cargo of such a shipwreck 'will have been considerably displaced from its original arrangements', it did so 'in a way that can be understood' [*ibid*: 279] and, accordingly, reconstructed.¹

During foundering, and even more so while actually sinking any objects not properly secured and/or of sufficient buoyancy would float away from or fall free of the ship.

When arriving on the seabed, 'the force of the vessel's impact may result in weakening or even cracking the hull open', and, if yet not damaging the structure, at the very least [provide] an opportunity for items to shift' (Wachsmann 1998: 206). If the vessel carries a deckload, at the moment of impact on the seabed considerable portions of these consignments are likely to be thrown off the ship, following the direction of the kinetic forces caused by the collision. During the ensuing gradual collapse of the vessel's structure, items stowed in higher tiers of the cargo would be predisposed to disperse further away from the remains of the ship than those in deeper sections of the hold. Initially, objects closer to the rails or higher up in the deckload would slide off the pile of cargo to settle close to the ship's sides, at first following the hull's list on its bottom planking, later into any opportune direction. Objects from slightly deeper layers of the cargo could glide over those already resting besides the hull to more distant locations. As soon as the hull starts

to break open, all of these items are buried under cargo pouring through the disintegrating planking. Consignments contained deep enough inside any eventual remains of the ship would have the best chance to remain in their initial positions; smaller objects atop such loads though would find ample occasion to drop into lower layers of the site through crevices developing in course of the on-going scattering of the cargo. These processes would continue until the majority of cargo items and the eventual remains of the hull reach a kinetic equilibrium.

For the Nanhan/Cirebon wreck this process is best observed at the example of a number of large storage jars, apparently containers for the ship's provisions of fresh water and victuals.⁵ To be readily accessible, such jars would have been stowed apart from the tightly packed cargo in the hold, preferably on deck or in cabins and other retreats. The recorded jars in all probability represent only a fraction of the overall number of such vessels.⁶ besides the obvious losses through breakage during the protracted burial of the site, any deckload initially not properly secured and/ or of sufficient buoyancy would have floated away or fallen free' off the ship in course of her sinking. When reaching the sea- bottom, jars still aboard ship and stowed close to her rails would have tumbled over her sides at or shortly after impact on the seabed, to become buried in cargo spilling out of the disintegrating hull; in Fig.2-1/ examples for this are found on grid-pointss [Q32] and [Y32],⁸ on the very sea-bottom off the starboard hull Displacement of storage jars to starboard off the wreck parallels the hull's list on the seabed and almost possible had followed the direction of the ship's initial impact onto the ground: it will be seen that considerable numbers of other objects proposedly belonging to the ship's deckload were also retrieved from these sections.

Storage jars initially remaining on board would subsequently have dispersed with the slowly dissolving pile of cargo. It has to be assumed that objects initially stowed in higher sections of the ship should have had better chance to scatter further away from the wreck: the remaining jars accordingly had dispersed widely over the site, and mostly settled on or shortly below the surface of the mound, well beyond the steep flanks of the tumulus (Fig.2-2). One could imagine that their globular shapes here were particularly instrumental, and this notion can be extended to any spherical objects initially stowed in the higher tiers of the ship's payload.



(Endnotes)

1. The database is based on all data supplied by the salvage company to the Indonesian authorities. Compiled in MS Access 2010, the database has to run in a Windows environment.
2. The site itself is described on pgs. g2f below; attempts at reconstructing the last moments before loss of the ship are found in the opening paragraphs of Chapter 4.
3. For this and the following cf., eg., Martin 2011; Steffy 1994: lgSff; the case studies referred to in Wachsmann 2011 and Muckelroy 1998 (here especially his Fig.4); and the relevant articles in part 1V.B, 'Site Formation Processes' in Babits and Tilburg (eds.) 1998.
4. An animation of the Brunei wreck in the documentary *Sultan's Lost Treasure* illustrates graphically how 'careful mapping of a shipwreck can provide with an understanding of where cargo was stored in a ship before it sank' (http://www.pbs.org/wgbh/nova/sultan/media/arch_01q.html).
5. In contrast to a considerable number of comparable vessels found on the Belitung wreck (Flecker 2001a: 339, 342; Krahl 2011b: 195), here none of these jars contained other ceramic objects; instead, in at least one were discovered leftovers of provisions (see Section 2.2:124).
6. Cf Section 4.1: 296.
7. For explanations of the distribution chart in the figure see Section 2.1: 99!?
8. See 'Writing Conventions': grid records are noted between upright lines! in the sequence [x-value y-value].

2.1 Data Generation: Excavation or Salvage?

Promoted as 'an exemplary excavation'¹ the salvage campaign from its very start was (and, in point of fact, had to legally be see Section 1.2, 'Legislation') an ultimately commercial operation. If we are to accept that 'commercial salvors are the only ones who have the money to recover [...] and] preserve the eroding archaeological information' contained in the precious time capsule' of a shipwreck (Mathewson 1998: 101), then dependability of the data collection process and the resulting corpus of information are benchmark and touchstone. For the present analysis, in any case, the electronic excavation data is the only available source: access to the physical collection was severely restricted for both broader and scientific public even

before the find was split in half between salvage company and Indonesian government.²

Following an agreement signed in 2009³, the original excavation records, 'data, plans, photos and drawings' are presently kept at the Musée royal de Mariemont, Morlanwelz,

Belgium. The website developed by the museum presents a short general overview of the project and a number of arthistorical studies pertaining to particular cargo items. The weekly excavation reports (hereafter abbreviated ER)⁴ and copies of the various spreadsheets used to register and document the retrieved items throughout the diverse steps of the operations should be held at the coordinating bureau of the National Committee for Salvage and Utilization of Valuable Objects from Sunken Ships (PanNas BMKT) at the Ministry of Marine Affairs and Fisheries, Jakarta. By Indonesian law these are in the public domain. One of my eventual tasks was the compilation of a comprehensive database covering all of the available data on the registered objects. This catalogue was repeatedly supplied to all parties involved in execution and evaluation of the find and is the main source for the following examinations. An abbreviated version of this database is found on the DVD accompanying this study.

Retrieving the cargo of a heavily burdened ship from a depth of more than 50 m is a task for trained divers. Two of the three chief divers of the operations, Jean Paul Blancan and Daniel Visnikar, certified C.A.H. Classe III⁵ commercial divers, had acquired experience with archaeological research on the under-water excavations at Alexandria, Aboukir and the salvage of the Manila galleon San Diego⁶. The third chief diver, Fred Dobberphul, a CMAS⁷ instructor and University of Hamburg M.A. in oceanography and research diving, had joined the salvage of the Belitung and Intan wrecks as head diver after the excavations in Alexandria. As it proved impossible to find experienced personnel in Indonesia, most dive group leaders were recruited from abroad, giving preference to applicants with experience in salvage operations and/or deep sea diving. In accordance with an initial agreement with the Indonesian Research Agency of Marine Affairs and Fisheries, a number of Indonesian commercial divers were trained in deep water diving and underwater salvage in the course of the operations.

Diving regimes are detailed under the heading 'Equipment and Procedures'



in the first part of this section. Depth and the associated dangers were handled well: throughout more than 24,000 dives to a depth of more than 50 m no major accident occurred. During the sixteen months of operations the on-site decompression chamber was used less than handful of times and for preventive measures only. On the other hand, short bottom times, restricted visibility and the dense concentration of objects did not always encourage application of a strict scientific protocol. It will be observed in the account of the grid layout below that the excavation progress throughout the site frequently followed opportunity (and, possibly, economic considerations), resulting in considerable distortions of the spatial recordings.

Further limitations were, unquestionably, triggered by the hapless events related to the administrative handling of the find (see Section 1.2). The perhaps most critical drawback occurred when the base line chains marking the grid layout became displaced during the enforced halt of operations on sea between November 2004 and February 2005. A comprehensive review and emendation of the data, planned for the months after the conclusion of the field campaign, was stalled by the ensuing 'Cirebon Affair'. As a consequence, the extant corpus of data will not, as initially anticipated, enable us to generate an authentic effigy of the wreck site. The critical analysis of the available information attempted below cannot but propose a "virtual" approach that, for reasons presently discussed, in many an instance will remain open to interpretation.

Choice, handling and recording of the retrieved objects on the site are described under heading 'Registration and Grid Records'. The main focus was salvage of the ceramics: pottery comprises the vast majority of the surviving objects, and it was this cargo segment that was anticipated to generate the greatest returns. Throughout the field campaign the (Indonesian) overseers and administrators accordingly distinguished between 'commercial artefacts' and 'non-commercial samples',⁸ and limited access to the former. On-site registration routines divided the ceramics into 'complete artefacts', worthy of individual registration in the main data, and 'restorables' and 'shards'.⁹ Items of both of the latter categories were not catalogued, but registered in batches only; any analysis thus has to rely on the former objects only.

Treatment and classification of the individually registered objects are topic of Subsection 2.1.2. As they are the starting point for any further analysis, I

here attempt to survey and compare the categorisation schemes applied on the site and in the depository of the salvaged objects. Although the available data seems sufficiently detailed, it will be seen that the two approaches are not consonant, and that neither is sufficiently reliable and consistent to allow for comprehensive examination and comparison. Moreover, information on the reasonings behind the categorisation choices made is not readily available, and a number of lacunae in the records encumber endeavours at an inclusive assessment. As a result, it will be necessary to partly reconsider the classifications of, first of all, the ceramic export wares,¹⁰ the topic of the following section.

Retrieval of the Nanhan/Cirebon cargo was a multi-million-dollar operation, financed solely by private investors. The usual motive for such an investment would be the generation of sufficient returns, and, as debated in Section 1.2, more often than not entail the idiosyncracies of a treasure hunt. On the other hand, without the considerable efforts of its recoverers, this wrecksite would have, inevitably, fallen prey to looters, and the information it contained irretrievably lost.

(Endnotes)

1. <http://cirebon.musee-mariemontbe/project-history/an-untouched-wreck-an-exemplary-excavation.htm?lng=en>, last accessed 2013-08-15.
2. See Section 1.2, 'The Cirebon Case'.
3. <http://cirebon.musee-mariemontbe/project-history/the~excavation~data-in-mariemonthtm?lng=en>, last accessed 2013-08-15.
4. The progress reports submitted weekly to the Indonesian authorities in the following will be noted by date, others by date and author.
5. A standard by the French Institut National de Plongée Professionnelle, certifying the ability to dive with mixed gases, saturated and unsaturated, to depths beyond 60 m.
6. For the Alexandria excavations see, e.g., Goddio 1998; Goddio and Bernand 2004; Cleopatra's Palace 2000; for Aboukir, Foreman and Philipps 1999; for the San Diego, Desrouches et al. 1996.
7. Confédération Mondiale des Activités Subaquatiques, 'World Underwater Federation'.
8. ... i.e., objects 'that do not have a sales value', Permit for Landing Artefacts..., 109/Sek-PN/BMKT /IX/2005, 5 September 2005, Secretary of the Panitia Nasional BMKT to Director of FT Paradigma Putra Sejahtera This division was upheld until 2008.



9. Not all objects classed into the two latter categories were examined when surfaced: a bowl bearing a date possibly related to its production (see below) was found in course of a recheck of the 'restorables' in 2006.
10. In this thesis, 'ceramic export wares' will be used to denote ceramic vessels in the ship's payload that were not used for domestic purposes during the voyage, such as cooking or storage (for an example of this difference cf. pg. 215 below). Such ceramics could encompass any 'ceramics that were traded throughout Asia' (http://ceramicsxhalrecom/ceramic_history.htm, last accessed 2014-07-11), ranging from mass-produced "tradewares" of widely varying quality and origin to the intricate "Imperial Wares" mainly intended for consumption and ceremonial purposes at China's courts.

2.1.1 On-Site Operations

The wreck's position is shown in Fig.2.1-1. The nearest nautical obstruction, the northern reef off Pulau Rakit, lies about 47 nautical miles (nm) to SW¹ (Fig.2.1-2): we thus can dismiss grounding as possible reason for the ship's misfortune.² The nearest shore is at Indramayu Point, about 73 nm SWbS from the wrecksite. Charts report depths at Lowest Astronomical Tide of 47-51 m in the vicinity of the wreck; the initial bathymetric recording, done in March 2004, found a water column of 51 to 54 m³ above the surface of the mound of artefacts (Fig.2.1-3).

The wreck-site had not developed into the ring of ceramics' (Flecker 2002: 27) reported for the Java Sea and Intan wrecks: the highest points of the mound, and thus the bulk of the cargo items, were found above the ship, of which about 30 per cent had remained (see Section 3.2). It would appear that the hull had buried itself soon after sinking into soft anoxic sediment on the seafloor that preserved the ship's timbers.⁴ As noted in the opening remarks to this chapter, the resulting mound in many aspects resembled the 'das-sieal wreck' in the Mediterranean, where objects falling off the vessels topsides and tightly stacked cargo inside the hull turned into a trap for waterborne sediments, thus creating its own tumulus' (Muckelroy 1998: 279). The hull's remaining structure so preserved seemingly prevented succedent dispersal of the lower layers of cargo. Around the mound subsequently developed a trench of up to about 5 m depth below the surrounding seabed.⁵

No records of fauna and flora atop and around the mound were taken.

As visible on video recordings, the site had attracted schools of fish, and hence ground-net fishermen, its initial discoverers. Nutrients whirled up by the dredging operations drew in more fish, both herbivores and their predators: divers reported 'thousands' of barracudas swarming over the wreck site, and 'hundreds' of stingrays that occasionally stirred up thick clouds of sediments when operations claimed their hiding places.⁶ Cavities in the tumulus were occupied by groupers, and the divers observed occasional visits by whale sharks. The site's largest persistent inhabitant; a marble ray, stayed throughout the salvage operations; and was awarded a minor role in a popular documentary film on the find.⁷

Mapping the Site: Grid Layout

Assuming that the elongation of the mound reflected the orientation of possible remains of a ship underneath; chain baselines tagged in meters were laid along bearings of 30°-210°/ 120°-300° to delineate |x| and |y| axes. The angle between these baselines was crosschecked by Pythagorean triangles. The base line chains were assumed to mark] AO |⁸ of the excavation grid; with the highest part of the tumulus lying between approximately |P27:Z29| (Fig.2.1-3). For depth values; |z|; the mount's surface was defined as zero; and; where possible; vertical progress throughout the mound measured in steps of 0.5 m.

Starting in gridS/⁹ the core excavation site was determined by a row of test pits which ascertained the existence of significant numbers of artefacts (Fig.2.i-4¹⁰). As the site's extent and the steep flanks of the tumulus made it impossible (and due to frequently restricted visibility possibly dangerous) to employ grid frames or permanent marker lines; recovery positions were established by two tagged "working lines" set parallel to the baseline chains. Starting in gridS and gridW; these working lines would be alternately moved in steps of 5 m. Depending on the extent of the working area; the lines were connected perpendicularly by one to three guy lines with m-tags. Divers retrieved items along "half- trenches" delineated by previously cleaned sectors, the guy lines and the tags on the guys (Fig.2.1-5). It was envisaged that each team of divers would be 'working at a rate of 1 m²/day (= 3 m³ [given the projected vertical "steps" of 0.5 ra]);¹¹ in practice, however, divers emptied as many or few sectors as their bottom time allowed. Depending on



visibility, the topography of the mound and positions and orientation of the items to be retrieved, it did not always prove possible to set and follow the ideally straight boundaries of the grid. When salvaging in higher and steeper sections of the tumulus, objects naturally would tend to slide down the slope of the half-trench, "fraying" the "wall" of ceramics formed by the excavation efforts; here it was often necessary to retrieve the items in steps or layers.¹²

Wherever possible, areas were cleaned down to the sterile sea-bottom. As the excavation was planned as an essentially commercial salvage, however, the target of the efforts naturally were "intact" items; hence, a number of zones that mainly contained sherdage were initially cleaned cursorily and only later researched comprehensively. Most of these areas are to be found along the edges of the heap of cargo items and, initially left pending as a possible salvage of the structure was anticipated, around the wreck itself. More often than not, the base lines by then had been moved to other positions on the site, and orientation could only rely on estimates. Judged by the daily excavation records, all but one¹³ of these instances are dated into 2005. It will be discussed below that similar problems were encountered when estimating $|z|$ values for grid sectors which some time previously had been cleaned of objects.

Equipment and Procedures

It was decided to use Standard Air because it proved too expensive and nearly impossible to find a secure supply for Heliox and/ or Trimix, mixed dive gases that allow for longer bottom time during deeper dives and reduce the effects of nitrogen narcosis.¹⁴ Diving times were based by Comex Air Diving Tables,¹⁵ and bottom times were restricted to about 20-25' per dive, plus around 90-120' for decompression. A first decompression stop for working divers was at 15 m, followed by stops at every three meters. To accelerate decompression and increase safety margins, the divers breathed 100% oxygen for 10' and 15' at, respectively, 6 m and 3 m depth, provided by surface supply.

Divers worked in teams of three, each under a team leader proven to be adapted to nitrogen narcosis: initially, narcosis related disorientation had been a problem for a number of less experienced divers, and several had to be replaced. Diving time was divided into a morning and an afternoon

shift. Following necessity, a chief diver would set the guys de-marcating the projected daily working area in the early morning, and, if required, adjust the lines for afternoon dives. By the end of the operations, more than 24,000 individual dives with average bottom times of about 22 were made, equating to approximately 9,000 man-hours, or roughly 375 full days, on the site.

During the first part of the campaign, a 150 ft. barge was used as working platform, to be replaced in 2005 by a former Irish fisheries-research vessel, *MV Siren*, positioned about 10 in off the site by a six point anchor system (Fig.2.1-6). A converted wooden fishing vessel of 24 m length in weekly trips shuttled dive crew and governmental supervisors and supplied logistics and provisions. Including the various overseers, security officers and the ship's crew, personnel on location averaged about 50 people, 20-25 of which were divers.

On the site, sediments were removed by water dredges;¹⁷ larger objects then were retrieved by hand and stored in lifting-baskets (Fig.2.1-7). Sediments (and the various smaller objects embedded in it) taken up by the dredge was collected in crates for further examinations. Surfaced items were cleaned on a washing table covered by a mesh of 1x1mm; any sand and mud loosened from the objects and the crates of sediment were then searched for smaller items. After cleaning the items were selected according to condition and preservation. Artefacts deemed as complete¹⁸ and/ or of any commercial or (as judged by the frequently changing personnel in charge of cleaning table¹⁹) site-contextual value were forwarded to the sorting tables to be individually numbered. Ceramics still preserving an identifiable profile were registered in batches of restorables; all surfaced shards were counted per foot/base of the vessels, but not numbered or batched. About 650 non-commercial samples of various provenance were registered in an own database.²⁰

Objects selected for individual numbering were arrayed on a number of sorting tables following provisional categorisations ("waregroups") based on a catalogue developed in course of the salvage operations. Grouped by their respective categories the objects then were sequentially numbered, and, together with number tags written on plastic labels, bagged in plastic netting.²¹ Where possible, the temporary storage crates were successively filled with objects belonging to discrete waregroups. In administrative theory all of the above steps should have been carried out together with



and/or overseen by the Indonesian archaeologists and supervisors on board. However, depending on the disposition of the respective personnel only now and then were they present at the washing and sorting tables, and, to the best of my knowledge, never joined the registration process.

Registration and Grid Records

Except for samples, records of individually numbered items were kept in MSExcel 2003 spreadsheets of 10,000 entries per sheet. Consecutive numbering was created by the 'autonumber' function of the program. The spreadsheets contain 155,686 individual entries, all but two of which are associated with grid records. Nearly 77,000 items labelled 'restorables' were registered in uncategorised batches in a separate spreadsheet. Although all objects found were surfaced for examination, various administrative obstacles made it inescapable to re-submerge about 260,000 shards at the site.²²

Recording of positions of retrieved items was based on the grids "worked" on a specific day. Depending on the position of the dredges and the quantity of objects encountered within a certain area, the grid-points opened normally amount to more than one.²³ Ideally, initial documentation of surfaced objects, including recording of their position of unearthing, was to be carried out on a daily basis; however, items often enough were logged in batches of several days, especially when the divers were working for more than one day in the same area. As shown in Fig.2.1-8, for the individually registered objects this procedure resulted in sometimes fairly large numbers of items and grid-points registered per day: the graphic reveals peak values of more than 5,000 entries on 50420²⁴ (5,649; 6 registered | xy/z | grids), 50416 (5,386; 7 grids) and 50318 (5,216; 19 grids), and up to 91 (on 50427; 3,892 registered objects) and 99 (50823; 910 objects) recorded | xy/z | grid-points/day. Fig.2.1-9 shows the frequencies of occurrences of multiple grid records for both | xy/z | and | xy | per day; and while about, respectively, 93% and 96% of the daily working area records comprise less than 20 grid-points, on the remaining days approximately 19% of all individually registered objects were retrieved. High values for multiple grid recordings are noticed ever more frequently during the later phases of the salvage activities. The same can be observed for the grid records of the batches of 'restorables', where the contents of the various boxes is associated with between 1 and more than

200²⁵ grid-points.

It was noted in Section 1.2 that during the involuntary halt of operations between November 2004 and February 2005 the base chains of the grid became dislodged. Despite all care taken, the attempts at reinstalling the grid did not succeed completely: while a chart of the grid-points recorded for individually registered objects and 'restorables' in, respectively; 2004 and 2005 shows a seemingly unbroken succession throughout the excavation area, a count of the items retrieved per grid-point notes a conspicuous gap along | N39:0241 | and | Q25:W23 |, approximately in the sectors comprising the "overlap" of operations in the two years (Fig.2.1-10). Compass bearings taken in May 2005 showed that the hull, found under about 200-350 cm of tightly stacked ceramics in the central sections of the mound, was orientated along 5-10/185-190°²⁶ - by June 2005, however, the chief diver in charge assumed the ship to lie in an angle of about 35° against the | y | axis of the grid, 20° counterclockwise off the compass readings taken in May. These discrepancies imply a considerable distortion of the griffs main orientation and become increasingly obvious in gridE, and especially so in the records of sectors cleared around the wreck's stern.²⁷

The majority of the ceramics found inside the remains of the vessel was arrayed in rows parallel to the ship's frames, and could be retrieved prudently only by trailing the courses they had been stowed in, thus (if based on the compass bearings of the keel) at an angle of 60° against the |y| axis. Nonetheless, the chief diver in charge of operations during most of the second part of the field campaign decided to record objects salvaged from inside the ship's hold in straight lines perpendicular to points on the |x| axis, starting at the grid-point most to gridSW where divers in 2005 had again commenced salvage of items from inside the hull's remains (Fig.2.1-11).²⁸

Noted in the right graph of Fig.2.1-10 is a rectangular "block" of registered items stretching over approximately |Q25:ZB33|: it would seem that most of these grid records are associated with objects retrieved from inside the hull of the ship, recorded following "straight" |x(grids. However, based on the few available references it is impossible to unambiguously project the vessel's remains onto the grid (Fig.2.1-12), and none of the possible solutions incontrovertibly supports the above assumption. Crosschecks of a number of grid records taken on days where references to features of the wreck



are available complicate matters further: for instance, objects evidently collected in the vicinity of a possible 'tween-deck placed 9.5 m from the ship's prow²⁹ were recorded under grids [ZB23:ZB27]. Fig.2.2-12 also highlights inconsistencies in the recording of grids evidently referring to the remains of the hull, as, e.g., the sectors cleared under her aft portside in October 2005. Plans to examine and, where possible, correct these inconsistencies had to be called off when the chief diver in charge of most of the 2005 operations failed to return to Indonesia from his home leave. I will consider a possible "virtual" solution below.

Further problems occurred when divers returned for cross-examinations to areas previously cleared of most of the objects they had contained. As by then no reference to the assumed "zero" value for $|z|$ was readily available, such sectors in a number of cases were again noted as $|N\#/0|$ (Fig.2.1-13). Although both three- and two-dimensional projections of the $|z|$ values recorded throughout the whole operation (Fig.2.1-14, -15) appear to demonstrate a logical progress throughout the site, first attempts at analyses of the distribution of cargo items in course of the preparation of my 2008 report had shown rather obvious distortions in the records. While some of the gaps visible in the graphs might be due to activities of looters who had left a number of "holes" in the tumulus,³⁰ they also indicate that it is especially the lower levels of the mound proved technically impossible to retrieve items following the rather narrow limits initially set for $|z|$.³¹

Crosschecks of the grid logs for these gaps disclosed that a number of records in the spreadsheets kept on board the salvage vessel differ considerably from those found in the weekly excavations reports. In several cases these variances appear to be result of inadvertences;³² others remain unexplained.³³ Following consultations with the master divers in charge of the initial layout of the gridding system, it was decided to replace obviously unsequential daily grid records for the core excavation area with values based on their possible consecutive order, as inferred from surrounding areas, the sequential progress of the salvage and the weekly excavation reports. These examinations indicate that throughout 2004 the latter records appear more reliable; for 2005, the grids logged in the spreadsheets in many a case follow a more evident sequence.

Corrections particularly focussed on days where grid records were

noted not for a contiguous area, but for number of discontinued sectors, thus considerably reducing excessive grid counts for a number of dates.³⁴ In course of the crosschecks were also found a number of "overlapping" grid records that seem not to be due to cleaning activities through extended areas of the site³⁵ Where such records coincide with grid-points that were logged as yielding high amounts of objects, they produce obvious irregularities³⁶ when plotted in distribution charts, and in cases compel detailed cross-examinations of the respective records. It, however, proved impractical and exceedingly time-consuming to revise the latter records without access to the overall excavation plan, in all probability now held at the Musée royal de Mariemont.

As a result of the various inconsistencies discussed above, the salvagers' initial expectation that records of working positions and retrieved objects would allow for a three-dimensional reconstruction of the site in a computer is unachievable. To create virtual models that could approximate the spatial composition of the cargo mound a number of further amendments (and, in cases, corrections) of the existing data are inevitable.

"Virtualising" the Site

As noted above, categorisation entries were only given to individually registered artefacts. In case of the export ceramics, the only class of items allowing to compute approximate numbers, objects registered individually on the site comprise 25-28% of the estimated overall quantity of stoneware carried on the ship;³⁷ based on the records kept in the warehouse, percentages vary between 23.7-26,3%.³⁸ Any possible analysis thus can only represent a result of sampling, which in case of the ceramic cargo, however, for even the smallest sample and highest population sizes assumable ranges at a >99% confidence interval with a standard error of <0.3.³⁹ It will be noted that the numerous inconsistencies in the available data considerably reduce this apparently high probability. As such incongruities appear rather randomly in both grid records and categorisations of objects, it is impossible to tangibly quantify the dependability of the results of any examinations involving spatial records and classifications.

As apparent in Figs.2.2-14 and -16, three-dimensional representations of the site are difficult to peruse in print, and cannot easily display quantity and/or types of objects per grid-point, one of the main requirements for further



analysis. For representations of the conformation of the site I therefore decided to use two-dimensional scatter plots that map the recorded positions of objects onto a $|xy|$ grid. One type of such charts, here mainly generated in SigmaPlot 11.0, employs diverse symbols representing attributes of choice (see, e.g.; Figs.2.1-10 and -15), and will mostly be used to plot distribution of categories of objects. As the range of available "incrementing symbols" is restricted by both the program and their discemibility, it also limits the amount of computable objects and categories.

A second type of these charts counts quantity of objects on any given grid-point (see Fig.2.1-4). Hots of this type here are modelled after the charts employed by, eg., Mathers and Flecker (1997: 53) or Flecker (2002: 22), adding, where appropriate, supplementary graphs representing the vertical, $|z|$, distribution of any objects to be examined. In these charts the numbers of items registered per grid square is plotted in intervals that are drawn as black-outlined "stacked layers" of incrementing colours. It should be noted that in both types of plots the programs used cannot chart the results of their calculations into the grid quadrangles, but that "the intersection of grid lines on these plots actually represents the centre of each grid square (Flecker 2002: 22).

The latter type of distribution plots is generated in MSAccess, and thus can be based on "select queries", a program feature that allows to isolate specific records from a number of data tables by a wide range of criteria and linking methods. The settings of the charts also permit to limit ("cap") the highest count represented by its "layers" and to adjust the number of counting intervals to be employed. These functions prove useful when plotting voluminous sets of data: some of the charts are based on datasets of more than 1,000,000 entries, where in cases several thousand of records could occur on any given grid-point. As "steps" with more than 20 intervals do not produce easily perceptible charts on A4 paper, "uncapped" plots would not represent grid-points with record counts that are lower than the "step" intervals and thus omit possibly important information. "Capping" the highest represented amount, then, allows to use "steps" of less entries per "layer" and hence represent grid-points with smaller objects counts. To maintain proportions between charts, for most of the plots based on large datasets I took the average amount of entries on all plotted grids as cap

value, and divided this number into 15 steps. Where employed, counting limits and intervals are shown on the plots in a small legend, written as "cap / step value".

The grid area of key interest would be the remains of the ship and its immediate surroundings. Most charts accordingly map a virtual square bound by | G14:ZN40|, containing 151,947 objects, 97.5% of all items with a grid notation. Fig.2.1-17 shows the distribution of all individually registered objects inside this area, based on the corrected grid data. The plot following the highest count of objects⁴⁰ notes their main concentration along |Y26:Y32|, and secondary clusters over |T26:T32:U32| and |ZA28:ZA34|. A comparable, though more detailed picture is found in the chart "capped" at 600 objects/grid-point. The obvious gap over |U27:U31:X30:X28:V26| in the latter chart about coincides with both an area of major looting activities and the proposed position of a tween-deck in the foreward centre of the hull; the scarcity of objects at |ZC22:ZE31| could note the sizeable concretions of iron implements found in the aftship that would have limited the space available for other cargo consignments.⁴¹ A number of further "holes" left by looters, already seen in Fig.2.1-10, are clearly visible. The conspicuous concentration of objects at |L24| was noted in fn.36 above as one of the points with "overlapping" records.

Judged by the sequential progress of salvage activities, the considerable decline in object counts along |Z26:Z31| appears to illustrate the effects of a "frayed" wall of cargo items: while |P26:W32| were emptied in "stepped layers", the objects in |X26:Z31| seemingly were retrieved without such "steps", ⁴² probably causing considerable numbers of items initially buried in "column" | Z | to "slip" into the former grids. This "fraying" effect is to some extent visible in the overview plot of the whole site using the original data for both individually registered objects and 'restorables' in Fig.2.1-10. A singular "drop" in object counts at 11211 indicates an unexplained recording mistake: this grid-point is logged in the database only on 50427 with 275 individually registered objects.

It was observed above that the grid-points opened per day normally amount to more than one; any individually registered object, however, could obviously be registered to only one point. As it in most cases proved impossible to allocate the surfaced items to a more precise location than



the daily grid records, items belonging to any given provision-al waregroup were to be “divided” into the respective grids by extending spreadsheet cells containing sets of corresponding data (Fig.2.1-18). For any group of items with more members than grid-points recorded on the day of their unearthing this procedure in theory should result in a relative proportional distribution of the objects over the grid; in practice, though, apportioning of $|xy/z|$ values was not as even as would be expected (Fig.2.1-19).

To constrain uneven representation of objects throughout multiple daily grid records, I created a separate database table in which any item is marked at all $|xy|$ grid-points noted on the day of its unearthing, thus “virtually spreading” the objects’ records evenly over the working area (Fig.2.1-20). This process over-represents items surfaced on days with excessive grid records; to produce distribution plots that obviate such entries, I discarded the five days with highest counts of $|xy|$ notations in a third database table (Fig.2.1-21). The latter table contains somewhat less than 1,250,000 entries, representing 147,651 records, about 95% of all individually registered artefacts. Fig.2.1-22 shows examples charts based on this dataset, limited by values proportional to those found in Fig.2.1-17. Here, a low capping value evidently “levels out” suspicious concentrations in charts based on the daily records only.

As the highest counts of grids/day occurred during clearing operations in gridENE, such “corrected” plots over-accentuate amounts of items here unearthed. This is especially visible in plots of waregroups encompassing limited numbers of objects, and will be noted and/or revised where necessary and possible. In, first of all, June and August 2004, the two available airlifts on a number of days⁴³ were apparently worked from rather diverging positions; “spreading” location records over the resulting “discontinued” grid notations thus ensues considerable distortions of the corrected charts for, again, especially waregroups with smaller numbers of members.⁴⁴ Where evident and feasible, such records will be adjusted accordingly and/or noted. Depending on context and available options, I in the following will use combinations of both types of charts, with “virtually evened” plots noted as [cor.] in the small legend containing the capping values.

Due to the various inconsistencies discussed above, any attempt at locating the position of the wreck on distribution charts will remain an estimate. The solution shown in Fig.2.1-23 follows those grid-points that

with some certainty can be related to features of the hull; these are, first of all, those grids explicitly noted as position of the bows of ship in the excavation reports from mid-end July 2004 and, as far as could be observed, the areas successively "cleaned" around and under the sides of the wreck in late September and October 2005 (Fig.2.1-24; cf. Fig.2.1-12).⁴⁵ However, the irregularities in the records for gridS obviously do not allow to draw an apposite outline of the ship's portside.

It has been mentioned that the "straight" columns running from gridS to gridN recording objects salvaged from inside the hull do not coincide with the actual working positions. Fig.2.1-25 (above) also shows that the records taken between 50210 and 50606, when the divers evidently were retrieving objects following the courses of ceramics stacked parallel to the ship's frames, mark a roughly rectangular block that does not conjoin with the grids logged for 40710-4072, the dates during which work was concentrating on the bows of the vessel: instead, the two areas are separated by the gap over |N39:024| and |025:W24| that has been noted as approximating the respective margins of operations between the two years of the campaign (see Fig.2.1-10). I here assume that the straight boundary of the rectangle at |U32:Y32| marks the highest points of the hull's remaining starboard side planking. The considerable number of objects recorded in |O30:U33:Q36:O36|, to gridNW of the "virtual ship", could be result of cargo dispersed into that direction: a number of features of the wreck itself appear to indicate a significant impact of cargo items onto starboard bows, either at the moment when the sinking ship had touched ground or during the early phases of her disintegration.⁴⁶ Were it not for the gap in grid records between the two years of operations, the line between |P26:Z26| then should connect to the sectors "worked" above the bows of ship and the "stepped" grid records for cleaning activities under the hull's portside. The "frayed" corners in gridE thus would indicate spill of cargo over and around the severely destroyed aftship. In gridN, both cleaning activities under the hull's planking and retrieval of objects further outside the wreck were recorded in rows stretching "horizontally" from gridW to gridE (Fig.2.1-25, below); here, a clear-cut distinction to the "vertical" progression throughout the hull will be noted on a number of distribution plots for specific waregroups. I will return to these suppositions in course of the discussions of the spatial distribution of, first of all, plain bowls and jars



below.

As evident from the above discussions, even the most detailed attempt at an interpretation of the available data can only provide an, essentially, virtual approximation of the site. To relate computer-generated representations of the site's composition and the positions of objects to actual features and locations, in most cases it will be necessary to refer to additional information (e.g., date(s) of unearthing, or possible relations to other, better documented objects) and, in many a case, to rely on educated guesses. While the inconsistencies in the administrative handling of the operations by the Indonesian authorities clearly contributed to this situation, it is apparent that a number of the decisions that disarrayed the recording of the site were taken with the aim to increase efficiency of the recovery of the ceramic cargo. The latter approach would be one of the criteria that distinguish commercial salvage from a scientific excavation.

2.1.3 Stotekeeping and Classification Procedures

After provisional categorisation and initial registration, objects were temporarily stored in containers and the cargo space on board the salvage vessel. To avoid their drying out, the items were packed into crates and covered with wet shreds of wool. Transport to the depository in Jakarta was scheduled according to the available stowage space aboard barge/ship and availability of transport vessels. In 2004 the objects retrieved were conveyed to shore in three trips of a small coastal freighter; in 2005 another three voyages were necessary. The remainder of the items were landed when the salvage vessel returned to Jakarta after on-site operations terminated in October.

For désalinisation⁴⁷ and storage, the salvage company rented a vacant stable complex belonging to a defunct horse-racing course in the southern periphery of Jakarta, in the following noted as "warehouse". A number of empty concrete box stalls were converted into désalinisation tanks by lining them with plastic tarpaulins; others were used as storage space. Restoration workrooms, administration offices and drafting studios were installed in two adjacent buildings, and sorting tables and two additional tanks of 4x4x1 m, constructed of rack boards lined with tarpaulins, set up on the lawns of the premises. Not all objects were forwarded to the warehouse: on demand by the Indonesian authorities, about 1,000⁴⁸ items of a putatively higher material

value were after landing submitted to a safety box in a Jakarta bank, thus preventing attempts at further preservation. These comprised, mainly, objects of precious metals, semiprecious stones, pearls and various kinds of beads, and were only in 2008 transferred to the main storage facilities.

Desalinisation and Administrative Handling

Indonesian authorities demanded that all objects arriving at the warehouse had to be re-registered before désalinisation could commence. These procedures involved a short dozen of warehouse hands seated in rows of facing pairs on the lawn of the premises; one person would open the plastic netting, remove the tag and object it contained and read out the number, to be noted on a sheet of paper by his/her co-worker. The objects then were repacked (more often than not in clusters of several items or even as whole contents of a given crate), placed in a new box and carried to their allotted désalinisation tanks.

The handwritten lists were subsequently entered into a number of MSExcel spreadsheets. Salvage company executives in vain criticised these procedures as a time-wasting measure preventing imminent désalinisation and a possible source of errors.

Comparisons between the on-site MSExcel sheets supplied with any consignment sent to the warehouse and the "cross-checked" lists revealed a number of inconsistencies. The original numbering of the objects had been produced by the "autonumber" function of the program; governmental supervisors, however, after compilation of their own inventories frequently claimed that the on-site artefact lists and/or the actual consignment of objects contained duplicated numbers. I suspect that such irregularities were caused by mistakes during the manual re-registration process, but am not aware of the nature of the applied solutions: the data eventually supplied to me contained no duplicate artefact numbers. It is more difficult to explain how registration numbers of objects that in all probability would have been stored in the bank vault were allotted to ceramic items evidently in the warehouse.⁴⁹ As I was not involved in the registration processes in the warehouse, I am not in a position to clarify the whereabouts of the "cross-checked" lists and/or the valuables in question.

Désalinisation was effected by both changing fresh water baths and



recurrent filtering of the water in the tanks. Progress was measured by salinity meters. To inhibit mosquito breeding and assist in the removal of algae, fish, mainly tilapia and plecós, were placed in the tanks. The authorities planned a second check of the objects' registration numbers after désalinisation and before any further handling; in practice this was not implemented consistently. Desalinated objects were cleaned and readied for categorisation, the procedures of which will be described below. After classification most ceramic objects were stockpiled in designated crates containing comparable items, and non-ceramic artefacts kept in separate storage rooms. A "core collection" of outstanding pieces and example objects was hoarded in a number of "showrooms". These activities entailed frequent movements of artefacts and untying of the plastic netting for inspections of the number tags.

Warehouse administration concentrated on store keeping. During 2004 to 2006, the persons overseeing this process for the salvage company changed thrice. As far as I am aware, no attempts at compiling a comprehensive overview were made; instead, the data received with the artefacts was successively disassembled into numerous smaller spreadsheets. These mainly comprised the contents of individual storage boxes and their locations, labelled by a code for the respective box and the categorisation codes produced in the warehouse (Fig.2.1-26). Any additional data grid records, surfacing dates, on-site categorisation codes etc - was discarded in the process.

To ease access to the extant information, in September 2006 I merged the original spreadsheets created on the salvage site into a single MS Access database. Using the registration numbers of the objects as primary key I then recombined the resulting data with the spreadsheets produced at the warehouse. The latter were kept on a number of computer[^] and even after exhaustive searches no data created at the warehouse could be found for 9,775 objects, 6.28% of the 155,687 items registered individually on salvage location. In the combined database table such lacunae are noted by the absence of a categorisation label created at the warehouse.

As far as can possibly be told⁵⁰ for a number of major types of ceramic export wares bowls, dishes, jars, lids and ewers in Fig.2.1-27—the percentages of these omissions are about the same (on average, 5.95%). However, for about 16.4% of the items registered as kendis and stemcups on salvage

location no categorisation entries given in the warehouse could be found, and 800 of the slightly more than 1000 “valuables” that until 2008 had been stored in the bank vault were not re-registered at all. All mirrors, bronze items and the Chinese coins, though, were re-categorised in the warehouse, possibly in course of their being drafted and/or examined.⁵¹ Double-checks of items registered as <B[owl]./loc>⁵² (Fig.2.1-27, centre) seem to suggest that spreadsheets for an undisclosed number of boxes containing specific groups of objects had gone missing;⁵³ this, however, is not readily supported by an assessment of items categorised as <KE[ndi]./loc> (Fig.2.1-27, below).

Further discrepancies in the data became obvious through a comparison of the basic type codes of ceramic objects between the two classification systems, that is, whether an item registered as, for instance, <B[owl][#]> on the salvage location was re-registered as a <B[owlj][0#]> in the warehouse, and not as, eg., a <J[ar][0#]> or <KE[ndi][#]>. It is conceivable that such mistakes could have happened during registration on board ship: to generate their “autonumber” entries it was usual to extend “blocks” of records with the same provisional waregroup code over the respective number of lines; the first and last records in such blocks thus could have been accidentally overwritten by a preceding or following block. A random sample of verified occurrences for a change in the general designation of objects registered under <B./loc> and <KE./loc>, however, did not return instances that can effortlessly be related to such faults (Fig.2.1-28). It has to be assumed that these mistakes happened in course of the re-registration and further handling in the warehouse.

While the inconsistencies in between the two coding systems⁵⁴ render it difficult to determine precise numbers, a report of December 2007⁵⁵ estimates that about 2-3% of the database entries contain such flaws. A number of these discrepancies could be result of ambiguous classification codes: distinctions made between, e.g., 'bowls' and 'dishes' or 'jars', 'Vases' and 'pots' proved rather fluent. The cursory assessment attempted in Fig.2.1-29 seems to show that, apart from such equivocal categorisations (as, for instance, the 1509/12% of 'bowls' re-registered as 'dishes' in the warehouse), differences in basic types of ceramics found in between the two coding schemes are not as high as initially anticipated. A more detailed analysis in the report of 2007, however, had found considerable variances in the amount



of such classification mistakes in between individual code groups (Fig.2.1-30). When such ambiguities occur under classification entries with a small number of members, they are apt to significantly obscure analysis of the spatial distributions of objects, and frequently will have to be omitted from assessment.

Classification Procedures: On Site

As noted above, most of the objects were classified twice: first on the salvage location, and a second time in the warehouse. A third classification, now based on data, drawings and photos only, seems to be under way at the Musée royal de Mariemont.⁵⁶ As I was expressly charged with the remains of the ship and sampling of items that by the salvage team and the Indonesian authorities' supervisors were considered not to be economically valuable, I was not involved in any of the categorisation procedures.

On the salvage location, all objects deemed sufficiently "complete" to be individually registered were assessed on sorting tables, and classification labels devised following the recovery sequence. Any object assumed to be not yet recognised would be given a new code consisting of a short acronym of one or more letters for its category, followed by sequential numbers. Thus, the very first registered item, a 'bowl', was labelled <B1[/loc]>, the second, a bowl of different shape, <B2[/loc]>, and the next different bowl, Art18, <B3[/ioe]>. Any "new" item was photographed, and its measurements, material, colour and a short description were noted. The resulting catalogue was not supplied to the Indonesian authorities; instead, basic measurements, condition, short descriptions and, in most cases, a link to a photograph of an example object are to be found in the soft copies of the salvage data accompanying the weekly excavation reports (Fig.2.1-31).

J.P. Blancan helpfully provided a shortlist of classification codes and measurements used in the spreadsheets kept at the salvage location (Fig.2.1-32). The column "Descriptive" found in the spreadsheets here was omitted: as noted in Fig.2.1-31, the descriptions are too randomly chosen to allow for easy comparison. The list contains 727 entries; however, a comprehensive inventory of all <loc> classification codes found in the spreadsheets logs 821 different records (Fig.2.1-33). I am unable explain the difference, but note in the shortlist omission of a small number of codes for export ceramics and

several entries that would seem to record singular and mainly non-ceramic objects. Conversely, three entries in the shortlist have no match in the inventory.

Fig.2.1-34 endeavours an overview of the various classification codes used on the salvage location. Nearly 98.9% of all individually registered items are ceramics, most of them export wares; classification endeavours thus concentrated on these. Any attempt at an overall categorisation (top right) must remain speculation: I am not aware of a catalogue of criteria that could outline the distinction between the notations of, e.g., a 'bowl' and a 'dish' or 'jars' and 'pots' in the spreadsheet column 'Nam'. As will be noted below, these categories are subject to considerable ambiguities in both classification systems.⁵⁸

A crosscheck of individual code entries (column 'Serial' in the spreadsheets) proved arduous. The criteria noted in a number of columns throughout at least the first 20,000 spreadsheet entries are not presented in a consistent routine, and even items classed under the same serials are often labelled with rather different, if not contradicting, descriptions.

A cursory examination of measurements and photos for a number of such code entries revealed considerable inconsistencies, apparent indications of objects of different characteristics being registered under the same code.⁵⁹ The classification team at the warehouse also expressed their impression that, if compared to their categorisation system, a number of waregroups were registered more than once.⁶⁰ A lucid example for such ambiguities, the various shallow bowls displaying broadened and bevelled rims, will be found in the following section. It here should be noted that the persons in charge of creating the classification entries on board of the salvage vessel were not experts in historic Asian ceramics: thus were the (majority⁶¹ of the) green-glazed stoneware ewers registered under more than 40 code entries on location, of which in the recent categorisations at the Musée royal de Mariemont only four groups and eight sub-groups remained. Not surprisingly, the number of classification codes of the two example categories mapped in Fig.2.1-34 stretches the possibilities of graphic representation.

A further reason for excessive labelling undoubtedly lies in the large number of categories comprising less than six objects. As noted in Fig.2.1-35, for <E./loc>, <J./loc> and <L./loc> code groups with only one registered



item even represent more than 25% of the overall number of the respective classification entries. A cursory crosscheck suggests that most of these objects are unique items.

Categorisation entries for items that could not be grouped into the main classes of ceramics are less structured. 189 objects were registered under <?> or <un>, noted as 'uncategorised' in Fig.2.1-34; 25b items, most of which appear to be at least non-export wares, were given a plethora of 125 code entries, in the figure headlined 'Various'. The latter codes seem to be rather inconsistently chosen: we, for instance, find tripod lion feet fragments under the code entries <Blf> and <Orn>, or tin/lead rings under <Ri>, <Ri1>, <Ring> and <LeRi>. Judged by the available photographs and, where offered, the more detailed records taken later in the warehouse, other rings and tripod fragments—or, for that matter, various other assortments of items akin to individually coded ones—are found under <un> or <?>. Additionally, typing mistakes, unclear designations and/or, possibly, temporary laxity caused a number of both ceramic and non-ceramic objects that should have been grouped under existing codes to end up in both the 'Various' and 'uncategorised' categories. As the additional information in the column 'Descriptive' in many a case is rather randomly compiled, it is not always helpful for further analysis.

Classification Procedures: Warehouse

Comprehensive examinations of data and objects were one of the major tasks of the warehouse team, as conditions on the salvage location did not permit detailed assessments. It was noted above that management of the warehouse changed hands thrice; only the last team included a ceramicist, Peter Schwarz, a master potter involved in the *Belitung/Batu Hitam* and *Intan* salvages. He was assisted by a factor for the Indonesian partner of the salvage consortium, PT Paradigma Putera Sejahtera, who could rely on three decades of experience as looter and broker of antique Chinese ceramics. The rather sporadic contributions by the representatives of Indonesia's Culture Department present at the warehouse were mainly focussed on administrative procedures.

Classification of the export wares was based on measurements and visual examinations, carried out on a row of sorting tables on which objects

coming out of désalinisation were arrayed. As most of the crates on location had been filled following the provisional classification groups, any further categorisations should have resulted in a “fine-tuning” of the waregroups devised on board ship. However, for reasons unknown, the persons in charge decided to design a new classification system.

Already at an early stage of the excavation, company officials had deemed it unviable to market objects that could only be labelled as mass ware; hence they demanded, as far as possible, “individualisation” of the retrieved objects.⁶² Responding to such requests, the classification team devised nearly 2,200 classification entries. 561 of these designations mark the about 1,000 non-export wares and non-ceramic objects registered in the warehouse; many of these are akin to the short explanations found in the column ‘Descriptive’ in the on-site spreadsheets. Fig.2.1-36 attempts to synthesise these entries following their material, often found in the opening of the short descriptive “code entry”, their purpose (for instance, as a ‘sample’), or codes that had already been used in the spreadsheets kept at the salvage location. It is virtually impossible to map the remaining 1,635 code entries applied to the various categories of ceramics; Fig.2.1-37 thus can only draw an outline of their structure. The small differences in the counts of the categories <B(owl)./wh>, <S(tem)C(up)./wh> and <various export wares/wh> in the two figures are due to indistinct code entries omitted in the latter.

To the best of my knowledge, the warehouse team made no attempts at compiling a catalogue that could define the classification choices they had made. The only information offered additional to the code entries are basic measurements of example objects and entries for the “quality” of the items, marked by the (unexplained) codes <++>, <+>, <+/->, <-> and <?>. Where an acronym or short descriptive entry cannot supply enough information, for any further analysis we are left with (if available) a photograph and/or drawing of an example object. The tentative compendium of the first-level codings (in the following, “categorisation [entry]”) in Fig.2.1-38 thus cross-refers to the classifications used on the salvage location.

While a number of categorisations for the ceramics can be explained by educated guesses (here, for instance, <KE[ndi]> and <E[wer]>), others would certainly need clear-cut definitions. Ambiguities in classifying ‘bowls’ and ‘dishes’ in between the two categorisation systems have been noted in Fig.2.1-



29. While such uncertainties often are avoided by defining a diameterheight ratio that would demarcate the difference,⁶³ this was obviously not applied in the <wh> coding structure (Fig.2.1-39). It is evidently more difficult to track the intentions of the classification team when form factors and measurement ratios are open to discussion (Fig.2.1-40).

The categorisation entry encompassing the largest group of items is <B0##/wh>, best defined as comprising "open" vessels (i.e., where 'the diameter of the top opening is of the same size as or wider than the largest diameter of the vessel's body'⁶⁴), all out of unadorned green-glazed stoneware. These objects were classified into 53 groups and 292 sub-groups. A first random validation of these classifications was carried out in December 2007.⁶⁵ Example objects and photographs promptly exposed a number of waregroups with a high degree of similarities (Fig.2.1-41). Examinations of the reported measurements indicated that in most cases the variances in between the noted dimensions for the given sub-groups are higher than those in between the average measurements for the groups in question, indicating that these groupings could not have been based on measurements alone (Fig.2.1- 42). Distribution charts show that the objects were retrieved in about the same sectors of the site. Neither the available photographs and drawings nor the classification team could supply further information.

Uncertain groupings in the warehouse should be reflected in the data compiled on the salvage vessel. Fig.2.1-43 crosschecks the four proposedly "combinable" waregroups of Figs.2.1-41 and -42 against the percentages of notations of <B./loc>. Evidently, classification aboard the salvage vessel had faced similar problems, but arrived at different solutions. As to be discussed in the following section, I assume that these inconsistencies are due to the very nature of any manually produced mass-ware: we cannot expect potters to handicraft tens of thousands of objects to exacting dimensions and identical shapes.

The various incongruities in the classification data indicate that neither of the two classification systems can be taken at face value for any further analysis. In case of the ceramic export wares it is especially regrettable that no catalogue with clear-cut definitions of their various shapes is available. For an examination of the ceramic cargo, the topic of the following section, it will be unavoidable to reconsider the existing categorisations. It will also be necessary to reassess the individual groupings and, in the case of the <wh> classifications, sub-groups.

To arrive at comprehensive solutions this would require a reexamination of a considerable number of objects. Due to the present circumstances this evidently is impossible: to apply the more dependable approaches outlined at, for instance, the analysis of the ceramics in the Karawang find,⁶⁶ a dedicated team would need considerable time of unrestricted access to the items in question.

An uncritical review and appealing presentation of the existing data, on the other hand, certainly would leave the impression that the salvage operations followed thorough routines. Extending this perception onto the consignment of export ceramics in the load could be helpful in marketing items that in most cases cannot be described better than "the plastic crockery of the tenth century", but is not supportive for a systematic and controlled analysis.

(Endnotes)

1. For directional references see Fig. 0.1
2. Possible scenarios for the vessel's last hours are found in the paragraphs opening Section 4.
3. High tides at Tanjung Priok, Jakarta and Tanjung Mas, Semarang, the two stations I could generate data for, in 2004 did not exceed 1,2 m above mean lowest water (computed by WXTide32 4.7), with a prevailing diurnal mixed tide (cf. Tomascik et al 1997: 92; Ray, Egbert and Erofeeva 2005). Based on the readings of depth meters, however, the master divers reported tide- and season-related differences in depth of up to 2 m (D. Visnikar, J.P. Blancan, F. Dobberphul, pers. comm., throughout 2005; the two latter divers, March 2013).
4. Cf Flecker 2002 26: The best preserved wrecks are those that become rapidly buried, and then remain so. Burial prevents teredo [a marine borer most damaging for timbers] attack, and provides an anaerobic environment that slows [...] the chemical and bacterial decomposition of organics.' For sources on wrecking processes see fn.3 in the opening section of this chapter.
5. J.P. Blancan, F. Dobberphul, pers. comm., March 2013; cf. Muckelroy 1998: 278k As the excavation grid was laid inside the "sunken" central area of the site, this trench is not visible on the figures.
6. J.P. Blancan, F. Dobberphul, pers. comm., March 2013.
7. The Treasure, Bernard de Launoit, Christopher Thompson, Hemi de Gerlache, Arctic Productions, aired worldwide on Discovery Channel and associated stations



in 2007/9.

8. See 'Writing Conventions': grid records are noted |in between upright line in this font), in the sequence |x-value y- value/z value j.
9. See 'Writing Conventions': quarters and areas on the grid arc referred to by Mgrid+ ABbreviations for compass-bearings" (Fig.0.1); thus, the "upper-left" portion of the grid, "gridNW". Additionally, references to locations relative to the ship's remains will be used where applicable: eg,, "off portside bow", "under starboard side" (Fig.0.3).
10. Here, individually recorded items are plotted following their grid records as noted on salvage location; the batches of restorables and shards were averaged and divided onto the respective single grids when registered for multiple grid-points. To reduce the possibility of mistakes in counts, numbers for shards were rounded down to the next integer, and records with no or probably unreliable grid allocations were omitted (e.g, the 60 white ware 'restorables' recorded on 50906 for grids |P32:Z040j [=243 |xyj grids], or the 60 items registered on 50709 for grids |ZB15:Z0221 [=140 |x/y |grids]). These procedures reduced counts by about 1136 items, 0.23% of the 494,483 datasets used.
11. [http://cirebon.musee"mariemontbe/project-history/an-untouched-wreck-an-exemplary-excavation.htm ?lng=en](http://cirebon.musee), last accessed 2013-03-12.
12. Cf. Green 2004 [1990]: 244. Retrieval of objects in steps of |z=50-100| is recorded over |P26:W32|, the grids allocated for the foreward half of the wreck. It will be observed below that attempts at stripping down the whole working face along |Y26:ZA35| resulted in considerable distortions of object allocations: 'slippage' apparently caused many of the items in |Z26:Z32| to be recorded in "column" |Y|.
13. Large scale cleaning of areas here is determined as a20 grid-points worked / day. The only date in 2004 that fits this condition is 41106, probably an attempt to clean as much as possible before on 4iios operations had to be temporarily abandoned.
14. Cf., e.g., http://www.tech diver.ws/trimix_eng.shtml (accessed 2010-12-04); Arieli 2007. The former is a mix of helium and oxygen, the latter of nitrogen, helium and oxygen.
15. See[http://www.offshorediver.com/content/index.php?option=com_joomdoc&task=doc_details&gid=76 &Itemid=294](http://www.offshorediver.com/content/index.php?option=com_joomdoc&task=doc_details&gid=76&Itemid=294), last accessed 2013-03-20.
16. All information courtesy J.P. Blancan and F. Dobberphul, pers. comm., February 2013.
17. for the function of which see, eg., Green 2004 [1990]: 256^ Underwood 20n:isof. for a comparison to the procedures here described, the latter author also details

the logistic arrangements applied for a scientific excavation of a (in this case, in-shore) shipwreck.

18. Nomenclature here follows the terminology found in salvage reports and administrative correspondence.
19. Despite continuous presence of (mainly Indonesian) archaeologists on board ship, choice of surfaced objects to be forwarded to the sorting tables was more often than not implemented by persons without scientific background, thus concentrating on items that they believed to be of commercial value.
20. These include a number of smaller objects rejected by the persons in charge of the cleaning table. Most are noted under the entry 'remains on deck - terdapat di geladak' of the salvage vessel in the samples database.
21. Photographs of the process are found at <http://cirebon.musee-mariemont.be/project-history/an-tuitouched-wreck-an-exemplaiy-excavation.htm?lng=en>. For details of the classification process see the following subsection.
22. " See Section 1.1;19.
23. It here should be noted that Green (2004 [1990]: 244) judges 2 m² as 'small grid squares' for underwater excavations.
24. See Section 1.1, 'Writing Conventions': for convenient sorting in the database, excavation dates were formatted as YMMDD; October 14, 2005, thus is noted as '51014'. To clearly distinguish between these dates and any general number, database dates are written in this font (eg., 40721, 21 July, 2004).
25. Eg., 50726, [ZB18:Z024/0~100] = 252 grid-points; see, too, fn.10 above
26. The precise orientation of the wreck remains unsolved. The three divers tasked with recording the compass bearings of the keel reported widely different findings, possibly due to the effects of nitrogen narcosis. Additionally, depending on the positioning of the (fairly small) compass used, the substantial concretions of metal objects inside the hull remains would have caused a now unidentifiable deviation of the readings. The figures assumed here are based on exhaustive discussions of the divers' reports and have been aligned with the grid records reportedly excavated around the hull in the last phases of the salvage operations (see pg.102 below).
27. See Section 3.2: 243: the ship's bows are presumed to lie in gridW, where a number of the vessel's anchors were found
28. ER 2005-10-05, Liebner: 7-8. I am not informed about the reasons for this decision. Possible explanations could be that the poor visibility and the steep flanks of the heap of ceramics in the central part of the site did not allow setting of a parallel



base line further to gridN and/or guy lines between the two base lines. However, there are (unverifiable) claims that these procedures followed demands by the financiers of the operations to work more efficiently.

29. See Figs.3.2-71, 3.3-27.
30. Thus, [J33:34], 11.28:0291, or [ZC23:27] on Fig.2.1-15. A number of further "holes" will be noted below.
31. Cf. Green 2004 [1990]: 244b Here especially of note is a considerable gap at [z 1=250: even the corrected records for individually registered objects contain 13,494 and 30,453 entries, for, respectively, [z]=200 and 300, but only 4397 objects noted under a depth of 250 an.
32. Eg., 50211, in the excavation report copying the entry for the previous day instead of [JR32:R35] found in the spreadsheet; 50318, recording grids 1025:0,32; U26;U3|], where the grid-recording sequence for the nearest dates implies that [Q{ should be read [jj.
33. Thus, differences by one to two grid-points in between the reports and the spreadsheets throughout most of the clearing activities in gridNE in August 2005. Here the spreadsheet records were kept — see below.
34. For instance, 50427, originally noting [D25:E27; E28;E30, E33; 123,24,32; J23; N36:N44; P35:P36; Z25:Z35]. Here, the consulted chief divers observed that bottom time and positioning of dredge equipment would not allow for searches of such an extended discontinued area Crosschecks with the excavation reports and salvage progress throughout the surrounding areas imply that the actually excavated area lies in between [Z26;Z35], here including 'registered pieces from April 25 and 26' (ER 2005-05-01). A number of further occurrences of discontinued grid records are found in fn.43.
35. Eg., [Z28/0-150], registered for both 50427 and 50823; [Z29:30/0-150], on the two aforementioned dates and 50822; [Z29:31/0-150], 50427, 50823, 50824; [JA28/0-150], 50430, 50504, 50507 and 50823; [ZE24/50-100], 50603, 50606, 50727, 50728,50729; [ZF24/50-100]# 50610,50613,50727,50728,50729. Grid records in the vicinity of these show variations of the theme. Most of these inconsistencies occurred in later stages of the salvage operations.
36. Thus were, for instance, during 40715-18 and 40721/22 2463 objects registered onto [JL24]. 1115 of these were recorded on 40722 alone.
37. See Section 2.2, and especially Fig.2.2-1: all registered ceramic objects, restorables and shards amount to 493,996 items; adding up to 20% of looted items and the

possibly unretrieved ceramics, we arrive at overall numbers between 553,395 and 612,794,

38. Reasons for these differences will be explicated in Section 2.2.
39. Computations based on <http://sampsizes.sourceforge.net/iface/#min>, last accessed 2013-05-17.
40. |Y3l:Y32f, 3504 and 3730 items.
41. For both the 'tween-deck and the position of these concretions see Section 3.2; 263f.
42. The available records, mainly 50408, 50413, 50416 and 50420, note 17,147 objects, one of the highest counts throughout the grid, retrieved from jY26;Y32/200-300|. All of the about 5000 'restorables' registered for the respective dates were logged under |w/x/Z26:32|.
43. Eg., 40616, |W19:W20| and |ZC331; 40617, |W19, X18, Y19|, |ZC39|; 40619, |X18, Y15:Y16|, |ZC27|; 40809, |Q24:Q25|, |X21:X22|; 40811, |R23|, |Y21|; 40812, |R22|, |Y22:Y23|; 40813, |Q25, R24, S23|, |Y23, Z21, Z22|.
44. A distinct example will be discussed for "open" whitewares (Section 2.2.2.1).
45. Anticipating a possible salvage of the vessel's remains, the sandbed supporting the hull was left largely untouched until the very end of the operations (see Section 3.2, espec. Fig.3-2.1-8). Only when these plans had eventually to be cancelled, areas around and up to about 1 m under the sides of the hull were searched
46. See Sections 3.2: 250.
47. The process of extracting salt that had been absorbed into an object during its time on the sea-bottom. If not removed, The pressure caused by salts crystallising out of the solution when drying, particularly between the glaze and the body of an imperfectly glazed piece, can lead to exfoliation and cracking' (Flecker 2002: 22). Removal is performed in fresh water baths, dissolving and extracting the salts through osmosis.
48. I do not have a confirmed list of the items stored in the bank safe. This number -precisely, 1,007- Is based on the entry 'safety box' in the on-site spreadsheets.
49. E.g., Art.33694, described as 'Gold sheet, 2 pieces' in the on-site inventory, in the warehouse registered as a (ceramic) bowl; Arti 16534, 'Gold, part of leaf > bowl; Art.47401, 'Pearls, 39 pieces' > bowl; Art3489, 'Rubies, 48 pieces' > lid; Art.29236, 'Garnet, 1 pieces' > jar.
50. As discussed in the following sub-section, the coding systems for the various registered waregroups are not consistent and transparent enough to allow for an



exacting analysis.

51. For the coins see Trigangga 2008.
52. Categorisation records are noted «Between cornered brackets»; <#r?/loc> refers to the provisional categorisations assigned, on the location, <#n/wh> to those used, in the “final” classification in the objects depository on land, the “warehouse”.
53. As detailed in Section 2.2, it would, seem that many of these contain groups of objects that in the warehouse were re-registered as decorated bowls, <BD/wh>. It here is very likely that those items for which <wh> data is still available are example objects kept in the “core collection”, while the spreadsheets(?) listing the contents of boxes with comparable items were at some stage mislaid: all but «B14/100 were not re-registered as plain bowls in the warehouse.
54. No catalogue of definitions for the general types of export ceramics applied on both the site and in the warehouse is readily available. As any computer-based analysis has to rely on sufficiently clear-cut data, a precise number hence can only be calculated via a detailed analysis of all, in the case of the categorisations used on location, at least 750 code groups, a rather time-consuming process indeed
55. ER, 2007-12-05, Liebner; cf. Liebner 2010:17.
56. See <http://cirebon.musee-mariemontbe/the-cargo.htm?lng=en>.
57. Eg., <d26/loc>, <123/100, <l20-23/loc>.
58. For reasons of convenience, here ‘jars’ and ‘pots’ thus were summarised under ‘jars’.
59. Eg., Art.461, classed, as <p3/loc> and. noted as Tot, small, 9 rims, 1 rim on a top’ vs. Art2762, again <p3/loc>, but a Tot with 12 vertical rims’; Art781, <BI7/loc>, coloured <Wh[ite]>, ‘Bowl, white, 5 rims’ vs. Art 1008, a ‘Bowl, 5 rims’ but with a colour noted as <Gr[een]/G[re]y>, or Art3280, <BI7/loc>, a singular ‘bowl’ in <Wh[ite]/G[re]y>; Arts. 10,1727, 4972 and 7264, <J2/loc>, respectively described as ‘Jarlet 2 rims neck 3 cm long’, ‘Jarlet’, ‘Lotus jar, small’ and ‘Jar, lotus jar?’; with colour-codes ranging from <wh> over <Gr/Bl[ue?]> to ? and <Gr/Gy>, The two photographs provided for the latter objects show a small vase without incised or molded lotus petals (the ‘[vertical] rims’ in the former descriptions), one in white glaze, the other possibly unglazed. A number of incongruences in measurements and <loc> groupings will be noted in Section 2.2.
60. Peter Schwarz, pers. comm., 2006/7. It will be noted in the next sub-section that comparisons between the two classification systems leaves the same impression for the warehouse classifications.

61. No concise list of the categorised objects is yet available; cf. <http://cirehon.musee-mariemonthe/la-cargaison/recherche-dans-la-cargaisoahm?lng=fr>, search entry 'ewer'.
62. Pers. comm., with master divers and classification personnel, 2006-8.
63. Cf Mason 2004: Chpt2, espec. Fig. 2.2.
64. Irdiansyah 2011; Licbncr 2009c: Slide 49; cf Fig.2.2-10.
65. ER 2007-12-05, Liebner.
66. See Irdiansyah 2011; Liebner 2009c: Slides 48-71, 2010: 10-4.

2.2 Ceramic Export Wares

The various ambiguities in the existing registration and classification systems discussed in the previous section render it impossible to compute precise numbers of the ceramic cargo. 154,010¹ objects, 98.9% of the overall records in the spreadsheets kept on salvage location, were given entries in the column 'Material' that seem to be related to ceramics. During re-classification in the warehouse no directly available code entries for the material any object consists of were specified; thus, a count has to rely on categorisation codes. Based on the broader classifications proposed in Figs.2.1-37 and -38, here 145,367, 993% of all objects for which a <wh> registration entry is available, appear to comprise ceramics.



Photo courtesy Jean Paul Blancan and Luc Heymans



In Fig.2.2-1 the so called restorables,² and shards, counted by footrings, are added to the above numbers. As salvage efforts concentrated on the central parts of the site, it has to be expected that not all ceramics were retrieved; rather conservatively,³ I estimate the number of unrecorded ceramic objects to range in between 10 and 20 per cent of the recorded ones. Onto these figures have to be added the considerable amount of objects looted before the start and during the forced halt of the official salvage operations.⁴ Calculation of the overall weight of the ceramic cargo is based on the 350 gr of a bowl of rather average dimensions⁵ (Fig.2.2-2).

Clays, glaze and firing divide the vast majority of ceramics into three groups: (i) unglazed or (occasionally) red-slipped earthenwares with, mostly, reddish-brown, crème-orange to light buff coloured bodies; (ii) white-glazed, high-fired stoneware made out of fine white to light grey clays; and (iii) stonewares with fine greyish bodies and a glaze of green-grey to green-brownish colour, in the following addressed as "green-glazed"⁶ (Fig.2.23) Except for the use of the term porcelain for the white-glazed vessels⁷ this classification roughly parallels Widayatfs (2008: 36) grouping of the Nanhān/Cirebon ceramics into '(1) porselin (*porcelain*) (2) bahan-batuan (*stoneware*), dan (3) tembikar (*earthenware*)'. Unfortunately neither of the two classification systems allows for an effortless recapitulation based on these distinctions.

The coding system kept on salvage location comprises entries for 'Material' and "Colour"; as discussed in the previous section, the respective records are neither as standardised nor as thorough as to be expected. For ceramics; the entries for 'Material' note <C[eramic?]>; <P[orcelain?]>; <P?>, <C/P> and <P/C>. 'Colour' is expressed in a number of abbreviations; not all of which are readily explainable. Not only throughout the ceramic data these acronyms show up in a wide range of possible variations and spellings (Fig.2.2-4) Consequently, a crosscheck and emendation of all <loc> groupings related to ceramics cannot but note a considerable number of ambiguous⁸ records (Fig.2.2-5).

Even if 'Material' and 'Colour' entries are corrected as far as practicable, they do not unequivocally match the proposed overall classification scheme (Fig.2.2-6). The figure also details an example for ambiguous⁹ classifications; <B17/loc>, comprising about 65% of the equivocal records: initially described as 'bowl, white, 5 rims' in the <loc> spreadsheets, a comparison to the

categorisations applied to these objects in the <wh> records clearly notes considerable recording mistakes on location. If we are to rely on the <wh> categorisations alone, one would assume that about $\frac{3}{4}$ of the 'ambiguous' records comprise green-glazed objects and about 15% whitewares; the overall figures then could be estimated as about 96%;2,2%;165% for, respectively, green-glazed stoneware, whitewares and earthenware. The remaining objects, marked unidentified¹ in the figures, mainly are unique items of various clays and glazes.

As noted in Section 2.1, the classifications applied in the warehouse consist of a code entry and, in most cases, photographs and/or drawings of an example object. For three main categories, <B[owl]./wh>, <D[ish]./wh> and <C[over]B[ox]./wh>; this coding system differentiates between green-glazed ceramics and whitewares; for the remaining entries we have to refer to the photographic records and/or the respective <loc> classifications.

Where these are insufficiently clear or unavailable; the items in question were marked as 'ambiguous' or unidentified'. Excluding objects that failed to be not given a classification code in the warehouse, figures for green-glazed stoneware, whitewares and earthenware are, respectively, 96%, 2.4% and 1.5% (Fig.2.2-7), showing a slightly higher share of white- wares than the classification based on the <loc> records.

Figs.2.2-8 and -9 compare the two approaches. Classification of green-glazed ceramics and earthenware shows a high degree of compliance between both registration systems, and especially so if the <loc> records are broken down into those made at the warehouse. The most obvious difference is found in the notation of white-glazed ceramics: only about 79% of the objects noted as whitewares in the <wh> coding system were recorded as such on salvage location; the other way round, 97% of the <loc> whitewares were again thus grouped at the warehouse. This discrepancy is, to some extent, due to the 11% of <wh> whitewares that had to be classed as 'ambiguous' in the <loc> records. The figures suggest that the team at the salvage location faced significant difficulties in distinguishing white glazed ceramics from green-glazed ones: above I mentioned an example of such uncertainties, <B17/loc>; others will be noted below. Despite their various other shortcomings, in the following I will give more weight to the <wh> categorisations.



I will begin my attempts at a more detailed analysis of the ceramics with the green-glazed stoneware, to be followed by the white-, and then the earthenwares. To avoid ambiguities in naming shapes, I will use the basic categorisations outlined in Fig.2.2-10 where appropriate. As noted in the figure, acronyms for these form definitions will be written differently from those in the </loc> and </wh> categorisations. They also will not be given the slash and abbreviation for their origin that are applied to the latter, but, where an additional notation for their type is required, a short dash will be used.¹⁰

Ceramic Cargo: General Considerations

As observed on a number of other shipwrecks, the bulk of the ceramic freight would have initially been stowed in tight courses of 'straw "cylinders"' stacked both athwartships and longitudinally in the hull (Flecker 2001a: 339)¹¹. I assume that (most of?¹²) these batches were assembled when the ceramics were readied for transport from their production sites to any following transshipment or staple point:¹³ recurrent handling during un- and repacking undoubtedly would have led to increased breakage and ensuing loss of profits for both manufacturers and traders.¹⁴ For the same reasons, the contents of any such batches would conceivably have comprised ceramics that had been fired concurrently.

The vast majority of the ceramic cargo is mass-produced wares, and it would appear inefficient had these not been manufactured, that is, thrown, glazed, stacked into the kiln(s), fired and subsequently packed, according to corresponding types.¹⁵ Distribution of a number of types of export ceramics over the site will corroborate these conjectures.

To appraise the varieties of ceramics in the cargo, reliability of the available data is a crucial prerequisite. The account of the data, compilation process and the critical valuation of the resulting body of information in the previous section demarcated its limited dependability and consistency. Accordingly, it will be necessary to crosscheck and rephrase considerable sections of this data. These inquiries will follow approaches recently developed for the ceramics of another, yet unpublished tenth-century wreck find, the so called Karawang cargo,¹⁶ for the present case but applied to the secondary data provided by the salvage company.

The analysis calls for an evaluation of various attributes of the ceramic vessels and their distribution over the site through a wide range of diagrams and graphic representations, I will detail the methods employed on the example of the decorated green-glazed ceramics, but in consideration of the overall questions addressed in this study and the stipulations regulating its form and length, for most of the other ceramic objects here I can only give an outline of the process. For similar reasons I will have to restrict the discussion to the most prominent (be it by numbers or artistic accomplishment) of the hundreds of types of ceramics unearthed from the wreck. The interested reader may find detailed descriptions for classification processes not discussed in the text and overviews of all registered objects of the Nanhan/Cirebon cargo on the DVD accompanying this thesis.¹⁷

A word of caution is necessary regarding attempts at classifying early export ceramics. Many of the lavishly illustrated tomes on Chinese (and other) pottery are works of dedicated connoisseurship, presenting, largely, singular highlights of the ceramic arts. The cargo of a "ceramic shipwreck", on the contrary, contains ceramic wares counted in tens of thousands, the majority of which would belong to the more mundane sorts hardly ever chosen for the coloured pages of an exhibition guide or a collectors' *enchiridion*.¹⁸ When found in the context of a habitation site or kiln, these everyday wares are generally reduced to shards and hence, more often than not, of only limited referential efficacy; and even here numbers and thus the scope of possible collations tend to be restricted.¹⁹ Referencing shipwreck ceramics to published pieces of a comparable provenance thus often trails episteme and, not rarely, bias of the latter's publishers. Indeed it seems that nearly every new discovery of a ceramic cargo yet 'is remarkable for greatly expanding our knowledge' of Chinese ceramics (Liu 2011:145, here on the Belitung find) and the particulars of their production and commerce. A hard to dispute benchmark would the physical and chemical footprints of the wares - unfortunately such a certification so far was not on the agendas of the parties in charge of this find.



(Endnotes)

1. The original spreadsheets contained 153,509 entries registered under codes related to ceramics. A cross-check revealed 32 evidently wrong entries. However, on 50926, 532 by their categorisation entries proposedly ceramic objects were not given a code entry for their material. Due to the inconsistencies in the coding system used in the column 'Material' it proved tedious to cross-examine all given entries, and we have to assume that there still is a small number of ceramics that by mistake were given a wrong 'Material' code.
2. "See Section 2.1: ceramics still presenting a recognisable profile
3. Based on the amount of ceramic items registered for the test pits outside the core salvage area (see, e.g., Figs. 2.1-4, and -15), the gridded but not comprehensively excavated sectors could have contained ca. 24,000 further ceramic items, about 15% of the overall number of individually registered ceramic objects,
4. See Section 1,2: 17,
5. Cf. Flecker's 'approximately 0.35 kilograms¹ for his "average bowl" of the Belitung cargo (2011: 107).
6. The term 'green-glazed' was chosen following the advice of the late Roxanna Brown (pers. com., April 2008) that "greenware" in Western pottery terminology is employed for 'unfired day vessels'. I though am aware that what are known in the West as "celadon" "Yue ware" and so forth are but variants of qing-ei, or greenware [...] strictly speaking, "green-porcelain"; however, the term "ware" saves the situation as the Chinese definition of porcelain differs from that in the West (Lu 1983: 3; cf. Kerr and Wood 2004: passim, espec. 139F, 529[^] and fn.i below). Lu's (1979:14) observes that 'no satisfactory definition [of such green-glazed ceramics] has so far been devised' is still valid today. It is out of question, that a final classification can only be reached through an analysis of the composition of the various clays and glazes. Both the salvage company and the Indonesian authorities were repeatedly informed on the possibilities of such an analysis and supplied with sufficient samples. I am not informed about any results.
7. See Section 2.2.2, fn.117 below: 'Porcelain is a western term without a firm definition' (Roxanna Brown, pers. comm., April 2008).
8. Here, any <loc> code group that contains a significant number of entries with evidently contradicting entries for 'Material' and/or 'Colour'.
9. <BO./wh> vs <B!0./wh> and <DO./wh> vs <D!0./wh>, The person in charge explained the <.1> as 'Liao', the name of a Khitan polity (907-1125) in northern

China, presumably after the proposed northern origin of the whitewares. White-glazed covered boxes, however, were given the label <[cb]xmg>, against <[cb]yue> for green-glazed ones. I assume that 'Xing' notes the historic kilns of that name in today's Heibei.

10. For instance, <OPOI>, "open vessels, type 01"; <CLS~wt0I>, "closed vessels, small, whiteware, type 01".
11. For the typical packaging of such export wares (though here without the outer envelopes of straw) see Namwon 2008: Fig.8. The stacking arrangements on the present site are readily noted in underwater video recordings; see also Figs.3.3-24, -25, and my attempts at reconstructing the stowing routine in Fig.3.3-34.
12. Divers reported a restricted number of occurrences of different stowage methods, including circular horizontal stacks that could have only been laid after disassembling the necessarily straight "cylinders" known from other shipwrecks. However, no records of such features were taken.
13. Cf. Sjostrand and Sharipah (2007: 59) on Jingdezhen export ceramics, at the kiln sites 'packed in straw bundles and sent to the river for onward transport'.
14. Cf. e.g., the 'serious complaint' of factors of the Dutch East India Company, in 1641 concerned with the transport of porcelain, about 'slipshod packing, handling and stowage of the ware [...] which resulted in much breakage' (Volker 1954:158), or their 1658 stipulation, 'against breakage please add 10 more of each [ceramic object ordered]' (Le Corbeiller 1974: 7).
15. References to the high degree of organisation in ceramic workshops of Tang to Yuan times are found in Kerr and Wood 2004: 428ff; Li 1994 discusses arrangements in Longquan kilns; Finger 1994:12-5 notes sizes of the premises of Yue kilns that unquestionably are of industrial scale.
16. A short outline of these methods is found in Irdiansyah 2011.
17. Explanations and figures for categorisations are found in the folder 'Appendix to Chapter 2'; the database in the folder 'data__nanjhan_ wreck'.
18. Cf. Green 2004 [1990]: 4.
19. See, for the ceramics here to be examined, e.g., Dupoizat 2002, 2008b; or the respective articles in Ho (ed.) 1994.



2.2.1 Green-Glazed Stonewares

Based on their various traits, the green-glazed ceramics in this cargo have been labelled "Yue- (type) - ware",¹ "the world's oldest ceramics that are hard, dense and durable - the ultimate predecessors of porcelain (Krahl 2011b: 185), often noted as porcellaneous stoneware' (here, Orsoy de Flines 1975). A core characteristic of Yue wares are the rings of firing clay supports of which clear traces remain under the base' (Grey 1984: 30) and in many cases on the interior of the vessels. Even similar types of vessels in the Nanhao/ Cirebon cargo exhibit a wide variety of such spur-marks, ranging from the "shape of pine- cones' observed by Dupoizat (2008: 323) on "the earliest export Yue bowls' over "triangular marks' and "elongated scars' (McKinnon 1979: 40, 43) to nearly closed rings (Fig.2.2-11).

The diversity of these marks in a single and, as to be discussed presently, rather well dated cargo of ceramics challenges a number of assumptions around possible associations of spur-mark types and production periods.² As far as I am aware, the classification teams kept no records of these marks.

Pottermarks

The close resemblances of glaze, clay and overall workmanship of the vast majority³ of the green-glazed stoneware imply that the vessels hailed from related manufacturing back-grounds, if not a single production. This impression is underlined by a number of ciphers, presumably potter marks related to the manufacturing process, that were carved into the outer base of a number of ceramics. The classification teams kept no register of these marks; for examinations we thus have to rely on the available photographic records and drawings.⁴

The most common mark is 大 [*da* [Mandarin] / *te* [Hakka]: 'great; big; major, important'), reportedly found on about 10-15 Per cent of a wide range of the green-glazed ceramics.⁵ With the exceptions of the ewer, Art.6702 <E33/wh>, and the censer, Art.96771, all other documented vessels carrying this mark belong to the category "open"⁶ (Fig.2.2-12). The available photographic record appears to suggest that 大 is found more frequently under objects of a more refined workmanship; however, the sign was first noted on Art.87, a plain bowl belonging into one of the most numerous groups of "open" vessels. I assume that here choice of documented objects had its say: the

more artistic items were divided into groups with often very small numbers of members and hence photographed more frequently.

大 is among a number of marks found by Flecker (2002:116) on 'brown/green wares' discovered on the tenth-century Intan wreck. He suggests these ceramics to be products of Guangdong and notes that

very similar marks are reported on the base of saggers used in the Zhaozhou Bijashan kilns of Guangdong Province during the Song dynasty. They may have served some purpose during production, such as indicating where the pieces should be placed in the kiln.

In her review of the ceramic cargo of the present shipwreck, Widayati (2008: 39) fleetingly notes the presence of this and 'several other signs', but maintains that 'until now the meaning or significance of these letters are unknown'. A second sign seen on a small number of photographs⁷ and drawings of "open" vessels is 上 [*shang*, on top, upon, above, upper; previous; first [of multiple parts]', Fig.2.2-13). A catalogue to an exhibition on *Trade Ceramics Found on Tioman Island finds both 大 and 上* 'cursory incised on the base' of large storage jars of, again, a proposed Guangdong origin (Southeast Asian Ceramic Society ... 1985:104, 106 Figs. 214, 215). However, 'kiln wastes with incised characters such as 大 have [also] been recovered from the Shanglinhu kiln sites; there are also many other characters such as 上, 王, 千, 水, 合' (Nai King Koh, pers. comm., November 2011).⁸ The vicinity of Shangling Lake south of Cixi, East Zhejiang, is probably the most prominent of 'the three principal Yue kiln regions' around today's 'Ningbo, Shaoxing and Taizhou [... which] produce[d] the millions of vessels required for tribute purposes by the WuYue kingdom' (Ruan 1994: 4)⁹

Concurrent usage of these two signs in ceramic production in both Guangdong and Wuyue indicate a shared purpose in production routines; however, I could not find references to their possible function in the literature available to me. If the single hexagonal ewer, Art.30442 (<E41/loc>, <E27/wh>), is related to the hexagonal cup(s) <C2/loc> in Fig.2.2- 13, 上's meaning 'first of multiple parts' would seem rather befitting. However, 大 could well refer to a bigger' or larger' size and/or diameter to, for instance, mark "open" vessels that were intended to be placed in the lower sections of a stack readied for firing; if so, 上 then might have noted objects meant to be positioned in



higher parts of such piles, necessarily thus of smaller diameters. Top and base diameters of an individually measured bowl with a number of 大 on its base, Art.90126, evidently range among the largest of all comparable objects (Fig.2.2-14); in between the vessels registered under <BD022-025/wh>, a set of individually recorded incised bowls of undoubtedly similar shape, and <B052/wh>, two undecorated vessels of the same profile, it is the object with the largest diameters that was marked with 大 (Fig.2.2-15). Where objects were recorded in batches and/ or following proposed waregroups and subgroups, comparison of the available measurements appears to support this impression (Fig.2.2-16, -17).

Photographs and/or drawings of example objects for subgroups of three <wh> ware- groups depict vessels that display 大 or 上. While the diameters noted for <B009./wh> and the sizes recorded in comparable groupings in the <loc> classifications seem to confirm the assumption that 大 and 上 mark, respectively, larger and smaller diameters (Fig.2.2-18), <D008./wh> and, especially so, <D001./wh> leave a more ambivalent picture¹¹ (Fig.2.2-19, - 20). The drawing sheet for <B0l6b-d/wh> details measurements and respective signs — here but vice versa to our expectations, thus confirming the claims by the persons in charge of the <wh> classifications that presence or absence of 大 (they seemingly had not paid particular attention to 上) are not related to the size of objects. In this case, though, <wh> records for subgroups <0 and <d> are not available, and the measurements of subgroup logged in the database somewhat differ from those on the sheet (Fig.2.2-21). Whatever their function, a frequent (and, conceivably, in some not readily explainable way consistent) use of these marks demonstrates that the manufacture of the ceramics followed common routines. It also underlines my impression of 'related manufacturing backgrounds, if not a single production' proposed above with regard to their glaze and clay.

Date and Possible Origin: Yue Wares

A fragment of a bowl, registered under Art.NN, <BD061/wh>, exhibits a short epigraph, 戊辰 / 徐記燒 (燒), *wuchen / Xu ji shao* (Fig.2.2-22). The first two letters mark the cyclical date 'Earth-Dragon', the fifth year of a sexagenary cycle. In the period here of interest, this year count occurs in 908, 968 and 1028; form and decorations of the ceramics as well as a number of coins

found on the wreck indicate 968 to be the most probable of these dates.¹² As it is not a reign title, it has to be assumed that the person noting the date was either not aware of the current era names¹³ or living in an area that, like Wuyue, did not use such periodisations.¹⁴

'*Xu ji shao*' has been translated variously.¹⁵ All attempts, however, agree that 'Xu' is a (personal) name, of either the potter who had left this mark or the 'company' in charge of the manufacture of the ceramics. One of three references to a ceramic production labelled 'Xu' I am aware of is a fleeting note by the Southern Song scholar *Gu Wenjian* re 'Wuni ware, Yuyao ware and Xu ware [that] do not compare with *Guan ware*' (Ts'ai 1989: 26); here, however, 'Xu Yao' is written 续窑 'related to the issue of Song Guan (Imperial) wares', and, as I am informed, has 'nothing to do with the *xu ji* (徐记) mark' found on the above bowl (Nai King Koh, pers. comm., November 2011). Secondly, a 'House of Xu' signed a box 'found in a Song tomb in Haizhou, Jiangsu' (Feng 1983: 38-9) reportedly discovered in 1971. The source available to me yet does not note the letter used for 'Xu', and the find's context appears to point onto '*Jingdezhen qingbai ware*' (*ibid*), not the green-glazed Yue ceramics in this cargo. The third mention is an unreferenced 徐慶記燒 *Xu Qing ji shao* by Kerr and Wood (2004: 531), translated as 'fired by Hsu [Xu] Chhing [Qing] 1 and presumed to mark 'tribute Yiieh [Yue] ware, the highest- quality product of several commercial kilns in the area, some managed by clans with many skilled craftsmen that also made everyday products for general sale'. None of the few other, generally more "graffiti-style" letters and short notations detectable in the available documentary (Fig.2.2-23) supplies further information on the source of these stonewares.

A small number¹⁶ of the green-glazed "open" vessels, covered boxes, jars and ewers display the artistically elegant engravings' (van Orsoy de Flines 1975: 20) in fine pencillike incised designs' (Adhyatman 1987a: 320) that commonly are noted as characteristic to Yue wares of the ninth to tenth centuries. The decorated vessels share not only colour of clay base and glazes with most of the undecorated ones, but, as mentioned above, repeated use of the marks 大 and 上 and hence in all probability hailed from the same production.

Application technique and motifs are readily comparable to a number of illustrations of ceramics identified as Zhejiang wares, and especially so as



products of kilns in the Shang- linhu area:

Of particular note is a three-clawed dragon on a shard pictured at the website of the Singapore-based connoisseur of antique Chinese ceramics, Nai King Koh,¹⁸ which was re-reportedly collected at Si Longkou kiln at the shores of the Gu Yingding Reservoir, about 2.5 km from Shanglin lake. The representation of the dragon's tail and a small circled dot fronting its fangs are similar to the motif on the six objects registered under <DD008/wh>²⁰ (Fig.2.2-24). On the same website²¹ is found an unprovenanced incised shard displaying two parrots with flowers in their beaks and "coiled" around a circled dot, a motif repeated on the six vessels given the registration code <DD042/wh> (Fig.2.2-25). A similar shard with an incised parrot²² design and a circled dot is noted by Mino (1992:15, Fig,2b) as 'found at a Yue kiln site in Yuyao, Zhejiang province', about 20 km to SW of the Shanglinhu area. A further, again unprovenanced, shard depicted at the website²³ shows an early Northern Song Yue incised butterflies' motif corresponding to the one found on <DD013/wh>.

Detailed repetition of complex motifs could have been possible only by a sufficiently proficient and experienced hand or through the use of stencilled templates and/or fine- pointed moulds or stamps,²⁴ I assume that dexterity and/or templates, stamps or moulds would have been valued and well-guarded assets of individual potters and/or particular companies' or kilns. Resemblance of (a range of?) designs on the green-glazed stonewares of this find with decorations in specific kiln sites thus could pinpoint their production site(s). However, my attempts to obtain further evidence proved unfruitful.

Many of the green-glazed "closed" vessels, kendi and ewers present carved exteriors comparable to those found on a number of decorated "open" ceramics. On the latter, these decorations here and there are combined with an incised interior, marked as 'carved, incised' in Fig.2.2-26. The main pattern is the lotus;²⁶ objects with other designs rely on the catalogue of motifs found on the incised "open" vessels. Particularly outstanding are jars with a wide variety of lotus inspired patterns (Fig.2.2-27). Such vessels are well known from a wide range of finds in both Southeast Asia and China, and are commonly associated with any of the various producers of Yue wares.²⁷ Grey (1984: 25-6) notes that

only incised decoration was used under the T'ang, carving starting only in the Five Dynasties period. [...] Contemporaneous with the Shang-lin-hu kilns [are] the group of kilns at Shang-yü [...] and] at Yin-hsien near Ning-po [...] producing carved bowls and jars, on which the lotus was a favourite motive.

Ceramics from other Sources: Guangdong?

The Shanglinhu kilns 'undoubtedly reached their peak in the tenth century when, under the Five Dynasties and Early Sung, they enjoyed the direct patronage of the Wu-Yüeh rulers' (Grey 1984: 30). Recent research, however, notes 'more than 400 kiln locations where Yue wares were made' (Ruan 1994: 4), and around the shores of the Shanglin Lake [...] alone] some 200 kilns operating there mainly throughout the Tang and Song dynasties' (Krahl 2011b: 187). Equally common in finds in Southeast Asia are 'Yue-type' ceramics, wares copying shapes and colour of glaze of the Zhejiang archetypes that were widely produced throughout Southern China.²⁸

Five "open" vessels²⁹ in this cargo display modest designs of deeper and broader incisions that parallel fragments classed by Dupoizat (2002:139 Fig. 6) as Guangdong Xicun ware.³⁰ Their small number and position on the grid indicate that these objects were not tradewares. Two of these small bowls were unearthed in the lowest layers off starboard bows of the wreck, thus probably had fallen off the deck at the moment or shortly after the sinking ship had touched the seabed Two were found in some distance off star and larboard bows in 50 cm depth on the slopes of the tumulus of ceramics, and hence in all probability had initially been in use somewhere on the foredeck (Fig.2.2-28). Judged by the photographs alone, their remaining glaze shows a darker and more brownish tint than that observed on other vessels. I am unaware of any other finds of ceramics with this type of incisions in the Nanhan/Cirebon cargo.

Also of Guangdong origin would be a number of larger storage vessels, often labelled 'Dusun' jars.³¹ I assume that (most of?) these vessels were not tradewares, but containers for fresh water and provisions: a fragmented (and unregistered) jar of this type held a considerable quantity of what are most likely the bones of large tuna.³² Evidently part of the commercial cargo, however, was a group of smaller jars that by shapes and sizes match the squat storage jar[s] with a folded mouthrim, a wide flat base and four [or more]



lug handles' (Flecker 2002:117) often observed in Southeast Asian ceramic assemblies and commonly noted as products of Guangdong kilns.³³ It will be discussed below that the available classification data, the photographic records and their distribution patterns on the site of these ceramics not readily allow for a distinction into possible *Yue Yao* and Guangdong types. The numbers of objects that by their example photographs can undoubtedly be identified as the latter are rather small and hence, again, were not necessarily part of the commercial cargo.

While according to the available photographic record the exterior base of all other "open" vessels is fully glazed, a (compared to the major waregroups) small number of conical bowls display an unglazed lower section and a broad, nearly *bi*-type footring.³⁵ Due to what would seem changing lighting conditions during the photographic sessions and the varying degrees of preservation of the objects, the photographs do not allow for a detailed and unambiguous comparison of the glaze and clay used. There however remains the impression that the paste has a deeper grey than that of vessels that can effortlessly be grouped as genuine Yue wares (Fig.2.2-29). At least on Art.63972 the broader foot apparently encouraged use of broader spurs which had left a slightly reddish stain on the clay that is not readily observed on other green-glazed stonewares in this cargo. Adhyatman (1990 [1981]: 61 and 188, Pl.195) finds 'reddish-burnt spur-marks' and an 'unglazed low footrim' on a vessel of very much comparable shape that she labels as Yue type, *Zhejiang*'; Krahl (2011b: 196; 198; 259, Exhbs. 258, 259), however, depicts conical shaped bowls 'with bi-disc foot' that she notes as 'imitation[s] of Yue wares [...] from the kilns at Guangdong'.

As will be seen below, these vessels share shape and overall sizes with a number of completely glazed ones. On example photographs the bowl's glaze seems less evenly applied and of a perhaps more greyish tint, and their simple conical execution and coarse and shallow feet have no ready match in the more refined shapes of, first of all, the finely incised genuine Yue wares. Neither the available line drawings nor, as far as can be assessed, the photographic record unhesitatingly³⁶ show 大 and/or 上 and while the style of most of the marks on at least the "open" vessels is surprisingly uniform (see Figs.2.2-12 and -13), the only object in this group that carries a letter, Art.39340 <BD057/wh>, bares a positively different hand (Fig.2.2-23). If

we are to look for the 'comparable ceramics of a lesser sort [...] made in Guangdong province' (Krahl 2011b: 194) that are so common in Southeast Asian tradeware assemblies, this group of vessels is a possible candidate. However, neither my endeavours at defining broader groupings for these bowls nor the analysis of their spatial distribution over the site found below could readily support distinctions to the bulk of the green-glazed stonewares. A final assessment will only be reached through a physical and chemical examination of clays and glazes.

Both salvage company and Indonesian government were repeatedly³⁷ informed about the potentials of an analysis of ceramic materials.³⁸ A sufficient number of samples of all identifiable types of ceramic materials were prepared for laboratory examinations. I am unaware of any eventual results. Where the available documentation allows comparison to further objects found in literature and online sources, it will be noted in the following discussion of the individual categories of the ceramic objects. I shall begin with the "open" and "closed" vessels, and then subsequently consider ewers, kendi and covered boxes.

.i "Open" Vessel

It proves impossible to give precise totals for the green-glazed "open" vessels in this cargo: the <loc> codes for categories <B./loc> and <D./loc> do not discriminate between white- and green-glazed objects and contain a number of undoubtedly ambiguous code groupings;³⁹ the <wh> categorisations suffer from mixed up registration numbers and considerable lacunae.⁴⁰ Based on those records for which figures can be computed⁴¹ "open" vessels amount to slightly more than 91% of the green-glazed wares.⁴²

Decorated Vessels

A major division of the "open" vessels readily offering itself is the distinction between objects with carved and/or incised decorations and plain, unadorned ones. However, a considerable number of <loc> categorisations appear to confuse decorated and undecorated objects⁴³ while the <wh> records note categories specifically marked as <B[owl] Dfecon- ated?]> and <D[ish]D[ecorated?]^e>I these in several cases miss out what seem to be records of particular storage crates.⁴⁴ A number of single plain objects



carrying short inscriptions only were also classed as decorated vessels (see Fig.2.2-23). Based on the <wh> data, slightly less than 1%⁴⁵ of the green-glazed "open" vessels could be classified as incised/carved objects, and even if we assume that records for about a third of these objects were lost, their share in the overall numbers does not rise above 1.32%.

All <BD./wb> "groups" are single items, and thus allow for a more reliable categorisation following the methods outlined by Irdiansyah (2011) for the ceramics in the tenth century Karawang cargo. The existing <wh> groupings apparently depend more on the diversity of motifs engraved or carved into the vessels than on their sizes and forms: both two- and three-dimensional scatters of the available measurements clearly show "clusters" of objects, many of which share rather distinctive form features (Figs.2.2-30, -31). Fig.2.2- 32 compares the measurements reported for the core members of the "red" group, bowls with recessed bases and bevelled mouth-rims, marked with a transparent red ellipse in Fig.2.2-30. A punctilious attempt at grouping these items by their measurements, shaded yellow and mauve in the figure, would seem cancelled by <BD038/wh>, displaying the broadest diameter but less than average height and an about middling base. <BD038/ wh> and five items that by their measurements fall into the smaller-sized group in Fig.2.2-32 also carry the lotus-carved exteriors of the majority of these vessels.

Fig.2.2-33 shows the same analysis for objects with a cono-segmental, "U-type" profile (mainly "green" and "light blue" groups, marked with a transparent blue ellipse in Fig.2.2- 30). Here it is even more difficult to subgroup the items by their measurements; and while the two vessels with incised parrots on their exterior are of nearly similar size, measurements of objects with a petaled⁴⁸ shape or carved lotus decoration differ only by millimetres from the former. The same observations is valid for vessels with a conical, "V - shaped" profile ("magenta" group), where again objects with lotus-shaped and plain exteriors are of nearly analogous measurements. Choice of motifs incised into the interior of the vessels also does not readily correlate with specific measurements and/or the exterior design (Fig.2.2-34).

The largest variance of measurements in between the objects examined above is the difference of 3.7 cm between the diameters of the bases of <BD018/wh> and <BD021/wh> ("red" group); averages of the observed variances are <2.5 cm. These numbers fit well into the range of sizes

found in waregroups in the early tenth-century tradeware ceramics of the Karawang find⁴⁹ and apparently mark rather realistic variations of individually hand-made ceramics of similar basic designs and, accordingly, production routines. The incised/carved objects in the Nanhan/Cirebon find yet are the most artistic items of the ceramic cargo, presumably produced by the most proficient potters, and it would appear only natural if less graceful vessels were manufactured with less attention to uniformity of sizes and shapes. I will return to this observation in the analysis of the unpretentiously plain bowls composing the major part of the ceramic freight.

Decorated Vessels- Plates, Dishes, Bowls?

Neither of the two classification approaches adopted an operable definition of shapes and measurement ratios that could delineate the distinctions between vessels labelled as bowls, dishes and/or plates in categorisation codes and descriptions.⁵⁰ A crosscheck of the measurements supplied with the <wh> data accordingly reveals a considerable overlap of objects registered as decorated 'bowls' (<BD./wh>) and 'dishes' (<DD./wh>) in between height:diameter ratios of 1:2.67-3.69 (Fig.2.2-35). Examination of the measurements of all decorated "open" vessels shows that 84.3% of these vessels parade a height:diameter ratio of 1 :<3, thus have to be characterised as at least shallow bowls; if we use Mason's definition of a 'dish' displaying a ratio higher than 1:3.8 (2004: Fig.2.2), there are 56.4% of bowls against 43.4% dishes. These figures are diametrically opposed to the proportions found in the undecorated "open" vessels: here nearly 80% of the objects have a height:diameter ratio of 1:>3, while, according to Mason's definitions, 91.4% of plain bowls stand against 8.6% of unadorned dishes (Fig.2.2-36).

If these proportions reflect consumer preferences, we have to assume that visibility of the decoration was one of the main appeals of these wares: the in many a case highly artistic incisions are more discernible in a more shallow vessel than in a deeper one. A major portion of the market price of any of these objects would have been based on the initial investment in workmanship; hence the decorated green-glazed stonewares were most likely intended for wealthier customers. These would have demanded items that could demonstrate a certain opulence, and for such a display of status probably prefer the dish- type shapes that allowed better visibility of the



incisions. Thus we could presume that the greater part of the incised vessels was not intended for everyday use.

Category <DD./wh> contains groups with both single and multiple members (Fig.2.2-37) ; grouping again prioritised motifs used for ex- and interior decorations. As is the case with <BD./wh> above, three-dimensional scatters of the reported measurements and comparison of the available photography propose broader groupings, where objects of similar shapes and sizes could display a variety of decoration patterns (Figs.2.2-38, -39). A crosscheck with the <BD./wh> data shows that at least two⁵¹ of the vessels registered as decorated bowls match form and size of groups in <DD./wh> (Fig.2.2-40). Except for the plain exteriors of the "orange" and "light blue" group and a preference for variations of lotus flowers and dots' in the latter, choice of motifs on both out- and inside of the vessels does not follow a pattern that can effortlessly be related to their measurements (Figs.2.2-41, -42).

Decorated vs. Undecorated Vessel?

As many of the <wh> entries for decorated "open" vessels contain only small numbers of objects, they are especially prone to mistaken registration numbers and categorisation entries, and hence have to be crosschecked against the records taken on salvage location. Besides highlighting registration errors, these examinations reveal numerous correspondences between decorated and undecorated "open" vessels. For common shapes such assessments return large volumes of data; as a more lucid example I here will use decorated vessels with a broadened and bevelled mouth rim and recessed foot, the "orange" group of <DD./wh> noted above.

Fig.2.2-43 notes all objects that following the <wh> records would fall under this group plus the corresponding <loc> entries for categorisations codes, measurements and descriptions; Fig.2.2-44 lists all vessels that were registered under the respective <loc> codes, double-crosschecked against any additionally emerging <wh> entries. Those objects with <wh> code groups that judged by the available photographs do not conform to the shape here sought are marked 'ambiguous' and are taken out of further considerations (shaded light red in the figure). Comparison of the available photographs insinuates that a number of records in the <loc> categorisation had been

given a code for a similarly shaped but footed bowl (yellow; Fig.2.2-45); these will be treated separately. Objects that did not receive a categorisation code in the warehouse here are assumed to belong into the group here under discussion (light blue). Apparently the <loc> field 'descriptive' notes a number of decorated objects that in the warehouse were registered as plain items; here, however, I will follow the <wh> categorisations.

An evaluation of the measurements found in the two categorisation schemes is shown in Fig.2.2-46. There is no marked difference in sizes between decorated and undecorated vessels.⁵² Two of the three code groups displaying extreme values, <B72/loc> and <B050/ wh>, have a footring and accordingly are higher and have a broader base; their top diameter, however, is only slightly above average. The third footed group, <D69/loc>, is of average size. The group with the smallest of all reported sizes, <B19/loc>, represents 22 out of 72, about 30%, of these objects. Except for the difference in height between the footed and not footed vessels, the highest variance between the various measurements is slightly above 3 cm, thus still in a range tolerable for hand-made ceramics.

The small number of such vessels does not support a comprehensive analysis of their spatial distribution on the site: adding daily grid notations for the "corrected" types of charts over-represents singular items noted on dates with multiple grid recordings (Fig.2.2- 47); as the records in the on-site spreadsheets were not "splitted" over the respective daily working area, a "normal" chart does not necessarily plot their actual position (Fig.2.2-48).

However, the distribution plots clearly indicate that decorated and undecorated vessels were found in close proximity.⁵³

The distribution charts imply that these items initially had been loaded into at least two locations. Nearly two-thirds of the surviving vessels had initially been stowed in the vicinity of a proposed 'tween-deck in the fore-central hull,⁵⁴ from where in course of the disintegration of the ship some had spilled into the deeper layers off starboard midships. One or more smaller consignments had proposedly been placed in higher sections of the cargo and subsequently spread evenly over the site; of note is the spread of objects over gridSE. Four of the seven footed vessels of comparable size and shape noted in the database were recorded on grids close to the ones with a recessed base.



'Broad and bevelled mouth rims' are an explicit shape attribute that is found on a number of ceramics of different sizes. Such mouth rims are present on vessels with recessed bases as well as ceramics displaying footrings. The <wh> records contain six further decorated footed vessels with a 'broad and bevelled rim' of a smaller size, <DD024/wh>; a cross-comparison to the <loc> records, however, here ends in considerable disarray.⁵⁵ These share shape and approximate size with nearly 1,000 undecorated vessels with a comparable mouth rim and foot, registered under <D001./wh>. Cross-comparison with the records kept on the salvage vessel finds the latter objects classified as <D2-3/loc>, <D25/loc> and <D81/loc>.

The available measurements appear to indicate that <D001./wh> consists of two groups of, respectively, larger and smaller sized objects (Fig.2.2-49). The smaller sized ones should be comprised in <D25/loc>; the <wh> categorisations, though, here note considerable ambiguities (Fig.2.2-50). Conversely, the majority of the vessels categorised under <D001d/wh> and <D001e/wh> had initially been registered as <D25/loc> (Fig.2.2-51), suggesting that the <wh> classifications are somewhat more reliable. The two remaining <loc> groups of consequence⁵⁶ break about even into the other <D001./wh> subgroups (Fig.2.2-52).

This distinction by size is, to some extent, confirmed by the distribution of the vessels on the site (Figs.2.2-53, -54). While a major concentration of both larger and smaller objects was recorded below |z=300| at |S27:U32|⁵⁷, roughly amidships over the wreck, about 30%⁵⁸ of the larger objects, but only four of the smaller, were located around the ship's bows. The two concentrations of larger vessels are separated only by the "gap" in between the grid records of 2004 and 2005,⁵⁹ thus should actually mark the same areas. On the contrary, about 14% of the smaller, but only 9% of the larger vessels were logged to gridE of |ZA|, off the hull's stern.

The overall distribution of these objects approximates the findspots of the yet even larger items with a comparable shape discussed above; in case of the larger ceramics in the group here analysed, the two types even "interlace" over |V25:ZA32|. However, no significant spread into grids off the starboard hull is noted for the type discussed last: it has to be assumed that the remaining planking of the wreck had barred objects initially stored deep enough in the midship hold from dispersing to gridN.

All but one of the six decorated vessels of this type were found among or in close vicinity to the undecorated ones. All in all, 125 objects of this shape were recorded on the fringes of the tumulus, some of which are noted along the edges of the plots in the figure; these probably were part of (a) smaller consignment (s) carried in the deckload of the ship. Smaller vessels are concentrated more to gridN, and larger ones to gridS. A further group of vessels with the same rim type and overall shape, but of considerable bigger size, contains 27 objects; all but four of these were located along [Y25:Y32], just aft of the former vessels inside the hull (Fig.2.2-55), where, again, vessels with and without feet, decorated and undecorated, were found in the same grid sectors.

Decorated Vessels and Associated Objects: Major Waregroups

Based on examinations of shapes and measurements, the most numerous of the deco-rated "open" wares are the "red" and "light blue" groups in Fig.2.2-39 (Fig.2.2-56). According to the available measurements, the latter of these groups, shallow cono-segmental dishlike vessels, appears to be divided into subgroups of smaller and larger objects (Fig.2.2-57). A division by size is supported by their distribution: while 73% of the larger sized vessels were recorded in lower tiers in the centre of the hull (Fig.2.2-58), 60% of the smaller ones were found off the starboard planking, mainly during cleaning operations in September / October 2005 (Fig.2.2-59). More telling, however, is the spatial distribution of the various motifs incised into the interior of the vessels (Fig.2.2-60): all except two of the 58 objects with a solar cross and a surrounding frieze,⁶⁰ but only 16 of the 273⁶¹ vessels with other patterns were found during the cleaning off the starboard side of the hull. Objects with parrots and frieze', 46 items, show a distinct dispersal to gridE off midships; those with incised phoenix, 30 objects, are scattered more to gridW. The most numerous type, 185 vessels with 'lotus and dots', had spread over the central part of the hull and close off its starboard planking, with a marked trend to gridSSE not observed for the other items.

These patterns seem to indicate that the vessels initially had been taken aboard in batches sorted by motifs: those with the two rather intricate faunal motifs had probably been stowed in the lower levels of the cargo hold, close to and possibly under⁶³ the proposed 'tween-deck, where the remaining side



planking of the ship had blocked dispersal to gridN; the objects with more modest floral applications had been placed in higher layers of the cargo, and in course of the disintegration of the ship spread over the remaining planking. As they were found furthest off starboard of the hull, the vessels with an incised solar cross probably had been loaded above, and hence after, all other objects of this shape.

A double crosscheck of the two undecorated <wh> waregroups, <D008.> and <D009.>, that judged by their example photographs approximate the shape of the decorated vessels with a shallow conical profile, returns a plethora of waregroups (Figs.2.2-61, -62). It will be noted presently that a number of these code groups show up again in a comparable crosscheck for the "red" group with its broader footring and biconical profile: the classification teams here had obviously faced difficulties in identifying distinctions between the two shapes. The various measurements noted for the undecorated objects also do not effortlessly reflect the division into the smaller and larger groups apparent for the decorated ones (Fig.2.2-63). In any case, a marked difference in size would be of more consequence for vessels with incised decorations: judged by the available line drawings, more complex motifs are of a wider diameter than less intricate ones, and accordingly could be applied only into vessels of a larger circumference.

Distribution plots for those undecorated objects that with some certainty can be associated with the decorated ones⁶³ show a number of similarities to the dispersal of the larger types of decorated vessels with this shape (Fig.2.2-64). As they were found in close vicinity in both gridNW and gridSE, it would seem possible that at least items with a 'lotus, dots, frieze' pattern were accompanying undecorated vessels; the available data, however, cannot explain whether here consignments of decorated objects had initially been stowed close to batches of undecorated ones, or whether the vessels had actually been bundled together. The furthest spread of all items with a shallow conical profile is marked by a single vessel with a 'lotus and dots' motif recorded on [C39:C41] and three undecorated ones found at [B35:B38], on the surface of the tumulus' NW fringe. These could indicate at least one⁶⁴ deckload where decorated and undecorated vessels of this shape had been packed into the same consignment. I will return to this observation in Section 4.2.

Following the <wh> classification, the "red" group of decorated "open" vessels, shallow bowls characterised by a flat and comparably broad base,⁶⁵ a slightly flared foot and a bi-conical to cono-segmental profile, contains 641 objects, marking it the most numerous of all waregroups with incised and/or carved designs (see Figs.2.2-39, -56). Style and motifs of decorations and shape of the vessels compare favourably to a 'well-known and beautiful bowl in the Percival David Foundation', purportedly a product of 'the Yueh kilns at Yu-yao and Shang-lin-hu [...] attributed to the period 950-75' (Gray 1984: 30, 31 Fig.5).

A crosscheck against the corresponding <loc> categories (Fig.2.2-65) marks 35 of the records as ambiguous. 98, about 7%, of the crosschecked records did not receive a <wh> code; as the <loc> data here is rather incoherent,⁶⁴ these will be excluded in the following. Both categorisation systems also note a number of doubtful measurements⁶⁷ omitted in Fig.2.2-66. Again there is a tendency for more detailed motifs to be incised into vessels with a somewhat broader base; however, the type with the reportedly broadest base, <DD029/wh>, has no decorations on its interior base.

The majority of these vessels had apparently been stowed in the lower sections of the central part of the hull, in all probability, again, under the proposed 'tween-deck (Fig.2.2- 67), and hence not scattered to gridN. The charts show dispersal to aft portside off the wreck hitherto not observed; the concentration over the bows of the wreck, however, have also been seen for the smaller undecorated vessels with a broadened and bevelled rim (see Figs.2.2-53,-54). Distribution by motifs (Fig.2.2-68) is less distinct: along | X26:Z26, | in the centre of the hull, all types of decorations are present, indicating that consignments that had possibly been packed according to the designs incised into the vessels were stowed in close proximity. The 210 most common objects, carved to a lotus shape on the outside but with a plain interior, had dispersed the farthest over the site, closely followed by the 162 vessels with a plain exterior and two phoenix and a surrounding frieze on their inside. The type second in frequency, 172 petaled vessels with two butterflies, however, was found spread over mainly gridSW, while the nine petaled vessels with 'butterflies and frieze had dispersed to gridN and gridNE. The objects with the probably most intricate designs, the 39 items with 'phoenix; dragon, frieze' and the 14 lotus bowls with an incised dragon,



were all found in the central parts of the hull.

Cross-comparison with the <loc> code groups associated with this group suggest a relation with undecorated vessels registered under <D008, D009, D012/wh> (Fig.2.2-69). All three of these waregroups have also been found to be related to the shallow conical vessels discussed above (see Figs.2.2-61, -62): I noted that the two classification teams here apparently had confused considerable numbers of ceramics. In any case, the available measurements mark all but subtypes <D001a/wh>, <D008a, l/wh> and <D009a, b, c/wh>, all in all about 500 objects, as notably smaller than the decorated vessels of the "red" group (Fig.2.2-70).

Decorated "Open" Vessels: General Observations

As shown in Fig.2.2-71, about 70% of the "open" vessels with carved and/or incised decorations were recorded in deeper layers over the central hull. The vast majority of those objects that had scattered beyond the remaining starboard planking and to gridW and gridS belong to the "light blue" and "red" groups discussed above. This impression is underlined by the distribution of motifs: of all decoration patterns noted on more than two grid points, all but the 'solar cross, frieze' and the 'two phoenix' were recorded in between [T26:Z28], the central part of the hull (Fig.2.2-72).

Fig.2.2-73 arranges distribution by "basic types" of decoration applied to ex- and interior of the vessels. Here, again, the greatest diversity is found in the central sections of the hull. A gradation by complexity of decorations (Figs.2.2-74, -75) likewise implies that objects with compound types of ornamentations⁶⁸ were concentrated amidships. Thus were the incised/carved bowls in Fig.2.2-75 (and all decorated vessels of a comparable shape, all in all 15 objects) recorded on [R26:ZA32], or the two highly decorated shallow bowls <DD008/wh> (and all but one of the other 53 decorated items with the same profile) over [Q26:Y32], on grid points and dates that are associated with salvage activities in lower layers over the central part of the wreck. <DD001/wh> and <DD013/wh>, the two types in the "red" waregroup that had scattered most extensively over the site, are not only more abundant and hence likely to have dispersed over a wider area, but also less complexly adorned (for illustrations of this and the following, Fig.2.2-76). Conversely, all of the less numerous objects with decorations on in- and

outside are concentrated over the central part of the site (Fig.2.2-77): the 40 vessels categorised as <DD037/wh>, carrying the possibly most artistic adornments found in this group, were recorded in between 50416-20 along |Y26:Y32/200-300| and all but three of the 15 objects <DD007/wh>, probably the second most elaborate type of decoration, on |V26:Y32/200-3001. Again, all except one of the six rather intricate decorated version of the smaller vessels with a broadened and bevelled rim, <DD024/wh> (Fig.2.2-78), were found over |S26:Y32/300-3501 (see Fig.2.2-53). The ceramics with the most extensive incised ornamentations, the six plates <DD027/wh>, and the ten unembellished objects of comparable size and shape (Fig.2.2-79) were unearthed on 50318 at |T26:U32|.

It has to be assumed that more intricate decorations necessitated a higher investment in workmanship, resulting in products of higher sales value: a vessel displaying decorations on only one of its surfaces would have been less dear for an eventual end consumer than an object with more elaborate and extensive embellishments on both ex- and interior. Concentrating the latter vessels in the lower sections of the midships' cargo (and possibly under the 'tween deck there found) could have been an attempt to safeguard a considerable investment.

Frequency of occurrence of motifs employed in exterior and interior designs is shown in Fig.2.2-80. For any given motif, the available line drawings propose a number of (often rather slight) variations; as noted above, such differences might have triggered separate <wh> classifications for vessels that otherwise are of rather comparable sizes and shapes (e.g., <DD013/wh>, <DD014/wh> in Fig.2.2-81; <DD011/wh>, <DD012/wh> in Fig.2.2-82; <DD001/wh>, <DD042/wh> in Fig.2.2-83; the three top rows in Fig.2.2-84). Conversely, several evidently dissimilar types of vessels display corresponding motifs (e.g., <DD004/wh>, <DD06/wh> and <BD038/wh> in Fig.2.2-83; <DD018/wh>, <DD040/wh> in Fig.2.2-84). In case of the 'dragon' pattern, rather substantial differences in size and form of a vessel yet did not discourage use of a nearly analogous figure (Fig.2.2-85).

As the line drawings and photographs depict only one example object for each ware- group, the actual degree of similarities of the decorations incised into individual objects is open to speculation. The drawings of the lotus and dots' motifs found on <DD010/wh>, <DD011/wh>, <DD012/wh>



and <DD055/wh>, waregroups with nearly identical sizes (see Fig.2.2-57) but possibly slightly different forms (Fig.2.2-82), show only little difference con-tractingly, the variances in between the two types of 'dragon' designs seem more pronounced even for objects with matching sizes and shapes (Fig.2.2-86). Whether the incised decorations were fashioned with the help of templates, fine stamps or moulds or are products of 'elaborate freehand carving', demanding the 'substantial [and] time-consuming labour and skill used in carving each piece separately' (Kerr and Wood 2004: 432⁶⁹), can only be determined through a detailed assessment of the actual objects.

Undecorated "Open" Vessels Major Waregroups

The above comparisons of shapes, measurements and distribution of the decorated stonewares suggest that the inventory of basic types found in the ceramic cargo is much smaller than intimated by the existing categorisations: a broadened mouthrim or, as noted for the various objects carrying this attribute, presence or absence of a footring and/or decorations, are not necessarily the ultimately defining criteria of a consignment of ceramics that, in the above sense of a 'related production background', had been packed into the same batches. As demonstrated for a number of groups of decorated objects this observation also includes varying sizes. For analyses of the undecorated vessels with their generally more numerous members, however, the absence of a comprehensive catalogue of the criteria that reasoned the classifications offered in the two categorisation schemes results in virtually limitless examinations.

It is evident that a detailed analysis of all of the about 400 groups and subgroups noted in the <wh> categorisations for "open" vessels (or, for that matter, the more than 200 codes in the <loc> notations)⁷⁰ is unfeasible without direct access to the objects. I therefore restricted my efforts to a number of examples that according to the available photography and line drawings exhibit resemblances in their basic shapes, concentrating on waregroups with more numerous members. Starting point of the analysis were the <wh> waregroups that in a preliminary report had been suspected to comprise virtually similar objects⁷¹ (see the previous section, Figs.2.1-41-43). The examinations, detailed in Appendix 2.2.1, confirmed only three of the major categories proposed in the <wh> classification system (Figs.2.2-

87, -88). At least one of these, <D008/wh>, is related to decorated "open" vessels.

As seen in Fig.2.2-87, the cargo of "open" green-glazed export wares, 91% of all green-glazed ceramics, is composed of a rather limited number of major types. Particularly of note are the high shares of two basic shapes of bowls and their variants: about half of the vessels belong into the three cono-segmental groups <OP06-8>; <OP01-3>, the three sizes of conical vessels, represent more than 20% of all green-glazed "open" ceramics. Only six of the more than 50 <wh> waregroups collected under 'open, others' contain more than 500 objects.⁷² I assume that a number of these groups are but further variations of the main types of vessels.⁷⁵

Spatial distribution of the objects in the major waregroups over the site is illustrated in Fig.2.2-89. There is an obvious tendency for the more numerous (and often coarser) types of vessels to be located further away from the central part of the hull. In case of <OP05>, <OP07> or <B007/wh> this tendency is observed as a rather pronounced "gap" over, roughly, grids |V26:X31|. This gap is most prominent for <OP02>, where only 18 vessels, less than 0.2% of the overall number of objects in this group, were recorded over |V26:X331|⁷⁴

While this drop in counts could be partly due to looting activities, it also approximates the proposed virtual position of the 'tween-deck placed about 9.5 m from the bows in the central hull. It will be seen in Sections 3.2 and .3 that this deck would have provided both access to and a retreat in the central hull, and hence in all probability was at least partly left devoid of the comparably bulky and unwieldy batches of ceramic cargo. I noted above that in the vicinity of (and, based on their vertical allocation, mostly under) that tween-deck considerable numbers of decorated "open" vessels were recorded:⁷⁵ the area I U25:Y32 j, thus allowing for an overlap of one gridpoint around the gap found in the distribution of the undecorated "open" vessels, contains 52% of all decorated green-glazed "open" ceramics (see Fig.2.2-71); adding grid "columns" |S,T,Z,ZA|, all of which appear to hold objects that had dispersed from this central area, the total rises to nearly 65%. Comparable figures are found for <D008/wh> and <OP04>, undecorated vessels that resemble the shape of decorated ones (Fig.2.2-90).⁷⁶ It appears that the lower central hold was not the place of choice to stow coarse plain bowls.



The highest remaining point of the hull's starboard midship planking reached to an elevation of about 1.75 m above the floors of the ship, and would have prevented dispersal of any cargo initially stowed deeper in her hold. On the uncorrected distribution chart of all undecorated "open" vessels in Fig.2.2-91 (above) this barrier seems to be represented by the steep drop in counts of "open" stonewares to gridN of approximately [U32:Z33]. The considerable spill of objects into 1030:U31:P35], off starboard bows, and around the hull's aft then would coincide with the more severely disintegrated sections along foreship and stem. Here, 91.5% of the (crosschecked) 121,757 records used in the plot were recorded on the grid sections outlined in yellow: it is evident that the vast majority of the green-glazed "open" vessels found inside these perimeters had initially been stuffed into the lower cargo hold. This observation contrasts palpably with the distribution of the "closed" green-glazed vessels (Fig.2.2-91, below).

.ii "Closed" Vessels

The <wh> records contain about 5575 objects that can be identified as green-glazed 'closed' vessels⁷⁷ No grid points are noted for 13 records, and a crosscheck against the <loc> categorisations marks about 100 entries as ambiguous⁷⁸ The remaining objects were grouped into more than 40 categories and 320 sub-categories. In between the latter are a considerable number of code entries that comprise one or two objects, in Fig.2.2-92 given in summary only. The figure also shows breakdowns for the three waregroups of 'jars' with the most numerous members and the smaller "closed" vessels categorised as 'small jars' and 'small pots/ I am unaware of the criteria distinguishing 'jars' and 'pots' (see Fig.2.1- 40). Except for <J3./wh> and, to some extent, <J4./wh>, there is no readily detectable association with the <loc> categorisations (Fig.2.2-93).

"Lotus" Jars and Related Vessels

<J3./wh>, with 85% of the records the largest of these waregroups, contains more than 120 subgroups. Most of these apparently were devised around the various types of carved lotus petals on their exterior plus a size range. Some are noted as <J3./s, m, I> for, respectively, smaller, medium and larger sizes. A comparison of the measurements reported for the largest

subgroups, <J3/005.>, <J3/006.> and <J3/007.>, is found in Fig.2.2-94. For a number of these subgroups differentiation by motifs is apparent; for others it seems a question of detail (Figs.2.2-95, -96). Distribution charts for the six subgroups with the most numerous members do not show significant differences in their spatial dispersal over the site (Fig.2.2-97); this observation is also valid for their sizes (Fig.2.2-98). It is obvious that all of these vessels, independent from their decoration patterns and/or sizes, were part of the same consignment. The 4510 objects registered as <J3[/.]> in both categorisation schemes will in the following be labelled <CL01>.

Only 4.4% of these vessels were recorded on grid points inside the boundaries of the virtual hull; in contrast, directly off starboard midships and over the bows and fore-port" side were found, respectively, 30% and 25%. This pattern indicates that these jars had initially been stowed in higher layers of the cargo, from where they in course of the disintegration of the conformation of ship and freight had scattered widely over the site (Fig.2.2-99). The accentuated spread of about one third of the objects to gridNW follows the direction of a scatter observed above for the "open" vessels (see Fig.2.2-91). This scatter coincides with the considerable fragmentation of the starboard bows of the wreck, possibly a result of a forceful impact onto the ship's planking.⁷⁹ Overall, about 60% of <CL01> were found in gridN outside and off the virtual hull, compared to ca. 35% in gridS.

The about 100⁸⁰ vessels registered as <J10./wh>, the second waregroup of jars with a carved lotus pattern on their exterior surfaces, are of generally smaller sizes (Fig.2.2-100). Their distribution over gridN and gridNW, however, closely follows that of <J3./wh> (Fig.2.2-101). Only one vessel was found inside the hull; slightly more than 50% of these objects were retrieved from |N32:ZB36|, approximating the main concentration of <CL01>: all of these jars apparently had initially been packed into the same sections of the hold.

<J9./wh> contains about 200⁸¹ jars of in cases rather divergent shapes, execution and sizes. Most of these vessels fall into size ranges comparable to <J10./wh>. A number of codes, and especially those for decorated items, label single objects (Fig.2.2-102). Distribution charts (Fig.2.2-103) note a concentration of about 14% of these vessels over approximately I X25.-ZB321; these grid points were emptied during retrieval of objects inside the lower cargo space of the vessel and hence note 121 values of 1150-3001.



I assume that this concentration represents a distinct consignment initially stowed into the lower central-aft hull. Its composition and percentages to the overall amounts of objects found in the respective subgroups of <J9./wh> are shown in Fig.2.2-104. However, the majority of the objects grouped under <J9./wh> had scattered far over the site (Fig.2.2-105): 83% of the vessels in this group were retrieved from outside the hull; about 53% and 29% of these were found in, respectively, gridN and gridS off the wreck.

Fig.2.2-106 shows the arrangement of the various subgroups of <J9./wh> over the central sections of the site. While the other subgroups are distributed about evenly over the area, all except two of the 19 vessels registered as <J9/010/wh> were found in gridN of the wreck. The two exceptions could be a registration mistake: following the photographic record and the available measurements, size and shape of <J9/010/wh> closely approximate those of <J9/001./wh> or <J9/004./wh>, the majority of the vessels noted inside the hull. It is possible that <J9/010/wh> had been brought on board ship as a distinct batch; however, the presence of the two objects noted under this code in the aft-midship concentration then is likely to indicate inconsistencies in the overall categorisation of <J9./wh>.

Plain Jars

The remaining about 330 objects categorised as medium sized jars in the <wh> classifications were divided into 39 waregroups and about 80 sub- (and sub-sub-) groups. 28 of the first level code groups and 69 of the subgroups contain less than four entries. The categorisation entry with the most numerous entries is <J4./wh>, about 200 'squat' undecorated jars with flat lug handles, classed into 38 subgroups. Measurements are available for 30 of these (Fig.2.2-107). It appears that the 31 vessels subgrouped under <J4/003./wh> are considerably and consistently less broad than the objects in the other sub-categories. This difference is highlighted in the distribution of the vessels (Fig.2.2-108): while <J4/003./wh> was found mainly off the starboard sides of the wreck, 75% of the vessels noted under the other subgroups of <J4.> had scattered distinctively to gridNW (Fig.2.2-109).

There is a small number of further objects that by shape (Fig.2.2-110) and size (Fig.2.2- 111) approximate the various subgroups of <J4./wh>. Of these, all but two of the ten vessels registered under <J1/wh>, all of <J19/

wh> and the single vessels <J24, 25/wh> and <J27/wh> had dispersed to gridS, while most of <J21/wh> were found in gridNE off the wreck (Fig.2.2-112). Contrarily, all but one in the remaining category of jars of this shape, <J7/wh>, about follow the distribution of the main subgroups of <J4/wh>. In light of their roughly comparable size I could imagine that the latter two <wh> categories contain variants of the same basic type of vessel.

Except for <J21/wh>, a cluster over [S20:X22] contains numbers of all of these vessels plus three further rather distinctive waregroups, <J2/wh>, <J8/wh> and <J11/wh>, indicating that consignments of objects of all these categories had initially been stowed in close proximity. This includes vessels that by glaze and execution appear to be genuine Yue types⁸³ (Fig.2.2-113) as well as stonewares that could have hailed from other areas. Among the latter would be <J8/wh> (Fig.2.2-114, above) with its 'coarse grained' clay and 'crackled glaze' that, as observed on comparable vessels from Chaozu or Shuiche kilns in the Belitung cargo, had 'withstood the plight of more than a thousand years in seawater better than the much finer Yue wares' (Krahl 2011b: 194). Both details -folded mouthrims, wide flat bases and flat lug handles- and overall shapes of many of these coarser, 'pale buff'⁸⁴ jars (Fig.2.2-ii4, centre) parallel published vessels from Guangdong.⁸⁵ It is of note that <CL01>, evidently a Yue type, was found in numbers on the same days and grids. Unfortunately, no results of an analysis of clays and glazes that could confirm the origin of any of these vessels are available. It has been seen above that those vessels displaying undisputed characteristics of Guangdong wares⁸⁶ generally are single objects (Fig.2.2-114, below), and thus in all probability would have been used as storage containers.

Jarlets and '(Small) Pots'

Smaller "closed" vessels were categorised under the <wh> entries <J[ar]S[mall].>, <P[ot].> and <S[mali]P[ot].>. I have no explanation for the distinctions drawn between a '(small) pot' and a '(small) jar': the assumption that 'pot' would mark a vessel with an opening of a larger diameter than its base is not confirmed by the available photography and measurements (see Fig.2.1-40).

Judged by the photographic record these code entries assemble objects of any types of glazes and clays. The available <wh> documentation does



not provide keys to glazes and/or bodies of these vessels; as noted above, the entries for 'material' and 'colour' in the <loc> data in many instances are rather vague. Most of the earthen- and 'Fine Paste'⁸⁷ wares appear to be readily distinguishable, and a number of photographs depict objects with an evidently white glaze. For many vessels with no or only little remaining glaze, however, differentiation proves difficult. Besides, a number of objects that according to the photographs seem to be distinctively green- or white-glazed sport comparable shapes, sizes and/or detail (Fig.2.2-115). Comparison of the available photographs implies that the bodies of white-glazed ceramics generally are of a lighter tone, denser and more vitreous. Accordingly, I will discuss any smaller "closed" vessels with these characteristics in Section 2.2.2.Ü, independent of the apparent colour of their glazes. This promptly excludes any vessels classed as 'small pots'.

The remaining 200-odd vessels were divided into 29 waregroups on location; the <wh> records note 47 categories and 22 sub-categories. Nine of the former, and 33 of the first level codes in the latter classifications contain only one entry. Ten of the records appear ambiguous.⁸⁸ Attempts at an analysis of the distribution of these vessels over the site require a review of the existing classifications.

Seventeen individually labelled vessels appear to be variants of three distinctive types (Fig.2.2-116) and will be identified as <CLS-gr01-3> in the following. The measurements reported for the remaining vessels are presented in Fig.2.2-117. Apparent is a division into smaller and larger sizes that follows the <wh> classification into <P[ot]> and <J[ar]S[mall]>.⁸⁹ The cluster of smaller sized vessels contains 29 'waregroups' in the <wh> categorisations; the <loc> records classed them under 12 code entries. A scatter of the measurements reported in the <wh> records against their respective <loc> categorisations finds this cluster dominated by, mainly, <J30/loc> and <J32/loc> (Fig.2.2-118). I assume that both the <wh> and <loc> categorisations were based on absence or presence of (variations of) incised petals and, in light of their small sizes, rather minute differences in the profiles of these vessels (Fig.2.2-119). Covering 31 of the remaining 35 green-glazed 'small jars', these smaller vessels will be labelled <CLS~gr04>, and, for purpose of comparison, the four remaining unclassified objects as <CLS-gr.>.

Fig.2.2."i2o shows the distribution of these jarlets by their categories. As

they were found scattered widely over the site, all of the vessels had initially been placed somewhere in the higher tiers of the cargo. It remains difficult to find patterns that could note distinctive dispersal patterns of any of these vessels. Nearly all vessels grouped as <CLS-gr1> and <CLS-gr03> are associated with <CLS~gr04>; hence I imagine that these would initially have been packed into the same segments of the freight, if not in the same batches. Although in gridENE appearing separately, in the lower central section of the site a number of items categorised as <CL\$-gr02> were found on the same grids as <CL\$-gr04>: even if belonging to different batches, they at least had initially been stowed into adjacent quarters.

Vessels of shapes and sizes comparable to <CLS-gr02> and <CLS-gr04> (but, for the latter, without incised decorations) have been found on both the contemporary Intan⁹⁰ and Karawang wrecks (Fig.2.2-121).⁹¹ These two cargoes also contained ceramics matching the about 140⁹² supposedly green-glazed 'pots' of a larger size: particularly of note is <P37 V wh>,⁹³ 26 vessels akin to .pot[s] with an everted or rolled mouthrim, a flat base and four lug handles' (Flecker 2002:116) in the Intan cargo. It is argued that most of these types of vessels 'have been produced in Guangdong (*ibid*⁹⁴). The various profiles, forms and sizes of the remaining 'depressed jarlets'⁹⁵ closely match the shape range of about 125 "closed" vessels in the Karawang find (Fig.2.2-122); the latter have as yet not been provenanced. The five vessels categorised under <P54./wh>, however, are distinctly Yue wares.

I assume that the wide range of their profiles was the reason for the division of the 'depressed jarlets' into the about 20 categories and subcategories found in the <wh> categorisations. The available measurements also appear to indicate that their mouth:height ratio could have been one of the factors here considered (Fig.2.2-123). Notably, the vast majority of the objects grouped as <P14/wh> and <P17/wh> was found throughout 2004; <P36-7/wh>, however, were retrieved mainly in August 2005 (Fig.2.2-124), when about 85% of the latter were recorded concomitantly on 50808-9 and 50815-16. Judged by their shapes, measurements and distribution (Fig.2.2-125), I suppose that <P14/wh>, <P17/wh> and <P18/wh> could have constituted an own consignment, to be labelled <CLS-gr05>. These vessels were possibly packed into higher tiers of the cargo in the foreship. Their distribution pattern is not too different from that of <CLS-gr04>; one accordingly could assume



that these two categories of small “closed” ceramics had been stowed in, at least, proximity (Fig.2.2-126). <P36-7/wh>, though found on the same grid points, appear to be of too diverse shapes to belong to the same waregroup, but had apparently been stuffed into the same quarters in the aftship (Fig.2.2-127; cf. Fig.2.2-124).

All of these vessels could not have needed more than 3 m³ of space.⁹⁶ If divided into different packs, the 0.4 m³ of smaller vessels would break down into rather small batches that, I assume, could have easily found a place in any small corner in between the main ceramic cargo. Their distribution, however, appears to indicate that these batches had been kept close together with the more voluminous packs of larger ‘pots’ in both fore- and aftship. Such consignments would have included both Yue stonewares and ceramics from other kilns. I will evaluate these observations in Section 4.2.

.iii Kendi and Ewers

The <wh> data contains 458 records categorised as green-glazed ewers⁹⁷ and 19 stone-ware kendi. The latter represent only 1.4% of all registered kendi: it will be seen below that the vast majority of such vessels are earthenwares of, possibly, Southeast Asian origin. In the warehouse, the kendi were divided into nine categories, corresponding to six <loc> code entries. Sizes and forms, however, suggest that all except one of these vessels belong to the same type, by workmanship and decorations undoubtedly associated with the lotus jars above (Fig.2.2-128).

The kendi had scattered widely over the site. Although their small numbers do not allow for a comparison to the distribution of other waregroups, it is evident that they, just as the majority of the jars, had initially been placed in higher sections of the ceramic load (Fig.2.2-129).

The green-glazed ewers were divided into 74 groups and subgroups in the <wh> classifications. These vessels are the only category of tradeware ceramics yet re-classified at the Musée royal de Mariemont,⁹⁸ allowing us to follow these evidently more rational and coherent groupings (Fig.2.2-130). Considering their different shapes and overall numbers, I divided Group lie into <EW02c>, vessels with a rounded shape, and <EW02d>, ewers with a broader foot and more quadrangular lower body. The available measurements also indicate that group <EW02a> should be separated into smaller and

larger vessels (Fig.2.2-131). It is of note for <EW01-2.> that ewers with an elongated neck or of a smaller size do not display the two vertical loops found on the other types. Ewers analogous to these two groups are well documented for finds in both Southeast Asia and China.⁹⁹

The attachments on the shoulders of <EW03> are comparable to those on, e.g., jars <J11/wh> or <J48/wh>, and the carved lotus decorations on a number of vessels grouped as <EW04> match those on <CL01>. Choice and execution of the incised motifs on several ewers in both of the latter groups compares to that found on the decorated "open" vessels. I trust that these green-glazed ewers are products of the same kilns) that had manufactured the majority of jars and "open" vessels in this cargo.

Of all ewers, 6.8% were retrieved from grid points over the remains of the ship; the remaining vessels had dispersed widely over the whole gridded area (Fig.2.2-132). In the deepest layers directly off starboard sides were recorded nearly 42% of all ewers, indicating that considerable numbers of these vessels had dropped besides the hull before the ship's planking broke up and inboard cargo spilled over the site. Again, main direction of dispersal seems to be gridNW, here marked by two concentrations on |J3| and |J34;M34|. Concentrations at these grid points have also been observed for the "lotus jars" <CL01> (see Fig.2.2-99). While their rather small numbers do not support a comprehensive analysis, all of the carved ewers <EW04>, above noted as of a very comparable shape to <CL01>, were retrieved from grid points with recorded finds of objects belonging the latter waregroup (Fig.2.2-133).

A comparison of the distribution patterns of <EW01.> and <EW02.> is found in Fig.2.2- 134. While the two waregroups cover approximately the same areas, <EW01.> shows distinct concentrations at |134:L34| and over the ship's bows not observed for <EW02.>: they apparently had initially been packed into separate batches. The distribution patterns of the subgroups of the latter type of ewers (Fig.2.2-135) present a comparable picture: nearly 12% of <EW02a-s> were registered on grid points in the vicinity of the bows of the wreck, where only, respectively, 2% and 8% of <EW02c> and <EW02d> were found; about 40% of <EW02d>, but only 17% of <EW02c> and <EW02a-s> were retrieved in gridSE. However, except <EW02a>, recorded only off the starboard sides of the wreck, all other categories of ewers had scattered



rather indiscriminately over the site (Fig.2.2-136).

The concentrations of objects over |J31|, |134:L34| and |ZA18:ZB20| evidently not only note high counts of recorded items, but also contain a considerable variety of types. At or in close proximity to |134:L34| the grid points with the highest recorded variation of types, were also found four of the seven hexagonal cups and the associated ewer Art.30442, and two of the three ewers with a sideways handle (Fig.2.2-137). This appears to indicate that any distinct batches of ewers would have initially been packed in close proximity to one another. Green-glazed kendi associated with ewers, however, were found only in gridS.

.iv Lids, Covers and Covered Boxes

Under the codes <L[id].> and <CO[ver].>, the <loc> records contain about 5200 entries of green-glazed ceramics; in the <wh> data are found some 4800 objects registered as (green- glazed) <Lid.>. No re-registration data is available for 334 objects noted as lids or covers on location, and 52 <wh> entries prove ambiguous. On location these objects were divided into 87 categories, 36 of which were classified as covers. In the warehouse, no distinction between lids and covers was made; instead, a number (but not all) of the single covers apparently were registered under various categories of <C[overed]B[oxes]>. The <wh> data divides the objects into 107 groups and subgroups.

I assume that most of the actual lids are associated with assorted categories of "closed" vessels (see Figs.2.2-95, -96). It remains unanswered whether these lids were packed together with their respective jars: distribution charts based on the better documented <wh> records show both similarities and differences (Fig.2.2-138; cf. Fig.2.2-99 for <CL01>, the most numerous "closed" vessels). Many of the lids were found in deeper layers of the site: it is conceivable that detached lids due to their small sizes could have buried themselves faster and deeper in various crevices of the disintegrating cargo than the jars they had possibly covered.

A small number of distinct covers, registered under <Lid63-79/wh>, have been proposed as associated with <EW04>.¹⁰⁰ The available data contains 24 such covers and 32 ewers <EW04>. A crosscheck against the <loc> data to locate possibly un-reregistered covers is unattainable due to considerable

ambiguities in between the two classification schemes. Distribution of these objects is shown in Fig.2.2-139; the inserts show the recorded positions of a ewer and a cover sporting the same design. While generally retrieved from the same areas and often in close proximity, there are only two grid points on which both covers and ewers were found, and only on four out of the 57 days logging finds of such lids and ewers both types were registered concurrently.

Covered boxes were on location recorded under codes <CB.> and <BX.>. According to the available example photographs the former code should note a complete covered box¹⁰¹ and <BX./loc> a single base of such a box. This, however, is not necessarily confirmed by a cross-check against the <wh> records.¹⁰² Those codes marked as green-glazed contain 104 entries, classed into 25 groups. For 22 of these items no <wh> registration entries are available, and six were re-recorded as different classes of ceramics. It proved impossible to differentiate the objects noted as <CO./loc> into covers related to covered boxes or to any of the various types of jars and ewers initially fitted with a cover.

In the <wh> records green-glazed covered boxes were categorised under an own classification code, <CB Yue.>, comprising 129 entries in 33 groups and subgroups. These include a number of objects registered as covers or lids in the <loc> data. Only waregroup <CB Yue02/wh> contains more than 10 objects. Seven of these had initially been logged as <BX./loc>; one as <CB./loc>; the remainder were on location noted as single covers. The other waregroups for covered boxes show comparable arrangements; hence I assume that <CB./wh> entries could include complete covered boxes, box bases as well as single covers fitting into the characteristics of a respective waregroup. It appears that the warehouse team had "rejoined" box bases with such fitting covers: the example photograph for <CB Yue 19/ wh>, a "complete" covered box, notes two numbers on the box base.

The rather incompatible categorisation approaches applied on location and in the warehouse do not allow for a comparison of the two schemes. Moreover, it proved impossible to unambiguously differentiate the <wh> records into covers, box bases and complete covered boxes. As example photographs, drawings and measurements for the <wh> records are more accessible, here I will use the latter records. The data available for single covers does not allow to unambiguously associate these objects with any type of



covered box;¹⁰³ Figs.2.2-140 and -141 thus attempt to categorise the objects registered under <CB Yue./wh> only. In relation to their sizes, the smaller types of covered boxes show considerable differences in measurements, and hence could be divided into several further groups. However, their small overall numbers (Fig.2.2-142), sizes and the in many cases only slight differentiations would question the very idea of a "waregroup" of ceramics.

The objects had spread over the whole site (Fig.2.2-143). While boxes and all except two of the single covers were recorded on the same or adjacent grids, it is impossible to relate the <wh> categorisations of the latter with either my or the warehouse team's attempts at categorising the former. The data, for the area of highest concentration of covered boxes, |X24:ZC34|, comprises records taken during the first advance into the higher layers of this section of the site in September 2004, retrieval of objects from inside the hull in between March and June 2005 and the final cleaning off starboard side of the wreck in September of that year (Fig.2.2-144). Here were found seven out of the eleven covered boxes categorised as <CVB-gr1O>, all recorded during recovery of objects over the wreck and registered in a depth of 300 cm. Five of these were found on the same date, 50406, and registered in |Y26:Y32|; two were retrieved from |X26:X32| on 50330 (Fig.2.2-145). Two of the remaining boxes were located off the starboard side of the hull; one was registered off the bows of the ship; the last one, together with a small cover, at |H41|, far down the gridNW slope of the tumulus. The majority of these boxes seem to have been packed in lower layers of the aft central hold, in all possibility as one distinct consignment.

Retrieval of objects belonging to the second waregroup with an over-proportional presence in this area, <CVB-gr03>, followed a different pattern (for this and the following, Figs.2.2-146 and -147). Of the 11 out of 18 boxes that were found in this section of the grid, only two were logged in a depth of 300 cm, and none on the dates noted for finds of boxes <CVB-gr10>. I assume that the variances in the vertical distribution of the boxes are result of a tendency of these rather small objects to drop through any crevices into deeper layers of the cargo after their initial wrappings had rotted away; the highest recorded location hence would mark their initial position. 13 out of 18 of these vessels were recorded to gridE of |X|, and two in gridN off the starboard planking of the ship: they apparently had been stowed in the

deckload, somewhat aft of midships.

<CVB-gr01>, the group of covered boxes with the highest number of members, has a rather comparable vertical distribution pattern (Fig.2.2-146). Here, however, the highest concentration of objects was found along the starboard sides of the hull, and a secondary cluster in gridSE, off the port stern. Only four of the 12 items retrieved from besides the hull's remains were recorded at depths below 200 cm; accordingly, I assume that these vessels had not been stowed close to the ship's starboard rails. This impression appears to be confirmed by the scatter of objects to gridSE and E, containing half of the 38 items registered under this code.

None of the remaining waregroups comprises enough objects for a detailed analysis of their distribution. No objects belonging to <CVB-gr02> and <CVB-gr05-6> were found during cleaning off the starboard midships planking, and none of the latter two groups were retrieved from gridE of | Y |. The gridSE quarter yielded only vessels belonging to <CVB-gr01- 3> and <CVB-gr07>; in gridSW <CVB-gr03-4> are absent; in gridNW no objects belonging to <CVB-gr02> were found; and, additional to <CVB-gr05-6>, no objects categorised as <CVB-gr02- 3> and <CVB-gr07> were recorded in gridNE (Fig.2.2-147). However, all but <CVB-gr05-6> were present in various depths over "column" | ZA22: ZA351. It thus appears probable that different types of covered boxes had initially been packed in separate batches — but if so, all such packs except <CVB-gr10> and, possibly, <CVB-gr05-6>, would have been placed in close proximity in the higher layers of cargo somewhere aft of midships.

It is unlikely that the ship carried, all in all, more than 1000 green-glazed covered boxes in her cargo, and that these would have needed more than 1.2 m³ of cargo space¹⁰⁴ Division into different batches would result in a number of rather small packages that could have easily been stuffed into any smaller opening in the pile of cargo. That (the majority of) such possible batches had initially been packed in close proximity, however, indicates that loading of and stowage in the ship's hold involved a considerable degree of planning and organisation.

As detailed above, the green-glazed stonewares represent about 95% of the individually registered ceramics. Judged by resemblance of glaze, clays and workmanship, the vast majority of these vessels appear products



of at least closely related kilns, if not one kiln site, I will discuss the various conseqences regarding production of and trade in such wares that arise from this observation in Section 4.2; here it should suffice to note that an undertaking of this scale could have only been possible with a sound financial backing and within an intricate (and possibly well-established) framework regulating the necessary economic transactions. Both sale of any freight initially forwarded to the port(s)¹⁰⁵ where the ceramics were taken aboard as well as marketing proposals for the ship's return cargo would have been indispensable parts of this framework. It is also striking that at least 87% of all individually registered ceramic objects are unadorned green-glazed bowls and dishes, and that the majority of these divides into only half-a-dozen different types.

The logistics of on-shore handling of the ceramic cargo are open to speculation; the general stowage pattern of the green-glazed stonewares, however, appears reconstructable. Figs 2.2-148 summarises the above discussions. The majority of the decorated "open" vessels, the probably most valuable ceramics, had been stuffed deep into the central hold, in all possibility under and around the 'tween-deck there found; the remaining cargo space in the hull was filled with courses of tightly packed bowls and dishes. On top of these, and presumably partly as deckload¹⁰⁶ were stowed the more bulky (but due to their less dense packing unquestionably less heavy) jars, ewers and kendis, most of which in course of the disintegration of the hull had spilled over the remaining planking to the fringes of the site. Such arrangements, namely stuffing tightly packed and thus heavier cargo into the lower hold and placing lighter and more loosely stored items in the higher layers of the cargo, reflect sound and prudent seamanship.

2.2.2 Whitewares

The <wh> records contain nearly 3580 entries, slightly less than 2.5% of all registered ceramics, that evidently¹⁰⁷ note white-glazed objects. For 83 of these entries the basic type and/or colour of glaze noted in the warehouse differ from those in the <loc> records.¹⁰⁸ As detailed above, the <loc> data suffers from considerable ambiguities in discriminating between white- and green-glazed objects;¹⁰⁹ here only 2945 entries can readily be marked as whitewares. Divisions into major types, following the <wh> and <loc> coding

system as well as the categorisations here applied, are found in Fig.2.2-149. Differences to the composition of the green-glazed stonewares are striking (Fig.2.2-150).

Without an analysis of their clays and glazes, origin and nature of these ceramics will remain an open question.¹¹⁰ For whiteware 'dishes', 'bowls' and covered boxes, the <wh> categorisations use the acronyms <DL[iao].>, <BL.> and <CBXing>: according to the persons in charge, the first should denote the Qidan [Khitan] Liao Dynasty (907-1125),¹¹¹ the latter the historic Xing kilns in today's Hebei, the producers of 'world's first true porcelains' (Kerr and Wood 2004:151), ceded to the Qidan in 937. However, by the five Dynasties period (+10th century) the peak of production at the Hsing [Xing] kilns had passed, and the main [Hebei] centres were those making Ting [Ding] and Yao-Chou [Yao Zhou] wares' (*ibid.*: 157¹¹²). Hence, possibly, 'some Hebei ceramics experts upon physical inspections of some of the Cirebon white wares' in course of an afternoon visit to the warehouse in March 2007 concluded 'that they were Ding wares'.¹¹³

Judged by the available photographic record (Fig.2.2-151), the whitewares in this cargo do not exhibit the creamy, 'milky-white' (Longsdorf 2013: 37) or 'ivory-toned' (Medley 1980: 2) colour of Ding products; instead, their colour range, as far as discernible, corresponds better to the 'white-greyish or -greenish coloured glaze' reported by Dupoizat (2008: 132) for fragments of whiteware bowls from Lobu Tua, Barus, by their 'thickened' or 'folded' mouthrims¹¹⁴ ascribed to 'tenth to early eleventh century Guangdong or Jiangxi'. Equally, Edwards McKinnon and Dermawan (1981: 5) label 'small folded-rim white- slipped bowls' from Bukit Seguntang, Palembang, as 'Very probably Xi Cun ware', adding that this type was 'produced at various kilns in the late Tang and throughout the Five Dynasties'. According to Lam (1985: 2),

this form of howls recalls the standard form of the northern Xing type (better known in the West as "Samarra" type) although the typical wide disc-like foot-ring is absent. [...] The glaze which stops well above the low and narrow foot-ring may be bluish white or yellowish ivory depending on the firing atmosphere. Being a very common product and a simple form, bowls of this type have been found in large quantities in Southeast Asia, and nearly identical types have been found in Xicun, Chaozhu and Huizhou kiln sites as well as sites in other provinces.



Small jarlets with grey-green tinged glaze but the light fine paste and form criteria of a number of comparable and unmistakably white-glazed vessels have been pictured in Fig.2.2-115. Brown (eel, 1989: 93/35-9) illustrates a set of unprovenanced lobed jarlets [... with] Qingbai to greyish green glazes' that repeat the shapes of a considerable number of the "closed" vessels in this cargo; she groups the vessels under the headline 'Guangdong wares, 10th to 12th century'. There are several possible explanations for such variations in colour and, hence, labelling of the glaze. The photographic record seems to imply that a more greenish (or grey) tone is found mainly on vessels with a more faded glaze.¹¹⁵ As seen on the examples of Longquan and Qingbai wares¹¹⁶ however, slightly different composition of and/or minor impurifications by spur elements in the raw materials plus intended or accidental changes in the firing atmosphere could easily result in fluctuating colours. Longquan and Qingbai glazes have their roots in developments in the later tenth century, when an increasing number of southern Chinese kilns adopted their own manufacture of white-glazed stonewares and/or porcelains¹¹⁷ On products of the Xicun kiln, located in the modern city of Canton five kilometres from the city centre', Watts (1989: 35-37) observes a wide variety of glaze colours, ranging from various shades of green to 'ultimately a light greyish or bluish *ying-ch'ing*^[118] which is nearly "white"', usually on a body of a white porcellaneous clay [...] likely from nearby Tung-kuan county', but also found on light grey bodies'. The last comments are a rather apposite description of the whitewares in this cargo.

There yet is a further argument in favour of a southern (and possibly Guangdong) origin. The first decades of the emerging Song rule saw recurrent conflict with both the Liao (and their allies, the Northern Han) and the various polities in southern China¹¹⁹ rendering long-haul transport¹²⁰ of ceramics through these two possible warzones unfeasible. Judged by a number of lead coins found in the cargo, the ship unquestionable had called at Guangzhou¹²⁰ where Xicun and/or whitewares produced at other kilns in the port's direct vicinity would have been effortlessly available. In any case, as assumed for the Belitung and Intan cargos, these 'highly esteemed' (Flecker 2002: 112), elegant yet utilitarian' objects, in their time 'the world's finest' pottery, certainly belonged to 'the most, valuable ceramics on board' (Krahl 2011a: 201, 203).

Distribution of the whiteware ceramics over the site is shown in Fig.2.2-152. The composition of types of vessels retrieved from the two areas of main concentrations (marked [A] and [B] in the figure) are distinctively different; although not so pronounced, other distinctions are found with and in between the two grid sectors with lower densities of objects ([C] and [D]) taken as reference (Fig.2.2-153). Assuming the highest breakage rate computable for the ceramic cargo¹²² overall numbers of whitewares could not have exceeded 12,000 pieces. It will be noted presently that many of these would have been of smaller sizes than the average green-glazed vessel: stowed in loose random packing, the whitewares hence could not have occupied more than 6 m³ of cargo space.¹²³ Had all the white-glazed ceramics been taken aboard as a distinct consignment that was intended to be kept together, it could not have been too difficult to find the required space in a hold of about 280 m³. Instead, it appears that the white-glazed ceramics were not packed into the same quarters of the hold, but, just like the green-glazed stonewares, stowed according to their respective types.

i. "Open" Vessels

The <loc> categorisations in many a case do not present valid distinctions between green- and white-glazed bowls and dishes; for these we have to rely on the <wh> groupings alone. The latter divide the 1665 identifiable "open" whitewares into 51 groups and subgroups. Ten first-level codegroups contain less than ten objects (Fig.2.2-154). I am not in a position to explain the criteria reasoning the division into <D[ish]L.>, seven categorisation entries, and <B[owl]L.> by their measurement ratios alone (Fig.2.2-155). Totals of vessels with reported height:diameter ratios of, respectively, 1:>3 and 1:<3, my assumed mark for shallow bowls, are about balanced;¹²⁴ there are only approximately 100 genuine dish-sized vessels (Fig.2.2-156).

Fig.2.2-157 shows the distribution of all "open" whitewares over the site. There is a prominent scatter of objects to gridNW, marked by the red rectangle [A]. About 5% of the vessels were recorded along the very fringes of the gridded site;¹²⁵ the main concentrations of the "open" whitewares though are found over the central-aft hull (rectangle [B]) and to gridN off the remains of the ship. Absence of objects recorded over the midships to forward hull is striking. Although in different percentages, the vessels retrieved



from the two marked areas represent all of the major waregroups designed by the classification team. This observation is also valid for any other area of higher concentration of these vessels.

The limited repertoire of shapes is evident in the available photography (Fig.2.2-158); that the whitewares initially had been packed according to types is exemplified by <DL003/wh>, a distinctive type of dish (Fig.2.2-159) found only in a restricted area off the starboard planking of the wreck (see Fig.2.2-157). However, the detailing crosschecks of measurements, shapes and distribution patterns found in Appendix 2.2.2 could neither confirm or reject the categorisations devised by the classification team nor produce sound alternatives.

A corrected distribution chart of all "open" whitewares is found in Fig.2.2-160. It is apparent that most of the vessels had initially been stowed behind the 'tween-deck in the lower midships, yet high enough to partly disperse over the concreted cargo of metalwares¹²⁶ in the aftship to gridE and over the remaining starboard planking to gridN. However, presence of objects belonging to all of the major waregroups scattered throughout gridNW and off the bows of the wreck implies that at least some packs of these vessels had been placed in higher tiers above the foreward sections of the hold.

I noted above that these types of ceramics are known from a number of sites throughout Insular Southeast Asia. Size and shape of <DL003/wh> (see Fig.2.2-159) repeat that of a 'porcelain saucer, 8th-10th cent.' from the 'Muria region, northern central Java' in the ceramic collection of the National Museum, Jakarta (Orsoy de Flines 1975: P1.7). Adyatman (1981:186, 187 Fig.192) pictures a bowl labelled 'Xing-type' and reportedly unearthed in East Java that sports measurements and profile similar to most of the white-glazed "open" vessels in this cargo, and, just as these, is 'covered by a transparent white glaze which is greenish coloured where it accumulated at the [...] unglazed base'. She also mentions sherds of such bowls found in Prambanan, Central Java, Bukit Seguntang (Palembang) and Muara Jambi in Sumatra'. It will be seen in Section 4.1 that these finds outline the last legs of the Nanhān/Cirebon ship's fatal voyage.

.ii "Closed" Vessels

Judged by the available photographic record and, where useable,¹²⁷ the entries for colour and material in the <loc> records, slightly less than

400 objects can readily be classed as “closed” whitewares. As detailed in the assessment of the smaller green-glazed “closed” vessels, here should be added the about 20 ‘small pots’ that on their examples photographs show a more green-toned glaze on fine grey-white bodies. 18 of the records appear to be ambiguous.¹²⁸ In both classification schemes, the vessels were logged as <(S[mall])P[ot]> and <J[ar](S[mall])>, The <wh> notations categorised the objects into 79 groups and subgroups; the <loc> records, dividing them into ‘pots’ and ‘jars’ only, spent 35 categorisation entries (Fig.2.2-161). As noted above, I am not in a position to explain the distinctions between a <P[ot]> and a <J[ar]>. According to the measurements reported in the <wh> data, ‘pots’ are the largest of these vessels; there though are no distinct differences in between the sizes of the ‘small pots’ and ‘small jars’ (Fig.2.2-162).

The entry <wh> ‘pots’ comprises 87 vessels, grouped into 35 categories and subcategories. The largest of these are the six vessels labelled <P38-42/wh>;¹²⁹ they share a number of form criteria with some of the larger objects categorised as ‘small pots/jars’ in the <wh> records (Fig.2.2-163). As no catalogue of classification criteria is available, it for the remaining ‘pots’ remains impossible to trace the choices made by the reported measurements alone. The photographic records appear to offer three possible distinctions: (i) a slightly flared footring and a “stepped” mouthrim; (ii) a straight foot and mouth; and (iii), short straight feet and thickened (‘folded’ or ‘rolled’) mouthrims (Fig.2.2-164). These characteristics are found on vessels with both petaled or plain (or ‘lobed’ or ‘unlobed’) bodies.

Group (iii) displays the widest range of shapes and sizes. There is a tendency for vessels displaying criteria (i) to be somewhat larger (Fig.2.2-165). The proposed characteristics comply better with the <loc> categorisations than with the classifications made in the warehouse (Fig.2.2-166).

The main concentration of these whiteware ‘pots’, comprising about 50% of the vessels, was found portside off and over the wreck’s bows (Fig.2.2-167). While ‘pots’ meeting criteria (iii) were reported only from gridN¹³⁰ (Fig.2.2-168), more than 70% of the vessels with characteristics (i) and the two registered objects conforming to criteria set (ii) were retrieved from |A1:ZA26| (Fig.2.2-169). I assume that at least¹³¹ the 53 vessels fulfilling criteria (i) form a distinct category, in the following labelled <CLS-wt01>.

There are 325 smaller sized “closed” vessels that can be marked as



whitewares in the <wh> records. 13 of these are equivocal entries.¹³² The <wh> categorisation system classed the objects under 44 categorisation codes; 31 of these contain less than three entries. Excluding ambiguous data, on salvage location the vessels were grouped under 21 codes, 14 of which comprise one or two objects only (Fig.2.2-170). The majority of these categorisations appear to note small variations between otherwise comparable objects (Fig.2.2-171).

Without a catalogue detailing the classification criteria it is impossible to generate conclusive groupings for all of these objects. This is especially the case for vessels with corresponding forms and sizes, but diverging distribution patterns and/or categorisations in the two classification system. An example are <JS007-9/wh> and <SP 17/wh>: as observed above for the "open" whitewares, there remains the impression that either the vessels had not been taken aboard ship in batches according to their types or that the classifications in cases missed the actual groupings of these ceramics (Fig.2.2-172). Attempts at amending the existing classifications would require a crosscheck of the actual objects; as this for the time being is impossible, interpretation of the distribution of the vessels will have to rely on a number of more tenable categories, thus omitting several of the 'waregroups' containing only small numbers of objects. Totals for the proposed categorisations and comparisons to the <wh> and <loc> classification schemes are summarised in Fig.2.2-173.

Conceivably, <CLS-wt01> and <CLS-wt05>, about one third of the "closed" whitewares, could represent a distinctive type¹³³ of jarlets; on the site, however, the larger of these objects were concentrated in gridS, and the smaller ones in gridN off the remains of the ship (Fig.2.2-174). I assume that the larger vessels had been batched in an own package which in course of the breakup of the ship and the stacks of cargo for some unexplainable reason had slipped to portside. Several correspondences between the two dispersal patterns though suggest that smaller and larger jarlets had initially been stowed in proximity. Except for a small number of objects that had possibly fallen through crevices into lower tiers of the mound, both larger and smaller of these vessels had scattered about circularly around the remains of the hull, indicating that they had been stuffed atop the main load of green-glazed stonewares.

While their small numbers do not support a conclusive interpretation, distribution plots for <CLS-wt02> and <CLS-wt03> (Fig.2.2-175) appear to repeat a number of the patterns seen for the other waregroups hitherto discussed. This is even more apparent in the distribution of the small vases <CLN-wt01> (Fig.2.2-176). The greatest diversity and highest count of "closed" whitewares was reported for grids | Q30:R331, and objects of all categories except the five vessels labelled <JS/009/wh> had scattered to gridNW (Fig.2.2-177). It will be seen presently that the white-glazed covered boxes follow a comparable pattern.

.iii Covered Boxes

Under the entry <CB Xing.>, the <wh> records note 1380 objects, nearly 40% of all recorded whitewares. This number is about thirteen times higher than that noted for green-glazed covered boxes (see Figs.2.1-36 and 2.2-149). of these entries are ambiguous; the remaining objects were given 35 categorisation labels at the salvage location. I assume that, as described above for the green-glazed boxes, the objects here were divided into <Co(vers).>, <B(o)x (Bases).> and complete <C(overed) B(oxes).>. The <wh> records group them into four first-level waregroups, each of which contains three to four subgroups (Fig.2.2- 178). Example photographs and the reported measurements appear to confirm the <wh> categorisations (Fig.2.2-179). The available data does not detail which of the entries notes a box base, a cover or a complete covered box (Fig.2.2-180). I found published references to comparable boxes only for <CB Xing01/2>, proposed as 'made by the coastal kiln complexes [of southern China] from the Song to the Qing [dynasties] and exported in quantities to Southeast Asia' (Southeast Asian Ceramic Society 1985: 94).

Distribution of the covered boxes over the site compares well with that of the "closed" whitewares discussed above (Fig.2.2-181). It is difficult to find significant differences in between the distribution patterns of the subgroups with more numerous members (Fig.2.2-182) or the actual categories (Fig.2.2-183). Although possibly divided into several batches packed according to type,¹³⁴ assume that covered boxes and "closed" white- wares constituted a distinct consignment that was loaded into the same quarters of the cargo space. Judged by the spread of both types of vessels to gridNW and to the



very fringes of the mound in gridS and gridW, I would look for that location somewhere in the higher tiers in the forward hull, and here, possibly, in the deckload. This would place them apart from the majority of the "open" whitewares. I will return to this observation in Section 4.2.

2.2.3 Earthenwares

Due to the various ambiguities in the data, total numbers of the earthenware objects in this cargo remain guesswork. The <loc> records for 'material' and/or colour' note 2550 vessels that would appear to be earthenwares; a crosscheck of the photographic record and the <wh> categorisations sums around 2230 objects. Fig.2.2-184 cross-compares breakdowns of these numbers. As their photographs are more accessible, here I will rely largely on the <wh> records. I cannot clarify the divisions into general types of vessels applied in the classification schemes without a catalogue of the definitions used (Fig.2.2-185). Overall composition of this segment of the cargo differs considerably from that of the white- and green-glazed ceramics (see Figs.2.2-149, -150).

The majority of the earthenwares, and especially the kendi, are so called Fine Paste Wares, high-fired ceramics, 'exceptionally finely formed from well-levigated clay [... and] widely distributed in Southeast Asia' (Stargardt 2012¹³⁵). Such ceramics are thought to be associated with the southern Thai repon of Patam (Flecker 2009; 40), and especially so with the 'Kok Moh tradition [and] other sites of the Satingpra complex and Nakorn Sri Thammarat' (Stargardt 2012). Comparable vessels have been recovered from a number of medieval shipwreck finds.¹³⁶ Referring to the Java Sea wreck, Mathers and Flecker (1997: 107) assert that 'the discovery of hundreds of these vessels [...] clearly demonstrates the importance of earthenware as an intra-Southeast Asia trade commodity, a fact [yet] absent from any documentary records'.

According to the photographs and personal observation, the earthenware objects in this cargo display a wide range of colours, and, in cases, what appears to be remnants of slips, a possible reddish burnish' (Flecker 2002:118 on comparable vessels in the Intan find) and/or remains of a red paint on their exterior surfaces¹³⁷ (Fig.2.2-186). Such variances could be in accordance with Stargardt's (2012) reports of ceramics with 'white, grey, buff, red and, in a single instance, grey bod[ies] with a black slip' among her finds at Kok

Moh. As noted at the examples of such wares in the Intan cargo, a darker colouration 'perhaps is due to weathering' (Flecker 2002; 117). It will be described presently that a number of "closed" vessels of a more utilitarian character appear to be made from coarser clays¹³⁸ implying that they not necessarily were made at the same kilns as the objects of finer paste. Shards of all major kinds of these vessels were prepared for analysis; however, I am not informed of any eventual results.

Flecker (*ibid*) observes that as with the fine-paste-ware on the Java Sea Wreck, each piece from the Intan Wreck is unique in its exact proportions, a sign that each potter was allowed a degree of freedom in design; and did not have to copy a particular model.

This observation will be confirmed in the following. I imagine that the results of such liberties prompted the <wh> classification team to divide the vessels into 285 goupes and sub-groups, of which only 46 contain ten or more items. A number of these ceramics appear to be single utilitarian vessels, probably used by crew or passengers for storage and cooking purposes; I here will restrict myself to the more numerous types of the 'closed" vases, 'pots' or 'jars' and the earthenware kendi

.i "Closed" Vessels

The <wh> records comprise about 770 vessels that could be classed as "closed" vessels. These were divided into five main types, under which are found a total of 81 categories and 44 sub-categories, it proved impossible to compare these records with the 55 categorisation entries found in the <loc> data. Forty-two of the entries are ambiguous;¹³⁹ for eight no grid records are available. Fig.2.2-187 details only those <wh> waregroups with three or more entries. It appears that categories branded as 'kitchen' types mark vessels with a rounded base (Fig.2.2-188). Most vessels labelled 'jars' display a pronounced neck that is not present on the 'pots' (Fig.2.2-189).

A distinction between "open" and "closed" vessels for especially the 'kitchen pots' is in cases rather delicate (Fig.2.2-190); as the available measurements for all of these ceramics report slightly broader diameters than mouth openings, here, however, I retain the designation "closed"



(Fig.2.2-191). Their shapes are of a distinctively utilitarian character known from both archaeological finds¹⁴⁰ and a number of contemporary 'traditional' ceramic industries of Southeast Asia.¹⁴¹ However, repetitive nature and overall numbers of the surviving vessels mark them as trade articles, thus not objects in daily use aboard ship. Highest concentration of both types and numbers of these 'kitchen pots' was found around [032:Z34], off the ship's remaining starboard planking (Fig.2.2-192). I cannot find dispersal patterns that relate to the proposed <wh> categories, and hence assume that these vessels had initially been stowed in close proximity, and possible as one consignment, in the higher tiers of the mid-foreship cargo.

This pattern apparently contrasts with the distribution of the about 25 surviving earthenware 'pots' (i.e., vessels with categorisation codes without the addition 'kitchen'): here greatest diversity and highest counts are found in gridNE over the stern of the wreck and off starboard aft (Fig.2.2-193). It again remains difficult to detect relations between the existing groupings and dispersal over the site; hence one has to suppose that all of these vessels had been taken aboard as one consignment. The wide spread of the objects indicates that this lot of 'pots', again, had initially been placed somewhere in the higher tiers of the cargo. A rather comparable distribution pattern was found above for a number of types of green-glazed 'pots' (see. Fig.2.2-125).

Except for, partly, the difference in size, I cannot explain the labels <BigJarKitchen./wh> and <JarKitchen./wh> by the available measurements and photographs alone (Fig.2.2-194). To ease presentation of the distribution of these objects, Fig.2.2-195 combines those categorisation entries that by size and shape appear to represent the same type of vessel.¹⁴² The chart notes a distinctive cluster of objects categorised as <JarKitchen5/6/wh> over the stem of the wreck; however, here as well as in a number of other areas vessels of both 'bigger' and smaller vessels were recorded on the same grid points, and in many cases on the same days. Except for the scatter over [T17:Q22:X22:Y19], their overall dispersal parallels that of the 'kitchen pots' shown in Fig.2.2-193.

With the exception of the broad, "three-folded" mouthrims of <PK01> and <PK07> (Fig.2.2-196), all 'kitchen'-type vessels are topped by a flanged and sometimes folded rim. A number of example photographs (and especially so those for <PK01> and <PK07>) evoke the impression that these vessels

were made of a coarser clay. They also show a wide variety of colours; hence it is possible that they are products of different kilns. However, the smaller object on the example photograph for <PK01> appears to display remains of the red slip, paint or 'burnish' that resembles that on a number of jars, to be discussed presently.

Besides their obvious differences in shapes, sizes and forms, the 'kitchen' and 'non-kitchen' types of "closed" vessels are distinguished by absence and, if present, type of decorations: the former are either plain or show rather simple impressed designs (Fig.2.2-197); the latter present variations of the often elaborate incisions (Fig.2.2-198) found on the Fine Paste 'jars' (Fig.2.2-199) and small number of kendi. On both 'pots' and on the objects categorised as jars', main motif are stylised (lotus?) petals with/or various combinations of lines and strokes, ranging from simple to rather intricate designs (Fig.2.2-200). Vessels with analogous shapes and (though generally more austere) motifs were part of the Karawang cargo (Fig.2.2-201).¹⁴³ I found modern versions of such jars sold in Penang and Malacca, Malaysia, in 2009, reportedly products of kilns in Selangor (Fig.2.2-202¹⁴⁴). A detailed analysis of the motifs on the vessels in the Karawang assemblage did not locate recurring designs; but a wide range of individual combinations of their numerous sculptural elements, I assume that a comparable variety of these incisions prompted the division of the about 650 'jars' in this cargo into the 70 groups and subgroups in the <wh> categorisations.

The available photography suggests a broad division of the earthenware 'jars' into vessels with a 'bulbous' (Flecker [2002: 118] on corresponding vessels in the Intan cargo) profile and those displaying a "teardrop" shape. In the existing categorisations; one of the criteria to further divide the first of these groups apparently was a distinction between vessels with an elongated lower body and those with a shorter foot section. This division though is not in all cases supported by the measurements reported in the <wh> records (Fig.2.2-203), and indeed at least one of the <wh> waregroups seems to comprise objects with both elongated and shorter foot sections (Fig.2.2-204). The same can be observed for the largest of these vessels: while <J5/o17a-c/wh> appear to display an elongated lower body, I find it difficult to comprehend the criteria defining <J5/016/wh> and <J5/019/wh> (Fig.2.2-205). The two remaining notations of vessels with a possibly higher foot



section are single objects of but average size. Sums of the (thus) two major types and breakdowns into the <wh> categorisations are found in Fig.2.2-206.

Fig.2.2-207 shows distribution plots of these 'jars'. Apparently, vessels of varying types were retrieved from virtually the same grid points: about 28% of all 'jars' had scattered into grid sectors off the starboard bows of the ship, and about 17% were recorded just off portside foreship; of the teardrop shaped vessels, 27.5% and 16% were found in these two areas. The measurement plot in Fig.2.2-203 bares a distinct cluster around diameters between 18-20 cm and height of 17-21 cm; if we are to assume that shared size is a major criterion for a waregroup, then vessels of these dimensions would be obvious candidates. However, their distribution, again, only repeats the pattern seen for the other groupings. Without doubt, all of these earthenware jars had initially been stowed together over, in all probability, the foreship. The wide dispersal to the fringes of the site clearly indicates that the objects were placed high up in the pile of cargo, and thus had been taken aboard after the hold was filled with, as seen above, green-glazed stonewares. I will return to these observations in Section 4.1.

.ii Kendi

The total numbers for earthenware kendi reported in the two classification schemes vary considerably: the <wh> records comprise 1366 objects that according to example photographs and categorisation labels should be classed as such; on location, 1552 vessels were registered under code <KE[ndi]> and colour <Br[own]>, To the latter must be added a further 15 vessels that were coded <J[ar]18/loc> and described as a 'jar with spout', but positively are kendi (Fig.2.2-208). One reason for these differences are the about 230 vessels noted as 'brown kendi' in the <loc> records for which no re-registration entries in the warehouse are available;¹⁴⁵ others are to be found in general discrepancies in between the two classification schemes (Fig.2.2-209). These differences, however, do not overly affect distribution plots based on the two classification systems (Fig.2.2-210). In the following I will restrict an analysis to those entries that in both classification systems were noted as earthenware kendi.

As described above, even vessels with comparable forms and sizes

can display wide variations of exterior colours (Fig.2.2-211; cf. Fig.2.2-186). Some of these differences could be due to weathering during the prolonged time under water; others appear to denote different clays and/or firing atmospheres, and, possibly, slips, glazes or colouring. Only one type of kendi, the fourteen objects registered under <Ke24./wh>, parades incised decorations, on the example photograph around the vessel's neck combined with remains of the red slip, burnish or paint above observed for a number of decorated "closed" vessels (Fig.2.2-212; cf. Figs.2.2-196, -204). Its form matches that of undecorated kendi in this collection; hence my assumption that the decorated (and a number of undecorated, but by shape and/or clays similar) 'pot' and 'jars' were made at the same kilns. Somewhat surprisingly I could not find other sources reporting ceramics that are decorated with the distinctive incised decorations seen on the kendi and jars in this and the Karawang cargo.

The available photography records a wide range of different profiles, a number of which are comparable to those described for vessels found in contemporary horizons in both Java and southern Thailand.¹⁴⁶ I suppose that the (apparently often slight) differences in shapes prompted division of the earthenware kendi into the 112 categories and subcategories found in the <wh> data and the 55 codes applied on location. In the <wh> classifications, the objects were again divided into 'kitchen' and 'non-kitchen' types. Given my above assumption on the criteria defining the label 'kitchen', I find it difficult to distinguish <KendiKitchen1./wh> from <Ke28/wh>, and feel unsure about <Ke7./wh> and <Ke8./wh> (Fig.2.2-213): without a catalogue of the choices reasoning the existing categorisations it in cases is challenging to determine the actual benchmarks used (Fig.2.2-214). I also cannot detect clear-cut correspondences between the major groupings of these objects found in the two classification systems (Fig.2.2-215), and note a considerable number of parallels in between distribution plots based on the code groups with more numerous entries in both approaches (Fig.2.2-216).

For <Ke1, 2,5/wh> and <Ke4/loc>, the percentage of objects recovered from the main concentration off the starboard bows of the wreck ranges between 24% and 28.3%;¹⁴⁷ for all earthenware it is kendi is 27.2%. These figures and the overall distribution patterns approximate those found for the decorated earthenware jars (Fig.2.2-217; cf. Figs.2.2-207, - 210); I accordingly



assume that earthenware kendi and jars had initially been stowed into the same quarters. Fig.2.2-218 shows the distribution pattern of three <wh> categories of a distinctive size and shape: variances in the dispersal of certain types of objects could perhaps explain the slight differences in the distribution of these objects to gridN W and off the starboard remains of the ship seen in Fig.2.2-217. As the available categorisation data does not allow a detailed assessment, any attempts at a more detailed evaluation would, however, be pure speculation.

Fig.2.2-219 shows the distribution of the remaining earthenware objects, about 90 stemcups, cups and covers. All of these repeat variations of the incised decorations observed above on "closed" vessels and kendi. It would appear that the majority of the covers were retrieved with or in vicinity to stemcups; however, the warehouse team did not attempt to associate the former with any other earthenware objects.

As detailed above, the vast majority of the earthenwares were recovered from higher levels of the mound. Except for the small number of cups, found mainly off the remaining starboard planking of the ship and in gridE, the vessels had scattered indiscriminately and widely over the side, and objects of all major types proposed in the existing categorisation schemes were recorded in various combinations in the same grid sectors (Fig.2.2- 220). I have noted possible presence of batches of particular items on the example of "high-footed" kendi and the decorated 'pots', but without reliable groupings cannot trace any further particulars. The overall pattern implies that all of the various earthenwares had initially been stuffed into the same quarters of the cargo space, here proposedly mainly over the foreward sections of the ship. Unquestionably, these vessels were loaded atop both whitewares and green-glazed ceramics. I will discuss the inferences of these observations in Sections 4.1 and .2.

I attempt a short summary. Judged by volume¹⁴⁸ and weight, the pottery apparently had constituted the bulk of the ship's payload: even for the largest reconstructable hull, the approximately 200 t¹⁴⁹ of ceramic cargo would have represented at least two thirds of its possible carrying capacity.¹⁵⁰ More than 90%¹⁵¹ of the ceramics appear to be products of a single kiln complex, of which, again, about 90% are modest plain bowls. The vast majority of both green-glazed bowls and the second most numerous type of vessel, approximately

5,000 jars of the same glaze, divide into variations of a small number of shapes, unmistakably marking them as output of mass production. Even the possibly most valuable ceramic objects, originally, perhaps, 5,000 finely incised green-glazed dishes and bowls and about 12,000 whitewares, rely on a limited repertoire of basic shapes.

The distribution of the surviving ceramic tradewares over the site implies a stowage pattern that followed the typology of the vessels (Fig.2.2-221). The majority of the decorated green-glazed vessels had been stuffed into the lower fore to central hold. Around and on top of these were loaded tightly stacked courses of the various types of plain Yue bowls. Unstackable globular objects like jars, ewers and kendi were placed atop the dense tiers of the former vessels, and in course of the disintegration of the hull had dispersed to the fringes of the site (Fig.2.2-222). Such a stowage pattern corresponds with the guidelines of prudent seamanship.

The distinctive distribution of the earthen- and whitewares in this cargo indicates that they were taken aboard and stowed separately from the green-glazed stonewares. We shall see in Section 4.1 that loading sequences would certainly be dictated by the itinerary of the ship. However, it also seems that, independently from their divergent glazes and clays (and thus their possible origins), a small number of corresponding types of vessels had been stowed into the same quarters of the hold. Parallels in the distribution of earthenware and green-glazed 'pots' or the decorated Yue wares and the "open" whitewares have been noted above, and are particularly obvious in the distribution of the white- and green-glazed covered boxes (Fig.2.2-223). Evidently, loading of the ship did not simply follow the course of her passage. There remains a distinct impression that at least some of the cargo space was expressly allocated to consignments of objects of comparable shapes or sales value, indiscriminately of glazes and clays. These arrangements reflect mindful choices and the presence of an organisation and authority that could implement such options. I will return to these observations in Sections 4.1 and .2.

(Endnotes)

1. Adhyatman (1987a: 320) notes that
the name Yue ware is now reserved for the wares produced from the Tang



dynasty onwards and there is a tendency to apply it only to the finest quality of wares. The coarser products [...] are referred to as Yue-type. The Chinese themselves refer to all the earlier ware, the Tang and later products as "green ware". And during a visit in August 1985, the author saw that in the Shanghai Municipal Museum Yue wares are labelled "celadon" ware.

See, however, Edwards McKinnon (1979: 41-2, fn.2), Ho (1994a: 104) and fn.6 above for somewhat different definitions. Attempts at detailed characterisations of Yue wares are found in, e.g., Lu 1979: iqqf, 1983: or Grey 1984: For the identification of the green-glazed ceramics here under discussion as Yue ware cf. Flecker 2009: 38; Ong 2010; Tan 2007; Widayati 2008: 45; <http://cirebon.musee-marienroet.be/the-ca.rgo/main-cargo/ceramics/chinese-ceramics/kilns-of-the-south-east-and-south-yue-and-yue-type-stoneware.htm?lng=en>, last accessed 2013-05-05.

2. Lin 1994: i45ff; here, 149: 'Solid round spurmarks appear on Late Tang vessels and short stroke spurmarks on those of the Five Dynasties. Then by the time of the Northern Song, the marks become long stroke-like'. Cf. e.g., Adhyatman 1987a: 320b
3. I.e., as far as can be verified through examination of the available photographic record and visual inspection during the salvage campaign, I will note a number of possible exceptions below.
4. In the <loc> data, 22 records the field 'Descriptive' contain notes of 'Bowl, with sign on bottom' (12 times), 'Bowl [...] with sign' (5), 'bowl [...] at sign on the bottom' (4) and one instance of 'Bowl [...] +sign' in. No such records are available for the <wh> data. Signs are plainly visible on about 50 photographs of ceramic objects; most of these, however, do not correspond with the <loc> notations..
5. Peter Schwarz, pers. comm., 2006/7.
6. Here I include covered boxes Art.69063 and Art.25524/127235, where the sign appears on the box base, arguably an "open" shape.
7. About 15, against about 35 photographs of vessels with 大.
8. Examples for 上 are found at <http://www.koh-antique.com/yue1/yuemain.html>, menu 'Early Northern Song', links 9-11 (last accessed 2013-05-30).
9. For Wuyue see Section 1.2: 52f.
10. Choice of waregroups here and in the following is based on crosschecks of both <wh> and <loc> codes, the procedures of which will be described below.
11. It will be noted below that the objects categorised as <D001./wh> in all probability comprise a smaller and a larger group of vessels. <D001e/wh>, the first of the two

apparently deviant subgroups, belongs to the smaller of these; <DO01f/wh>, the second one, contains only two objects.

12. Cf Sections 2.4.5: the latest coins appear to be 955/6 Later Zhou issues of *Zhou Yuan tong bao*,
13. In 968 only two of the Chinese polities had proclaimed reign titles. For the Song Dynasty these are 乾德 Qiande, 'Heavenly Virtue', 963-968, and 開寶 Kaibao, 'Opened Treasure', 968-976; for the Nanhan, 大寶 Dabao, 'Great Treasure', 958-971. I do not know of the month of the change of Song Qiande to Kaibao; re the eventual reasons see the anecdote reported in Li You's Song Chao Shi Shi (Cheng 1984: 28).
14. Ouyang Xiu 2004: Chpt.67.
15. 'Xu registered firing', Roy Quek, pers. comm., June 2006; 'Xu in memory of manufacturing', Nai King Koh, pers. comm., November 2011; 'Xu Company fired/manufactured', Roy Quek, Nai King Koh; 'Pottery of Xu Company', <http://www.chinahistoryforum.com/index.php?/topic/17064-trade-of-china-with-indonesia-during-5-dynasty/>, last accessed 2013-05-10; 'a company seal Xu Ji Shao', Tan 2007; 'the potter, Xu, fired this piece in the year...', Ong 2010.
16. As to be discussed below, about 1-1.2% of all unambiguously green-glazed vessels.
17. E.g., Brown 1989: 117 Fig. 118; Dupoizat 2008b: 110-1 Figs.23-7; Mino 1992:15 Figs.2a, b. Flecker (2002: 106) depicts a small 'box cover decorated with two parrots' found on the contemporary Intan shipwreck that is akin to a number of covered boxes in the present cargo, but notes its origin only as 'excavated from a Yue kiln [...] dated to the Five Dynasties period'.
18. Here, <http://www.koh-aitique.com/yue1/yue1.html>, last accessed 2013-09-17.
19. According to Lai (1994: 26) a tail 'twisted around [the dragon's] hind legs' is a typical motif of Five Dynasties Yue wares.
20. Arts.25884, 27988, 65861 and 65863. According to their line drawings, code groups <DD007/wh>, 15 objects, and <DD0Q9/wh>, 23 objects, display a slightly irregular, "flame"-shaped circled dot The line drawing for <DD037/wh>, 40 objects, does not show the dot All of these vessels, however, depict the dragon's tail as twisted around its right hind paw.
21. <http://www.koh-antique.com/yue1/yuemain.html>, link 6, menu 'Early Northern Song', last accessed 2013-08-01.
22. Arguably, parrots transpired as a decorative motif on ceramics in the wake of 'exotic animals and birds flooding] into China during the Tang Dynasty [...] but may have



- not persisted beyond 960' (Flecker 2002: 121, partly quoting Li 1996). For the allure of these 'multicolored creatures which knew how to talk' see Schafer 1985 [1963]: 99-102 and 1985 [1967]: 239-41.
23. Here, <http://www.koh-antique.com/authenticate/dingmain.html>, last accessed 2013-08-01.
 24. Cf the 'basin stamped with a double-phoenix design', Brown (ed.) 1989: 109, Fig.98; or Kerr and Wood (2004: 565) on the use stencils in fifteenth century Jingdezhen, and on moulds in Huang Bao during the Five Dynasties and Early Song period (430!). I am not aware of western-language studies on a possible employment of such appliances in the production of Yue Yao.
 25. E-mails to both the Zhejiang Provincial Museum and the East Zhejiang Yueyao Celadon Museum remained unanswered; and attempts at contacting their staff via Chinese social networks proved impossible
 26. An assessment based on the available photographs and drawings shows that out of nearly 5200 ceramics with carved surfaces only 34 carry a "non-lotus" design. According to McArthur (224: 48),
the lotus; one of the eight Auspicious Symbols of Buddhism, represents spiritual purity. [...] Just as the lotus flower rises up from the depths of a muddy pools and lakes to blossom immaculately above the water's surface, the human heart or mind can develop the virtues of the Buddha and transcend desires and attachments, to reveal its essentially pure nature.
 27. Eg., Brown (ed) 1989:114: Fig.108, 'Yue ware'; Flecker 2002: 109, 'Yue type ware'; Guy 1980: 34 Fig.1, 'Zhejiang', 1986: 80 Fig.9, 'probably Zhejiang'; Southeast Asian Ceramic Society 1979: 119, Pls.21-3; Orsoy de Flines 1975: Pl 15, 'Yüeh Ware, East China¹.
 28. See, eg., the respective articles in Brown (ed) 1989; Southeast Asian Ceramic Society (ed) 1979; sections 'Kilns Outside Zhejiang' and 'Markets Outside China' in Ho (ed) 1994; Guy 1980,1986; Miksic 2009b.
 29. Art.2341, <BD053/wh>; Art.NN, <BD054/wh>, no grid record; Art.154075, <BD071/wh>; Art 154077, <BD072/wh>; Art.28016, <BD076/wh>.
 30. Flecker (2002: 107, 110) notes comparable objects from the nearly contemporary Intan cargo, but does not give any closer definition than 'Yue type ware'.
 31. Cf Cembrano 1989: 78-9; Flecker 2002:118-7; Guy 1986: 79-80; Krah1 2011b: 195-9; Earn 1985: 8; South-east Asian Ceramic Society ... (ed) 1985: 104-7.
 32. To the best of my knowledge, the bones, registered as Art8487, have not been

analysed My assumption here is based on the photographic record, showing a number of characteristic spinal bones of different sizes, and thus different individuals. Still today tuna is a rather rewarding source for stockfish For the distribution of these jars see Figs.2-1 and -2 above.

33. E.g., Dupoizat 2008b: 161, Figs.23-4; Krahl 2011b: 197, Fig. 144; Southeast Asian Ceramic Society (ed.) 1985: 100, Arts.184-88. Here should be added a set of nine toy bird whistles, by Watt (1989: 37) noted as typical 'products of [the kilns of] Hsi-ts'un'.
34. Here of note are, first of all, Art27603, a 'spouted jarf] a typical shape from Guangdong' (Krahl 2011b: 196; Fig.2.2-114 below), and Art 150906, with a glaze displaying the 'yellowish to olive green [and] darker streaks and drops, leaving the lowest part of the vessel free³, again a distinctive characteristic of 'coarse Guangdong jars' (*ibid.*: 199). Those ceramics readily comparable by form and/or, in absence of glaze, colour of their bodies, total 46 objects.
35. Here following unchecked <wh> categorisations only, <B031. and 32./wh>, 1474 registered objects.<B017./wh>, 201, and <B030./wh>, 413 items, also display broader, but apparently fully glazed footrings. Measurements and cross-checks against the <loc> records will be found below.
36. Only die example photograph of <B023/wh> shows incisions that could faintly resemble 大 — and if so, here but in a much larger lettering than on any other vessel.
37. E.g., ER 2005-11-14, Liebner; ER 2006-1-27, Liebner; ER 2007-03-21, Liebner; ER 2007-11-05, Liebner.
38. The possibilities of current analysis techniques for Chinese ceramics are described in, e.g., Kerr and Wood 2004; Li, Chen and Wood 2011; Prinsloo et.al 2005; or Wood 2011; cf Vandiver 1992 or Wood 1992, Chemical and physical composition of especially Yue wares have been given considerable attention: see, e.g., Fan, Feng and Xu 2005; Yap and Hua 1995; Wu et al 1999, 2002, 2009.
39. Eg., compared to the <wh> classifications, <D21/loc> contains 189 white ware vessels, 25 green-glazed ones (all recorded on 50326), and 9 ambiguous or not re-registered objects; <D27/loc>, 10 white wares, 79 green- glazed and 1 not registered objects; <D51/loc>, 9:12:1, For <B17/loc>, containing 1944 ambiguous records, see Fig.2.2-6.
40. See Section 2.1:105f
41. See Figs.2.2-8 and -9: <wh> classifications without entries for 'earthenware', 'no



- identification code', 'unidentified' and 'whiteware'; <foo classifications without 'ambiguous', 'earthenware', 'unidentified' and 'whiteware'.
42. For <loc>, 133,831 records for "open" vessels against 11,620 of other green-glazed ceramics, 91,32:8.68%; for <wh>, 128,422:10,961, 91.46:8.54%.
 43. Eg., <860/loc>, described as 'bowl with motifs', 'plate with floral motifs', etc., encompassing 13 objects, only 7 of which were re-registered as decorated "open" vessels; <B85/loc>, 'bowl with frieze', 43 not re-registered, 2 decorated, 41 undecorated vessels in the <wh> categorisations; <D18/loc>, 'dish with 2 parrots', of 204 objects only 160 again noted as decorated vessels; <D61/loc>, 'plate with lotus', 'dish (with) floral pattern', 226/173; <D77/loc>, 'plate with parrots', dish, 2 parrots', 16/8.
 44. See Section 2.1.2, especially Fig.2.1-27 and fn.7: eg., the 17 objects <B31/loc>, described as 'Lotus bowl', of which only one item, Art.25929, was re-registered (as decorated bowl <BD015/wh>) in the warehouse; <B43/loc>, 25 'Lotus bowls', only 4 of which were re-registered as various types of decorated bowls; <B58/loc>, 42 decorated bowls, of which only Art60981 received code grouping <BD006/wh> in the storage facilities (two further objects, Art 127703 and 127703 were respect re-registered as a dish and a 'Boat Pot'); <B73/loc>, 78 'Lotus bowls with dots', only 9 re-registered as various types of decorated dishes and bowls; <B84/loc>, 54 'bowls, lotus pattern inside' ⇨ one <BD001/wh>, one <BD003/wh>, one <B012/wh>; <B94/loc>, 29 'bowls, outside carved', with parrots' ⇨ one <BD0035/wh>, four undecorated bowls.
 45. As far as can possibly be calculated, 128422:1266 objects, 0.986%.
 46. I use '(dia[meter].) base' to designate the measurements noted as 'dia. bottom' in the original data: wherever I feel assured of the actual denotations of measurement labels, I substitute them with more common terms in my representations of the data. Where I recite original datasets, I will retain the labels used there.
 47. See Fig.2.2-10 for the nomenclature here used.
 48. I.e., displaying the 'lobed' (e.g., Grey 1984: 36 Fig.13) or 'foliated' (e.g., Brown [ed.] 1989: 102 Fig.76) impressions on mouth rim and/or body that imitate a flower's petals.
 49. Cf. Adhisti 2009, Irdiansyah 2009.
 50. While 'plate' was not used for an acronym for categorisation labels, already Art.3, <D1/loc>, was described as a 'small supper plate' (cf. Art.553, <D11/loc>, 'plate'; A 14.613, <D12/loc>, idem; Art.2759, <D10/loc>, 'plate'). The label shows up in the

- field 'descriptive' in nearly 4,000 <loc> entries.
51. <BDG31, 041/wh>, "magenta" group of <DD/wh>.
 52. See, for instance, <DD033/wh> vs. <D020d/wh>, or <DD023/wh> vs. <D020b/wh>.
 53. Cf. pg.115f above: I assume that those objects that occur isolated or in only small numbers over any given grid would not have constituted own consignments, but had initially been packed and/or stowed together with other vessels of the same basic shape and measurements. Manageable packs of ceramics would weight about 20-40 kg, based on the average weight of a bowl thus containing between 50 to 120 vessels.
 54. See Sections 3.2 and .3, Figs.3.2-71, 3.3-27.
 55. The <loo records note four different code groups under this entry (<D34, D39, D60, D87/loc>), only one of which (<D39>) is associated with a photo of a vessel with a broadened rim.
 56. See fn.11 in this section: <D81/loc> contains only two objects, both of which were re-registered as <D001f/wh>, of a proposedly even smaller size These will be omitted in the following.
 57. For the larger vessels, 141 out of 453 objects (31%); for the smaller ones, 186 of 341 (55%).
 58. 138 of 453 objects.
 59. See Section 2.1: 97.
 60. Illustrations of motifs are found below.
 61. 'Lotus, dots, frieze', 13 of 188 items recorded during September 2005; 'parrots, frieze', 3/48.
 62. See Section 3,2, Figs.3.2-70, -71: the 'tween-deck was recorded at about 100 cm above the floor planking, thus at about [z=200-250].
 63. Here mainly <D008/wh>, minus a number of ambiguous records nearly 3,000 vessels.
 64. About 25 such objects were recorded in the higher levels in gridW and NW; about 50, a number of which are visible along the lower edge of the distribution charts, to gridS and gridSE
 65. The confirmable measurements recorded in both classification systems note height:diameter ratios between approximately 1:3 and 1.4, with an average of 1:3.1. Ratios of base:top diameter range between 1:1.32 and 1:1.65, with an average of 1:1.44. The average of all <BD/wh> is 1:2.1, that of <DD/wh> 1:1.94.



66. Many of the corresponding <loc> waregroups confuse various shapes and even general categorisations: e.g., <Dl8/loc> notes a number of presumably whiteware 'supper plates', Art3516-24, among its otherwise green- glazed and decorated entries; this group and <Dl3/loc>, <D35/loc>, or <D56/loc> contain both decorated and undecorated vessels of this shape.
67. E.g., <D71/loc>, top diameter 20 cm, but <DD037/wh> 17.7 cm; <DD028/wh>, top diameter 21.6 cm, but <D47/loc> 16- 17.5 cm, <D79/loc> 17 cm.
68. In the available records, more complex and elaborately decorated vessels in many cases are single objects or of small numbers, mostly noted on only one to two grid, and thus not noted in fig.2.2-73.
69. See *ibid*, 428ff for a discussion on the use of moulds and other forming and imprinting devices used in China's late first millennium pottery manufacture
70. See Figs.2.1-34 and -37.
71. ER 2007-12-05, Debner.
72. The rather indistinct shallow bowl <D010/wh> (see Fig.2.2-50), about 1700 registered objects; <D001/wh>, 975 shallow bowls with a broadened mouthrim (Figs.2.2-50-54); <D018/wh>, slightly more than 900 shallow bowls with a recessed foot; <B012/wh>, nearly 700 petaled conical bowls of medium size; <B013/wh>, nearly 600 cono-segmental and petaled bowls of a size comparable to <OP07>; and <B028/wh>, the possibly largest sized petaled cono-segmental bowl, 518 registered objects.
73. E.g., <B045/wh> and <B046/wh>, a possible petaled version of <B008/wh>; or <B013/wh>, previous footnote.
74. Over grids | V26:X31 | were recorded 5.8% of <OP05>, equivalent to 21.6 objects per gridpoint; the average of objects per gridpoint over the central section of wreck (here assumed as | P26:ZC32 |) is 26 records/grid. For <OP07> these numbers are 4.2%, 122 against 264 average objects/grid; <B007/wh>, 4.2%, 12 against 35 objects/grid.
75. See, e.g., Figs.2.2-47, -48, -55/ -67, -77.
76. Probably most telling is the average of objects belonging to <D008/wh> per grid points: here 19 vessels average over grids |P26:ZC32|, but 103 on |V26:X31|.
77. The available photography and data do not allow to determine the glaze of about 50 vessels with a "closed" shape
78. These contain 58 records of <B[owl]/loc>; 16 <D[ish]/loc>; 13 <L[id]/loc>; four <B[o]x/loc>; five kendi; one <Ru[by]/loc>; and one bottom rim'.

79. See Section 3.2: 250.
80. The <wh> records note 119 vessels under this code. A comparison to the <loc> categorisations marks 11 of these as ambiguous.
81. In between the 209 records in the <wh> classifications are four objects noted as bowls and one classified as a lid in the <loc> data. Two <wh> entries are missing grid notations.
82. Flecker's attribute for a rather comparable type of jars in the Intan find (2002: 117).
83. For, e.g., <clo1> and others of the various types of lotus bowls see fn.27 above; for <J2/wh>, Southeast Asian Ceramic Society 1979:115 Pl.18; for <J11/wh>, Brown (ed) 1989:115 Fig.110; Ho (ed) 1994: 343 Pl.3f.
84. Krahrl *op.cit* see also <J7,19,21,25/wh> in Fig.2.2-110.
85. Cf, e.g., Guy 1986: 80 Fig.8; Krahrl et al (eds) 2011: 235 Art.44-54; Miksic (ed) 2009:158; Southeast Asian Ceramic Society 1979:100.
86. Eg., the 'short stub of a spout between two of the four lug handles' (Flecker 2002:116 on comparable wares in the Intan find) on Art.27603/<J32/wh>, or the streaky glaze on <J43/wh>.
87. See Section 2.2.4 for these earthenwares.
88. The <loc> here record five bowls, and each one box, dish, ewer and kendi and one 'bottom rim'.
89. Measurements of vessels grouped as 'small pots' in the <wh> records about correspond to those of 'small jars', and that in the <loc> notations a number of <p/wh> were labeled 'jar' (e.g., <P37./wh> = <J102, J56/loc>).
90. Flecker 2002: 110, grouping then under 'Yue and Yue-type wares' (*ibid.* 103).
91. I do not know whether the people tasked with classifying the present ceramics had attempted to associated lids and covers with the small jars here under discussion,
92. The <wh> records contain 140 entries for such vessels, five of which appear ambiguous (see fn.88).
93. See Fig.2.2-127 below.
94. About 30% of the ceramics in the Intan find would appear similar to this type of vessel. However, Flecker (2002:110) also depicts a 'squat jar with no decoration, a short mouthrim and no foot' under his group of Yue and Yue-type wares.
95. Brown (ed, 1989: 93) on a set of by shape and size about comparable Qingbai-glazed vessels 'of possible Guangdong provenance'.
96. Based on the overall numbers of ceramics I assume a total of 200 smaller vessels, in, including packing, spheres of an average diameter of 12 cm, and a very loose



random packing factor of 0.5. The larger 'pots' could have totaled around 550 pieces, here of an assumed average packing size of 17 cm diameter.

97. Twelve of these are ambiguous records: the <loc> categorisations here registered five bowls, three jars, two dishes, one covered box and a stone bead.
98. For this, and were not marked otherwise in the following, see <http://cirebon.musee-mariemont.be/the-cargo/main-cargo/ceramics/chinese-ceramics/kilns-of-the-south-east-and-south-yue-and-yue-type-stoneware/the-ewers.htm?lng=en>.
99. See Flecker 2002:108 for a wide number of sources; and Ruan 1994:18 Pl.1.18, here expressly noted as originating from a 'Shanglinhu kiln site'. Comparable vessels were found on the Karawang wreck (Hilmiya 2009).
100. <http://drebon.musee-mariemont.be/the-cargo/main-cargo/ceramics/chinese-ceramics/kilns-of-the-south-east-and-south-yue-and-yue-type-stoneware/the-ewers.htm?lng=en>, last accessed 2013-10-09.
101. Many of which still had their covers in place: cf Flecker 2002: 106 for similar finds in the Intan cargo.
102. E.g., Arts.27841, 30762, 128834, 133661, 154890, <BX2/loc>, or Arts.25395, 110750, <BX16/loc>, all re-registered as <CB Yue 12/wh>, according to the example photograph for this waregroup single covers.
103. For complete boxes, no measurements are available for the diameter of their mouths; for covers, there are no records for 'broadest diameters', presumably measurements of the outward diameter at the junction of cover and box. Comparisons by shape or incised/carved motifs do not correlate with the measurement data to hand.
104. There are approximately 150,000 individually registered ceramic objects to an assumed overall ceramic cargo of roughly 600,000 pcs. (see Fig.2.2-1). I noted above that the available records contain about 150 covered boxes. Volume is calculated for a rather overstated size of, on average, 12 cm diameter and 6 cm height, and a for their cylindrical shape equally exaggerated density of loose random packing (~0.6).
105. Possible scenarios for this unfortunate voyage are discussed in Section 4.1.
106. Packs of an about handable 35 kg could contain about 100 of the proposed average example bowls, and, if packed tightly, have a volume of approximately 0.025 m³; in a loose random packing, the roughly 5400 packs needed for 90% of the 600,000 ceramics would occupy at least 230 m³ of the approximately 280 m³ available in the hold
107. See Fig.2.2-7. Based on the available photographs alone, for 89 records colour of

glaze must remain unidentified

108. In the <loc> records, these include 57 (mostly evidently green-glazed) bowls, nine dishes, five covers and lids, each four box bases and kendi, two jars, and each one bronze and glass object
109. See Figs.2.2-4-9.
110. Overviews of the chemical composition of glazes and clays of various types of early whitewares are found in Kerr and Wood 2004: passim.
111. For an overview of the history of the Liao see Wittfogel and Feng 1946. For the use of 'Liao' as designation of ceramics of the period here under discussion see Medley 1980 9-10/5 and 11/10.
112. Cf. Krahl 2011a: 201-2.
113. <http://www.koh-antique.com/authenticate/dingmain.html>, last accessed 2013-11-11.
114. 'The thickened rim or rolled lip is a device invented by the Tang potter to strengthen the mouth-rim and to minimize distortion in the firing' (Lam 1985: 2).
115. E.g., <JS012/wh>, <P7/wh>, <P44/wh> or <BLO11/wh>. Prolonged exposure to and/or intrusion of seawater or vicinity to metalwares could also have caused the paste to change to a more yellow tone (see, e.g., <P10/wh>, <BL014/wh>). I assume that these effects explain some of the ambiguities in the <loc> records for 'colour'.
116. For the former, see, e.g., Gray 1984: 16off or Ren 1994; for the latter, Grey 1984: 144ff or Kerr and Wood 2004: ssbff; graphic comparisons of the various shades of such wares are found at <http://www.koh-antique.com/article/qingbaiceladon.htm>, last accessed 2013-10-17. Flecker (2002:115) pictures a small number of ceramics from the contemporary Intan cargo that he classes as Qingbai wares. He notes that 'the glaze alone prompts speculation on [...] production in the Jingdezhen area', and that, hence, manufacture of this type of glaze could have been 'achieved as early as the mid-10th century.
117. It will be noted that I here refrain from using of the latter term. 'Porcelain is a western term without a firm definition beyond "it rings, is translucent"' (Roxanna Brown, pers. comm., April 2008); 'porcelains and stonewares are closely related - so closely, in fact, that the Chinese language does not distinguish at all between the two. There is no distinct dividing line between the two but a smooth transition, and the difference is not necessarily apparent to the naked eye' (Krahl 2011a: 202).
118. '*Ch'ing-pai* [Qingbai] (bluish-white) -also called *ying ch'ing* [Yingqing] (shadow



blue)- refers to a type of popular early porcelain. It was created in the late tenth century from a fine white paste covered with a thin, lustrous glaze that ranged in color between light blue and white' (<http://www.artsmia.org/art-of-asia/ceramics/early-chinese-ceramics-ching-pai.cfm>, last accessed 2013-08-14).

119. Cf Clark 2009; Lau and Huang 2009; Standee 2007, 2009; Ouyang 2004. Belligerent relations and open warfare between Song, Liao and Northern Han persisted between 967 and the fall of the Northern Han in 978. For the contemporary events in Southern China, see Section 1.2: 51 ff.
120. The beeline distance 'between the Xing and Ding kiln sites in Hebei and Hangzhou, the main port of Wuyue, is about 1000 km; to Guangzhou it is around 1500 km,
121. See Section 2.3.5 below: "After the Qianhe reign [943-958] these lead coins were used only inside the city [Guangzhou], outside which copper cash was circulated (Guangdong Provincial Museum ... 1989: 55).
122. Cf, fn.104 above.
123. To accommodate the generally smaller sizes of the white-glazed ceramics, I calculate with packages of about 2/3 of the volume of those assumed for average green-glazed bowls (see fn.106). However, it will be seen below that nearly half of the surviving whitewares are small coverboxes and jarlets; the resulting numbers in all probability are thus rather overstated
124. 54% have ratios of 1 : >3; compare to the 84.3:15 7% for the decorated and about 20:80% proportions for the undecorated green-glazed "open" vessels (Fig.2.2-36).
125. Here, grids [A., B., C.] and [1-6], where 83 vessels were registered.
126. For these concretions see Section 2.3.6: 203, and Figs.3.2-7, 3.3-2.
127. See the respective discussion in Section 2.1.
128. Of the ten <JS./wh>, three were in the <loo records listed as bowls, each two as covers and dishes, and one each as kendi, lid and a glass phial; <P./wh>, four green-glazed bowls, one lid, and one without grid record; <sp./wh>, one dish, one kendi.
129. Confirmable grid records are available for only four of these jars: two of the records, Arts.8113 and 142734, both initially registered as <B3/loc>, are ambiguous.
130. Here, [Y224].
131. As to be discussed presently, criteria set (ii) is also present on smaller-sized "closed" vessels.
132. See fn.128.
133. Except for the set of 'lobed jarlets' (Brown 1989: 93) mentioned above and a 'very

small jar decorated with five lobes' depicted by M. Flecker (2002:115) I am not aware of comparable published vessels. Flecker also shows a 'fine jar with well defined lobes as decoration [and a] well carved slightly flared foot' that appears to resemble <CLS-wt001>, but is of considerably larger size than the vessels in this cargo.

134. See the distinct distribution of the larger jarlets <CLS-wt01>.
135. Cf, e.g., Miksic and Yap 1988: 49f, 1992 *passim*; Miksic 2009b: 87-8; see the latter for a number of references to published vessels of this kind, and the former and Flecker 2002:117 and his App.A B1, 5 for results of chemical analysis of Fine Paste Wares.
136. For an overview see Flecker 2009: 38f and Miksic *op.cit*; for the Karawang Wreck, Annisa 2009.
137. Cf. Taim's observation of a 'colored slip, yellow, orange or red' (2006: 337) on Fine Paste Wares found at the temple complex of Batujaya, West Java.
138. Pojoh in her preliminary analysis of these earthenwares (2008a) here includes all "closed" vessels and a number of kendi. I cannot confirm this observation, and below will note characteristics shared between vessel of coarser and finer clays.
139. The <loc> records here noted 21 bowls, seven jars of evidently different types, five kendi, three lids, each two boxes and dishes plus each one ewer and garnet
140. Cf, e.g., Djafar 2010: 94, Figs.3.50, 3.52; Guillot et al. 2008: 93 74-5, 207 11-2; Mundardjito, Pojoh, and Ramelan 2009:140 Fig.9.1; Rungrujee 1985: 404.
141. See Yudhoseputro (ed.) 1983: 16-8, 25, 54.
142. Though here unnoted, this is supported by a crosscheck of their distribution patterns.
143. See Annisa 2009; Liebner 2009c: Slides 24-5.
144. In today's Singapore, such vessels are commonly used as urns by the local Indian community, with a lesser percentage employed for domestic storage purposes. Lately, these vessels have become 'fashionable decoration objects bought by foreigners' (pers. comm., Sharmila Abdul Hamid, August 2013).
145. This number amounts to about 17% of the objects registered as earthenware kendi in the <wh> categorisations; cf. to the around 6% of missing re-registration entries for the overall data (see Section 2.1.2).
146. For the former, see Adhyatman 1987b: Colour Plt 5; Stargardt 2001: 370, Plts. 16,17; for the latter Mundardjito, Pojoh and Ramelan 2009:141 Fig.9.2.
147. For the other two code groups here analysed the numbers are higher. <Ke3/wh>,



43.7%; <Ke1/loc>, 39.4%.

148. See fn.106 in this section and Section 4.2: 304ff.

149. See Fig.2.2-1.

150. See Figs. 3.3-18 and -23.

151. 1 here refer to the about 96% of green-glazed ceramics. 3% of the surviving cargo of green-glazed stonewares would amount to about 4,000 objects, a figure significantly higher than any computable numbers for green-glazed ceramics of non-Yue types.

2.3 Non-Ceramic Objects

In contrast to the shipment of chiefly Chinese ceramics, the vessel's non-ceramic load encompasses an extensive variety of objects of diverse origins, ranging from the Middle East to the mountain ranges of Central Asia, and through India, Sri Lanka and Southeast Asia back to China. Form and length stipulated for this study do not allow for the space necessary to discuss all non-ceramic objects unearthed; the selections made here present a cursory outline only of the collection.

The excavation database contains about 1800 entries of non-ceramic articles. Among these are a number of the find's highlights; the majority, though, is of rather ordinary character. Approximately 1700 of the objects were

registered in the spreadsheets kept on the salvage location; the remaining 100 entries record various items that had found their way to the warehouse without being logged on the site. About 420 further objects collected in the samples database were later added into the main data.

The samples generally are documented by both descriptions and photographs. However, slightly more than 1000 of the items registered on location were not re-registered in the warehouse. Nearly 800 of these had until 2008 been stored in a bank vault. Two hundred and twenty-four objects were photographed on site, and photographs and/or drawings produced in





Photo courtesy Jean Paul Blancan and Luc Heymans

the warehouse are available for about 150 further items. Identification of the remaining articles has to rely on the data and short descriptions found in the on-site spreadsheets, and is impossible for about 50 unphotographed objects which were registered on location as 'UN[categorised]' or '?'.

It is not always feasible to unambiguously distinguish between merchandise and utilitarian or personal items. I assume recurrence to be one criterion of marketability: any group of repetitive objects should have been part of the vessel's commercial freight. Many of the non-ceramic items, though, are unique. An alternative approach would be the negative proof of a possible utilitarian purpose — for objects yet unparalleled in comparable contexts, however, one often enough has to rely on conjecture. In cases, the two approaches apparently exclude each other: the standard example would

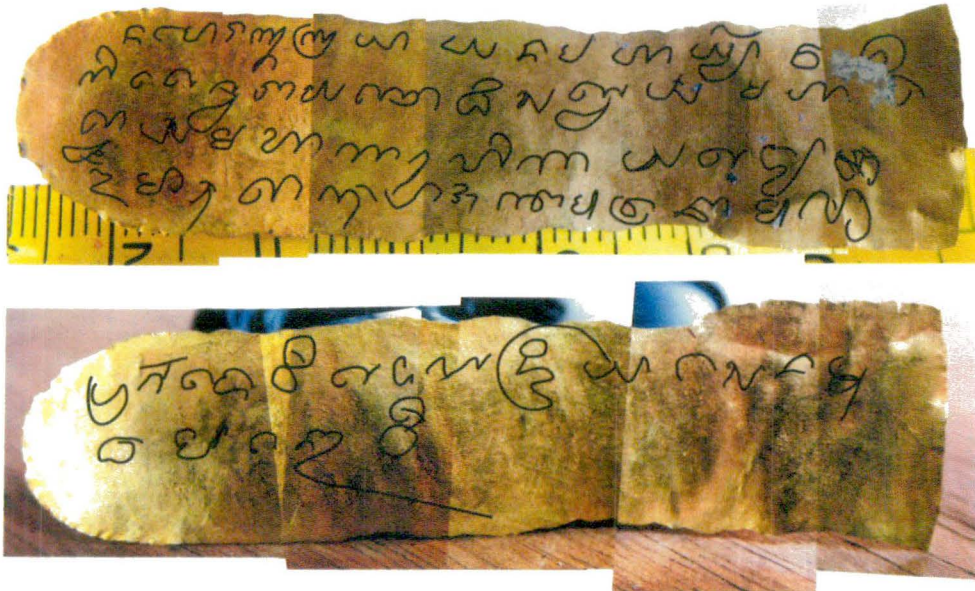


Fig.2.3-63: Photomosaic and assumed transcription of obverse (above) and reverse (below; courtesy A. Griffiths, June 2012).

be coins and other currencies that could have been both personal reserves and trade capital.

Presentation will trail, somewhat loosely from West to East, the possible provenance of the various items, and, where possible, link a thematic approach with the objects' materials. I begin with glasswares, a product of the Islamic lands on the western fringes of the Asian Seas, and rock crystal, in the available data associated with glass. Shared intaglio work links the crystal to the second topic, a consignment of crude and wrought lapis lazuli, a singular product of the Hindu Kush and western Pamirs. No jewellery using gems of the blue stone was found: hence gold, jewels and beads of various but mostly unspecified materials are discussed in a separate section.

A piece of gold sheet, a small amulet mould and a number of beads bear short invocations of Buddhist and Islamic faith; these lead us to religious paraphernalia, carried aboard as personal belongings of travelling clerics of Hindu-Buddhist persuasion as well as possible merchandise or presents. Most such ecclesiastical trappings were made of bronze; here included are a few non-metallic items with liturgical purposes. Also of bronze are a number of Chinese and Southeast Asian mirrors, objects of both ceremonial and worldly usage.

Nobler metals would be the material of choice for specie, a goddess not only of our times. Besides a small number of silver ingots possibly intended for minting, both the Chinese cash as well as (rarely known) the Southeast Asian "currencies" found on the wreck were made of more common ores. Lesser metals were as well in constant demand on mineral-deficient Java, the most probable destination of the fatal voyage: the substantial cargo of ingots, both ferrous and non-ferrous, and metal implements for martial and domestic purposes is discussed in the last but one section.

The final section presents a miscellany of objects mainly associated with activities of the ship's complement. These comprise articles as disparate as scales and weights, pastimes like gambling or catering and lighting. I here also include a small number of aromatics and chemicals that apparently were part of the commercial load but are recorded only as samples. Of the textiles, Indian and Chinese, that almost certainly were a considerable part of the cargo nothing remains.¹



Fig.2.3-70: Pedestal and standards depicted on the Borobudur.



Fig.2.3-94: Tin ingots stacked in Jakarta storage.



In contrast to the shipments of ceramics and metal utensils that were stowed in bulk into the hold, many of the non-ceramic objects would have been packed into boxes and chests. Of these remained a small number of fittings and handles (Fig.2.3-1). 'Differing] little in form and function from modern chest handles' (Flecker 2002: 98), Arts.6536 and 6852, for instance, match rectangular handles in the Intan cargo; others recall the rounded scroll-like handles' (*ibid*) of Chinese boxes. Such fittings were found scattered around the hull of the ship (Fig.2.3-2), and could have been associated with any of the various nonceramic objects unearthed in their vicinity. The only complete chest, the tin-sheeted wooden box Art.10383 (Fig.2,3-3), was filled with a jumble of broken metal implements: apparently it was a scrap-box, possibly kept by the ship's carpenter or a travelling black smith.

(Endnotes)

1. See, for the former, Guy 1998; for the latter, the frequent mention of silk and brocades as reciprocal "gifts" of the Chinese Court to foreign embassies (e.g., Bielenstein 2005; Ptak 2007).

2.3.1 Glass and Crystal

Both translucent to transparent, glass and crystal have been linked since antiquity,¹ The tenth-century physician and chemist Ibn Zakariya al-Razi (1937: 87) classifies glass as a stone, 'the best of which is [...] white and clear, equalling the purity of rock-crystal'. A short century later al-Biruni knows of writings explaining that rock crystal is a kind of mineral glass, and that glass is a kind of artificial rock crystal'.² In the thirteenth century, the Persian polymath Zakariya al-Qazwin finds crystal to be 'the most beautiful, hardest, whitest and most pure of all kinds of glasses'³ The classifications of most of the glass and crystal found on this wreck followed this time-proven taxonomy.

Many, and especially so smaller types of glass vessels in the art-historic record, imitate more exclusive crystal paragons.⁴ The bottles, flasks and cups retrieved from this wreck, the first group of objects discussed here, were but all of glass. It will be seen that the various items of processed crystal, our second topic, by form and possible function as well as their findspots appear to be unrelated to these glasswares. On the other hand, most of the beads of both materials (as far as the records allow a differentiation⁵) were found



on the same grid sections / dates or in close proximity. They regularly were associated with various semi-precious stones, pearls and jewellery, and will be assessed together with the latter in Subsection 2.3,3 below.

Glassware

Besides a plethora of shards and fragments of glasswares, the wreck site produced 39 (largely) complete vessels, one of the largest documented finds of medieval glass.⁶ Size and form of the vessels and fragments can be divided into larger objects, mainly bottles and cups (Fig.2.3-4), and small perfume flasks', marked as such by their typical Tunnel-shaped neck, slightly rounded shoulder, and usually cylindrical body and flat bottom' (Cullen 2009: 237; Fig.2.3-5). Fourteen of the latter were still complete; among these are three so called molar flasks', one of which sports a, to the best of my knowledge, yet unparalleled shallow shape (Fig.2.3-6).

All vessels found are translucent. Their colouration ranges from brown, dark blue and green through various lighter shades to the greenish-yellow or light amber of uncoloured glass. Two fragments, Art.7270 and WH123, combine uncoloured and coloured segments (Fig.2.3-7). Objects of different tints were found on the same dates and grids (Fig.2.3-8). The available photography and records do not allow to establish exacting ratios of the extant vessel's colours; a fleeting visual examination though indicates that dark cobalt-blue appears to be least frequent, while the light yellow-amber of undyed glass is most often met. This is in accord with the proportions observed for comparable glass finds on the about contemporary Serce Limam wreck.⁷

Most of the small flasks and many of the bigger vessels contained amalgams of sand and residues of their original fillings. In cases these had preserved shattered vessels in their original shape (Fig.2.3-9); in others only the concreted contents remained (Fig.2.3-10). A number of these deposits distinctively appear as sediment of fluids (Fig.2.3-11). More than 50 of such light concretions were sampled.⁸ I have not been informed of results of any eventual analysis. As they represent genuine (though broken) vessels, 30 of the entries in the samples' database were added to the set of data used to generate distribution charts.

Except to starboard off the ship's remains, the main concentrations of

(fragments of) larger glass vessels and those of the smaller flasks were found in discrete grid sections (Fig.2.3-12). This impression is corroborated by a review of the dates on which the respective objects were retrieved (Fig.2.3-13). The concentration of larger glass objects at | K21:N23:R19:P17 | yielded 17 (largely) intact vessels, marking a consignment of glasswares initially stowed over the ship's bows. It is well possible that other glass items recorded in the vicinity of this concentration had belonged to the same shipment. The spread of (fragments of) larger glass vessels to gridSW could indicate that this consignment contained a substantial amount of glasswares, some of which had dispersed in that direction. As, however, only a number of test pits were excavated here, no consolidated data for most of the grid-points in this quadrant is available.⁹ Contrastingly, the scatter of perfume flasks off starboard bows and their concentration abaft and astern suggests that these had not been stowed with the bottles and cups: due to their small sizes, any "batches" of such flasks would have been of rather inconsiderable volume and, hence, easily placed (and later likely to be found) among the larger vessels.

The concentration of both types of glass vessels along the wreck's starboard sides un-questionably represents deck cargo that had tumbled off the ship in the early stages of her foundering and subsequently was covered by the bulk of ceramics pouring out of the dis-integrating hull.¹⁰ Due to their fragile character, any glass objects buried here would have been prone to breakage, which is possibly why substantial numbers of small glass shards found in the sediment were garnered from along and under the starboard planking (Fig.2.3- 14¹¹), and most of the roughly 50 concreted remains of contents of glass vessels¹² were also registered in gridN off the wreck. However, these grid sections contained a potpourri of any objects carried on the ship's topsides: while the finds of remnants of both larger and smaller glass vessels here do not allow us to identify possible ownership and/or batches of such items, they yet hint at the considerable number of glasswares in the cargo.

Glass was a relatively rare article in medieval Southeast Asia.¹³ Discussing the glass finds on the Intan wreck, Flecker (2002: 89) hypothesises that some of the 'broken glass formed part of the cargo', conceivably intended for further processing into beads. The early eleventh-century 'glass-wreck' of Serge Limam even carried a paying ballast of about three tons of raw glass and cullet



that was meant to be re-molten and worked into new objects at the ship's unknown destination.¹⁴ On the present wreck, however, all concentrations of shards were found in close vicinity to intact vessels and/or fragments still containing residues of their content. Only one of the eleven pieces of raw glass retrieved was unambiguously recorded together with shards of glass vessels; all the others were discovered individually or in association with beads. I accordingly assume that the bulk of shards initially had belonged to glass vessels that were intended to be sold as such: throughout the ages, their very fragility has been one of the charms of glass objects.¹⁵

Based on a stylistic analysis Guillot (2012) identified a number of the larger-sized vessels and shards as of Iranian origin, and notes especially Art.6851 as, 'sans doute , a product of Khorasan,¹⁶ One of the bottles, Art.7036, displays a short line of writing that he transcribes as (Arabic) 'barakatun M-sahibi-hf, 'blessings on its owner¹⁷ In contrast, the perfume flasks (and particularly so their molar variety) are commonly associated with Egypt.¹⁸ I am not aware of attempts at an analysis of the composition of any of the glasses.¹⁹

Exports of Middle Eastern glasswares to Southeast Asia and the Far East are well documented,²⁰ and fragments of glass vessels were also found in the roughly contemporary Intan²¹ and Karawang cargoes QFig.2.3-15). Their transparency made glass beakers and bottles celebrated receptacles for fluids:

Water and ice, behold, within a glass / How candle-bright all three do shine; but see, / The twain will fuse, yet one a frozen 'mass / Remains. One hue, one luster have these three.²²

A genuine product of Islamic, lands, glass not only sweetened water:

Delicate the glass and delicate the wine, both resembling each other, approximate in their humours / As if it were wine without the beaker, as if a beaker without the wine.²³

The latter verse might also suggest a possible purpose for larger vessels: Wilkinson (1943a: 176) illustrates a 'demijohn for wine' found at Nishapur that could have its parallels in a number of fragments retrieved from the present site.²⁴ Particularly of note are the various funnel-shaped concreted residues of the vessels' fillings that had preserved the form of larger bottlenecks.²⁵

Smaller bottles, and especially the bell-shaped Arts.7035,7036, 7136 or 25452, yet recall the form of extremely popular rose-water sprinkler[s of ...] the Early Medieval period, occurring not only in glass [...] but also in metal and glazed pottery', while the long-necked Arts.8864, 7276, 12718 or WH71 resemble perfume bottles that were signs of the owner's prestige' (Jenkins 1988: 31) known from the Serçe Limani shipwreck and other contemporary finds.

Since late antiquity, many of these fragrances, valued equally with gold and silver²⁶ (Ziegler 1932: 226), were a coveted merchandise of Middle Eastern traders:²⁷ even the Persian or Arab Belitung wreck, probably foundered on her return voyage from China, carried at least one of the flasks commonly used for attars.²⁸ An essential²⁹ Persian scent, rosewater first arrived at a Celestial Court in the late 950s by the agency of an Arab trader who claimed to represent Champa.³⁰ Writing in the early thirteenth century, Zhao Rugua (1911: 203) knows the fragrance as 'the dew of flowers in the country of the Ta-shi [Arabs]'; he though regrets that since Champa's singular 'tribute [of] fifteen bottles [...] importation became rare', and that 'much' of the trickle arriving at Chinese markets is 'counterfeited and adulterated'. We cannot validate the latter verdict, but have to correct his numbers: the *Songshi*, not published until a good century after Zhao's demise, throughout the 990s alone records at least 160 bottles of the perfume, presented to the Celestial Court by Arab traders and ambassadors. Rose water also was among the tributes brought by Vietnamese and Cholan envoys in the early years of the second millennium.³¹ That such luxuries seldom passed Zhao's tollhouse might imply a different port of importation, but nonetheless underlines their rarity on the public marts of his time. Some of the cologne was channelled through Śrī Vijaya's harbours,³² where it was pleasure and privilege of the mighty: the *mahārāja* of Sanfoqi thus 'bathes in rose-water; should he use ordinary water, there would be a great flood' (Zhao Rugua 1911: 61).

Lucidly underlining the worth of their possible contents, the tiny cavities of the various perfume flasks could carry but small volumes of such essences. Roses, apparently supplying their fragrance in volumes adequate to fill larger bottles, were not the only source for such scents: from among the floral palette should be mentioned the 'almost fabulous' (Schafer 1985 [1967]: 173) fragrance of jasmine, the best of which, as we are told by the tenth-century geographer al-Istakhri, was a product of Fars.³³ Writing in the early thirteenth



century, Gao Sesun knows that 'when this fatty substance is rubbed on the palm of the hand, the odor penetrates through the back of the hand'.³⁴ For the harem maidens of the last emperor of Nanhan, jasmine was the flower and scent of 'peerless beauty',³⁵ imported into Song China, the fragrance, just as any of the manifold eau de toilette then known, would have imparted its olfactory sensations onto patrician sybarites of both sexes.³⁶

Glass containers, though, could have held whichever of the high-valued fluid or pow-dery matters intended for purposes cosmetic and remedial. Such substances would range from the well-commended costus oil³⁷ or the liquid storax³⁸ imported into Sanfoqi by Arab traders³⁹ to beautifying precipitates such as *kuhl*, the famed galena mascara of which residues remained in 'perfume flasks found at Fustat and Khirbet el-Minye' (Cullen 2009: 237⁴⁰). A fluid of a genuinely maritime purpose would be the 'holy water that can calm agitated waves' when sprinkled over the seas, according to Zhou Qufei (1977: 44) 'filled into bottles of opaque glass' in twelfth-century Baghdad. Also worthy of note are the eighty-four glass bottles of liquid "Greek fire" (Schafer 1985 [1967]: 173) that accompanied Champa's gift of rose water to the court of the Later Zhou. Whatever they held, we have to assume that the sales value of many of the glass vessels found on this wreck lay not only in the aesthetic appeal of the container but also in the desirability of its contents.

Rock Crystal and Quartz

The available data contains 42 entries that with sufficient certainty⁴¹ can be identified as records of rock crystal. Four of these note blocks of crude quartz (Fig.2.3-16); the remainder are wrought objects. The latter could, roughly, be divided into beads of diverse shapes, both pierced and unpierced (Fig.2.3-17), examined in Section 2.3.3 below; a small number of (fragments of) singular items (Fig.2.3-18); and nearly 40⁴² objects noted as stoppers', 'pendants' or 'chops'.

Three crude rock crystal blocks, amounting to approximately 125 kg of the material,⁴³ were found on 50406/08, [Y26:Y32/300], close to the aft expanse of the proposed 'tween- deck in the hold (for this and the following references to findspots, Fig.2.3-19). These blocks apparently were a shipment of rock crystal that was bound to be unloaded at the destination of the ship's hapless voyage. A smaller single piece, Art. 115866, of about 5 kg and a

possibly less transparent colour was found off portside aft; this might have belonged to the deckload. I know of no attempts at a chemical analysis of these rocks.

Al-Bīrūnī informs us that the best rock crystal of the late tenth century came from East Africa and Kashmir, and claims that the abundant crystal of Badakhshan due to its lesser qualities did not warrant importation into the Near East.⁴⁴ Other contemporary authors add Arabia ('the most exquisite' - al-Kindī), Armenia (Its colour tending to yellow') or Sri Lanka (close to the Arabian, but not approaching the latter in clarity' - Nasr al- Fārābī) to Al-Bīrūnī list⁴⁵ Badakhshan, however, would be the foremost source of lapis lazuli; as will be seen presently; another mineral carried aboard ship in both crude and processed form.

The most elaborate wrought crystal item is the fish-shaped container; Art 155309; found off the wreck's starboard planking. The object is, unquestionably; a flask: Finder- Wilson (1954: 86; 89 PLXXXIV.b) figures an ampulla in the form of a fish¹ held at the British Museum; Reg.No.1953,0218.2, that apart from its unfortunate fracture[s] at the head; tail, and back' compares favourably to the present item. The fish was a popular decorative motive in the Islamic world¹ [*ibid*], and Finder-Wilson knows of ten other rock crystal flagons carved into the form of aquatic vertebrates.⁴⁶ A number of crystals worked into the shape of terrestrial beasts that reiterate our fish's style are depicted by Longhurst (1926: Plate II, F-H). Also mentioned should be Inv.No.15448 in the Museum of Islamic Art at Cairo, assertedly a *kohl* flagon in the shape of a bird that, probably rather optimistically, is claimed to represent an example for an essential part of the makeup kit of every medieval Cairene woman'.⁴⁷ Many of the surviving examples of such vessels, however, found a less worldly use: their preciousness and clarity ordained most of the medieval Islamic crystal works arriving in the West as reliquaries.⁴⁸

Finely processed crystal is commonly ascribed to workshops of Fatimid Egypt⁴⁹ Al-Bīrūnī, though, considers Basra to be the hub of artistry in the mineral,⁵⁰ and Contadini (1999; 320) accordingly cautions that a Fatimid identity [of any carved rock crystal objects] should not so readily be taken for granted'. Wherever its origin, as an article of trade this flagon undoubtedly represented a major investment; if intended as a present, it instantiates affiliations of might and wealth.⁵¹ Found in the vicinity of a number of perfume



flasks (see Fig.2.3-12), it could have been the showpiece of a dealer in fine smells, and it is intriguing to speculate whether and what a possible content could have met its container's opulence.

Another striking object is the 'crystal ball', Art.7819, a nearly spherical orb of about 4 cm diameter. It may be related to Arts.18314 and 19236, fragments of wrought crystal objects found on | P26:Q25 |: its globose form could have easily displaced the object. The sphere recalls the crystalline "fire orb" [of] the size of a hen's egg' presented to the Tang court by Champa in 630, that, just as a Campbell-Stokes heliograph, 'held between the sun and a bit of punk would set the latter on fire' (Schafer 1985 [1963]: 237). The *Tangshu* knows such spheres to be in use in Poli, an unidentified country in the southern Ocean,⁵² and notes them as a product of Kashmir.⁵³ Since antiquity, more remote uses for transparent and translucent orbs of glass or crystal were various 'occult and curative purposes' (Kunz 1938 [1913]: 180, overleaf), here, first of all, the 'hypnagogic illusions' (*ibid.*: 180) popularly sought in scrying. Apart from, possibly, Ibn Khaldun's 'soothsayers [...] who gaze into transparent bodies, such as mirrors, bowls, or water',⁵⁴ I am not aware of contemporary Eastern sources describing scrying with crystal balls: divination in Asia preferred other methods.⁵⁵ In any case, the object's size alone would have made it an exquisite marvel that, alike a number of its confreres from early medieval Europe,⁵⁶ might have awaited to be banded or slinged as a pendant.

The most numerous items made of crystal found are the small polyhedrae, mostly de-scribed as 'stoppers' or 'tokens'.⁵⁷ Their shapes divide them into a cylindrical and various angular types (Fig.2.3-20). Registration numbers of items shown on photographs and drawings and the descriptions found in the records taken on location and in the warehouse do not always match. At least the round 'stopper' contained in Art.153169, registered on 50924, was not found together with the other hedrals under this entry, but was presented to the author by a diver on 50919. The existing records might not reflect all of such objects found: reliable rumours claim that a number of these crystals have shown up on the antique market of Belitung, the home of a number of the divers employed in the salvage operations. Their wide diffusion over the site and main concentrations besides and under the wreck's starboard planking and off the aftship imply that these objects had been stowed (or

used) on deck of the ship. None, though, were recorded in gridS.

Pocoh (2008b: 56) assumes that these crystals were plugs for the various perfume flasks found in the cargo. However, no flask closed with such a crystal 'stopper' was found, and a comparison of their respective distribution over the site does not support this supposition (see Figs.2.3-12 and 19). Writing in the early twelfth century, the Hanlin academician Cai Tao tells of the intense fragrances of the Middle East that even though kept in a glass-bottle and sealed with wax on the outside, the fragrant smell would leak out, and be smelt at a distance of several ten-steps' (Kuwabara's translation [1928:19]) — while some of these plugs, as claimed by Pocoh, might fit into the mouths of flasks, their often rough finishing could not have assured a tight fit. A small ninth- to tenth-century bottle in the collection of the Museum für Islamische Kunst, Berlin, that still holds its original content was closed with a plug of palm fibre.⁵⁸

Observing the repertoire of basic forms and their upright, pawn-like' shape, Luc Heymans (pers. comm., August 2011) proposes that these objects could have been used as game pieces. Al-Bīrūnī notes that from rock crystal are made chessmen and stones for nard⁵, and cites the report of a prospector who, probably referring to the crystal habit of quartz, "among pebbles¹ in the mines of Badakhshan "found things like the figures of the game of nards or the pawns of chess, octagonal and hexagonal, as if artificially smoothed and polished' (Kahle's translation [1936: 333, 336]). Some of the forms of these stoppers' thus could have been cut according to the crude rock; if employed in games, their basic shapes —round, triangular, square, rhombic or pentagonal (Fig.2.3-21)— then may have distinguished the stones. If so, any game possibly played with these pieces would have been of a more elaborate character than a mere two-party race game like nard. Their forms indeed bear resemblances to pawns known from a number of contemporary Middle Eastern chess sets;⁵⁹ missing, however, are the distinctive "M"-shape of the *rokh* or the "stepped" *shah* and *fīrzīn*, and I would feel at a loss if asked to point out pieces representing opposing sides of the game. I will return to these observations in Section 2.3.7 below.

The bases of five of the objects were engraved with intaglios (Fig.2.3-22). Four of these were found in close⁶⁰ proximity off the aftship; the findspot of the rounded one, Art.153169, is unknown.⁶¹ Though carved into a medium of different shape,⁶² the motifs displayed on these "stoppers' appear to stand



in the tradition of the well-known dactyloid stamp seals commonly labelled Sasaniaft: the bird on one of the pieces registered under Art.153169 or the zebu on Art.130672 find their matches on a number of such seal stones.⁶³

Seals commanded ample consequence in late classic Persia's bureaucracy and economy (everything was sealed in Iran, and everybody apparently sealed [...] not carrying a seal meant to be a nobody⁶⁴) - with the final fall of the Sassanids to Islam in the 640s, however, their administrative importance began to fade, to be replaced with a more limited use of inscribed signet rings.⁶⁵ I have no knowledge of the use of such stamp seals in tenth-century Southeast Asia: as in the Middle East, the medium of choice for sealings appears to have been rings with inscribed bezels or, more rarely, insets of semi-precious stone.⁶⁶ The significance of the present seal stones thus would not necessarily have been a bureaucratic one.

Both animals (and the feline, Art.130673, for which I could not find a counterpart as striking similar as are the paragons of the two other beasts) belong to the most common faunal imagery in Sasanian glyptic: they are icons of Zoroastrian myth⁶⁷ It will be seen presently that intaglii of bull and bird are repeated on a number lapis lazuli 'sequins' carried aboard ship, and that variations of the curious cardioid topped with a pinnate plant, Art.155677, are found on at least ten of these small bluish discs. Iconography here could parallel geography: Badakhshan, where rock crystal 'is found in plenty' (Al-Birūnī 1989: 160), is also the origin of the lazurite gemstone.

Zoroastrian intaglio carvings would point onto the craftsmanship of a stone-cutter with knowledge of the fire-faith; the monkey - Hanuman? - on Art.133664, though, appears a motive inspired more by India, than Iran, where simians are not endemic.⁶⁸ Since the Arab conquest of Persia under pressure of the incessant expansion of Islam, by the early years of the tenth century some adepts of Zoroastrianism had emigrated to Gujarat, to become a nucleus of India's Parsi population.⁶⁹ Speculatively, enterprising members of this community could have been the agents of both crystal and intaglio works: Zoroastrians reportedly⁷⁰ were among the victims of Huang Chao's army's massacres in Guangzhou, hence involved in the Eastern trade. The undecorated stoppers, then, would be blank stamps prepared for future customers' requests. The monkey thus may have been an attempt to cater to the Hindu-Buddhist taste at the ship's anticipated destination.

2.3.2 Lapis Lazuli

The principal sources of the lapis lazuli known to the Old World are, in order of their importance, the mountain ranges enclosing the upper reaches of the Kokcha river and its tributaries in Badakhshan, the Ljadshuar valley on the northern slopes of Mayakovsky mas- sif in the Shakh-dara range of the southern Pamirs, and, disputedly, the Chagai Mountains in the Rigestan Desert.⁷¹ All deposits of lapis lazuli have a 'distinct affinity with remote regions, high mountains and/or climatologically adverse areas (Krassmann 2010: 6). The legendary Pamir source was 'rediscovered' in 1930 by a Russian expedition:

They found the route extremely difficult and had to leave their horses at 11,400 feet, climbing the remaining 5,100 feet on foot. The lapis lazuli occurred in a steep wall of marble and gneiss, which bordered an immense glacier. The local inhabitants knew of the lapis lazuli but few ever succeeded in reaching it, for they usually succumbed to mountain sickness and turned back. (Herrmann 1968: 28)

Lapis lazuli has been mined since, at least, the fourth millennium BCE.⁷² Analysis of samples found in Shahr-i Sokhta, a site of the late fourth to third millennia BCE in Baluchistan, infers 'that the Chagai hills source was discovered during the third millennium and that its exploitation was therefore a recent addition to the long-established trade in lapis from Badakhshari (McIntosh 2008:167). The relative inaccessibility of the Pamir deposits restricted exploitation to 'gathering scattered blocks of stone that had to be carried on foot over mountain trails several dozen miles into the Shakh-dara valley' (Bliss 2005: 36). At the upper Kokcha, however, developed a substantial mining industry.⁷³ By 2000 BCE, a Harappan outpost settlement' at the confluence of the Kokcha and the Oxus, Shortugai, played a role in channelling the trade in the gem,⁷⁴ and Bactrian Greek found this site strategic enough to warrant foundation of a major fortress and city.⁷⁵

The Nan-Han/Cirebon cargo held several hundreds of kilograms of crude lapis lazuli;⁷⁶ however, only a number of samples were recorded⁷⁷ plus Arts.22724 ('stone, blue') and WH13 (lapis lazuli stone'). Photographs are available only for the samples. No sample was analysed.⁷⁸ Divers reported that the crude rock was found deep in the hold of the ship; the few stones for which grid records are available though were concentrated off portside



aft (for this and the following references to findspots, Fig.2.3-23). Registered on 50613 and 50617, they are associated with commercial cargo stuffed in the lower hold of the vessel.⁷⁹ S54, according to the extant records found on [ZB24:ZB26], 50527, appears to reflect a distortion in the gridding system: on that day the divers were working in the vicinity of the proposed amidship 'tween-deck.⁸⁰

Crushed and pulverised, the stone was a feted colorant for "(1) azure-blue" dyes, 'in the early Middle Ages in Northern Europe [the] genuine ultramarine from lapis lazuli' (Raft 1968:1), and used as a pigment for the finest of the blue Islamic glasses.⁸¹ However, one of the three crude stones registered under S271, noted off the starboard aftship at [Z33- ZD33], shows signs of processing (Fig.2.3-24). In the quarries, lapis lazuli was won by heating, resulting in broken rocks;⁸² the smoothly cut surfaces on the sample thus are traces of a later treatment, possibly associated with the production of wrought objects.

Only two larger objects made out of the gemstone can be identified in the records. Due to its sharp comers, the finely worked 'handle', Art.154452, could not have proved practical, but may have been (part of?) a small pedestal used for various domestic and ritual uses (Fig.2.3-25). Art.112756,⁸³ described as a 'ring' (Fig.2.3-26), yet strikingly reminds of the shape of the Sasanian seal, here but without the intaglio work on its bezel. Apart from a number of beads (Fig.2.3-27, to be discussed in 2.3.3), the most numerous objects of processed lapis lazuli are, however, small disc-shaped "sequins", many of which are decorated with intaglii (Fig.2.3-28).

The spreadsheets kept on the site record 58 entries of 'intaglia', 28 of which were re-registered as such in the warehouse. According to their colour codes and descriptions, 55 of these entries appear to represent objects made of lapis lazuli. Items not re-registered are marked with a '?' in Fig.2.3-23. The individual records contain in between one and nearly 50 objects, totalling 282 of these small discs. No separate counts of decorated and undecorated ones are available. Art.127343, comprising 25 discs, was entered on 50709/[ZB19:ZQ20], a day with an excessive number of grid records that is not included in the distribution chart. It is apparent that the main concentrations of these small discs were met over and off the aftship and to lar- and starboard off the wreck. In at least gridN and gridE this pattern comports with the

distribution of the crystal 'stoppers' (see Fig.2.3-19).

Not only their distribution, but even more so the motives depicted on both decorated 'stoppers' and sequins draw obvious correspondences. Bird and zebu, repeatedly represented on the discs (Fig.2.3-29), have been noted above, and the recurrence of the heart- shape with its burgeoning crown in most cases even including the crossed lines flanking its depiction on the crystal, Art.155677, underlines the argument. A western Indian Ocean origin of the symbolism is highlighted by the dromedaries on two of the disks of Art.136202; the flower, be it rose or tulip (here and Art.133663), or the winged horse (or *Sen?*; among Art.136202) link with Persia.⁸⁴ The overall concord of the floral and faunal canon of motifs with the iconographic inventory of published collections of Sasanian seals, much of which relies on Zoroastrian fable and faith, is striking.⁸⁵ I could not find a match for the cardioid with its (I assume) sprouting plant in the Sasanian repertoire: heart-shaped motifs appear only in monograms.⁸⁶

John Guy (pers.comm., November 2006) drew my attention to the *pūrnaghata*, the 'Vase of plenty' of Indian mythology, one of the most auspicious of Hindu-Buddhist symbols, used freely, though meaningful, throughout the history of Indian art [... and] employed equally by all sects not only in India proper, but also in further India and Indonesia' (Agrawala 1965: 2⁸⁷). 'Overflowing vessels' accordingly adorn many Indian shrines (and the ninth-century Prambanan, Java's foremost Hindu temple complex, as well as the slightly earlier Buddhist sanctuaries Kalasan and Borobudur⁸⁸), but bear, as a rule, freely blossoming lotus,⁸⁹ and not the austere pinnate leaves shown on e.g. Art.128103. Their representation on stamped ingots and early 'Sandalwood Flower' coins found in late eighth-century contexts in Central Java⁹⁰ hence depicts the buds of such flowers, and mostly draws their receptacle not as a cardioid but in square outline.

The size of the sequins the intaglii are carved into restricts the motifs depiction to the very concept of vegetation sprouting from the water of a thick bellied jar' (Boeles 1965: 103). This prototype is aptly expressed on coins ascribed to the seventh- to tenth-century Buddhist domain of Dvāravati in southern Thailand that display 'the full brimming water jar [...] from which two tender creepers are sprouting' [*ibid*: 101] in a style almost similar to that found on Art.2311. Chosen on the other sequins are variations of this



'archaic form[,]) appealing in its moving simplicity' [*ibid.*: 103), of a heart-shaped vase bearing an unpretentious foliage. The crossed extremities of the basic 'creepers' on Arts.2311 and 23699 may be attempts to sketch blossoms; lines underneath the cardioid apparently represent its stand. The function and meaning of the two "struck lines" flanking the heart-shaped vase on a number of its representations elude me.

The symbol must have held sufficient import; whether its recurrent employment reflects a genuine conviction or, as speculated for the crystal monkey, is a mere marketing measure I cannot say. Of the *aṣṭamaṅgala*, the Eight Auspicious Symbols of Buddhism, here appears only the vase - the paired fish on Arts.6096 and 155313, the other candidate, are not 'depicted head to head' (McArthur 2002:119), the usual manner of the *suvarṇamatsya*. There also are no representations of other common Hindu-Buddhist icons, such as, for instance, swastika or turtle. Fish (and birds, besides our vase the most frequent motifs) are indispensable 'guardians of nature' (Neumann 2008: 340) of Zoroastrian mythology. The Indian 'vessel of abundance' has no role in Persia's Fire Faith⁹¹ - conversely, Saurashtran and Gujarati coins of the ninth to thirteenth centuries copied the iconography of Sasanian paragons, including the very image of Zoroastrianism, the fire-altar.⁹² The archetypal altar of flames, on coins and seals often depicted in overall arrangements resembling our "flowering heart", is but a square affair, and the representation of its flares is far from the clearly faunal character of the present motif.⁹³ It may be no coincidence that late first-millennium Badakhshan, the main source of lapis lazuli (and, as to be seen presently, possible origin of a number of other precious and semi-precious stones), was a stronghold and refuge of the Fire Cult.⁹⁴

These sequins could not have been beads: none were supplied with holes. If intended for jewellery, the stones would have to be set into pendants or rings. The latter would produce signet rings that, akin to documented examples,⁹⁵ could have had the dual function of adornment and stamp. Just as speculated for the undecorated crystal stoppers', cutting of the numerous blanks then may have awaited demand. However, alike the crystals, the disks' very shape could have made them the typical game piece, employable for a wide number of board games. The first possibility would associate these sequins with various other gemstones and jewellery, our next topic; the

second with gaming, to be explored in Section 2.3.7.

2.3.3 Jewellery

Bertatahkan ratna mutu manikam, "adorned with pearls and sundry gems", was not only a Malay ideal of the early modern age,⁹⁶ but apparently even more so in classic Java (Fig.2.3-30). About 1000 of the available records accordingly log several thousand of precious and semi-precious stones, pearls and beads, and nearly 500 pieces of gold leaf and (fragments of) gold and silver jewellery. On their landing, nearly all of these objects were secluded in a safety box; only about 50 were re-registered in the warehouse. Twenty-three of the items were photographed on location, and only a handful of additional photographs taken in the warehouse are available.

All but a small number of larger objects were found in between the surfaced sediments (Fig.2.3-31). I assume that due to their often miniscule sizes only a portion of the various beads, gems and fragments of jewellery were recovered. Smallness could also have been instrumental in their wide dispersal over the site (Fig.2.3-32). As a rule, the various kinds of jewels, beads and fragments of precious metals were found in close proximity - dates with records of only one or two of the basic types of jewellery are an exception (Fig.2.3-33).

The records differentiate the objects by a serial number and codes for material and colour, plus (in most cases) a short description. No catalogue of classification criteria is available, and descriptions and coding conventions vary widely.⁹⁷ Fig.2.3-34 summarises the colour codes in the <loc> entries for the main categories of beads and stones. It proved difficult to confirm the categorisations of, first of all, the numerous unspecified 'coral-; 'glass-' and stone beads' against descriptions and the few available photographs. For example, beads made from rock crystal (see Fig.2.3-17) were registered under both glass' and 'stone1; coral beads' could note pierced pendants of grown coral or various types of beads known to be made of glass (Fig.2.3-35⁹⁸); wooden rosary beads (see Subsection 2.3.4 below) were labelled coral', 'glass' or 'stone'; 'glass beads' comprises any of the wide variety of known shapes and types of Indo-Pacific beads (Fig.2.3-36).⁹⁹ It also is unclear whether the records of precious and semi-precious stones include pierced gems, or whether these are to be found under 'beads'. My attempt at a workable



classification can only be provisional (Fig.2.3-37).

Most entries record more than one object.¹⁰⁰ However, individual counts for multiple objects logged under one entry are available for only 610 of the about 1000 confirmable entries for beads and jewellery. Tallies are missing for especially corah, glass- and stone beads (Fig.2.3-38). Where sums were recorded, totals per record vary in between one and 2355.¹⁰¹ larger batches, possibly aggregating finds of several days, appear more frequently throughout 2005.

Gold, Gems and Beads

A small hoard of gold¹⁰² ornaments was recorded on 50408-16, [Y26:Y32/300], in the depth of the midship hold (Fig.2.3-39). Art.78257 appears related to one of the two fragments of ear pendants, Art.69079, associating the cache with other gold objects retrieved from the central hull over [U31:W26:W32:U32/300-350] (Fig.2.3-40). Further pieces of jewellery of a comparable style (of note are a number of gold disks, possibly representing earrings¹⁰³) and a considerable amount of crumbled sheets of gold foil were found at [ZA22: ZA34/ZS23:2B301 (Fig.2.3-41), when the divers proceeded throughout the aftship.¹⁰⁴ I assume that all of these objects belonged to a consignment of jewellery initially stowed somewhere in the vicinity of the proposed 'tween-deck (Fig.2.3-42).

In contrast to a number of documented hoards of medieval Southeast Asian jewellery,¹⁰⁵ only a limited number of objects made of solid gold were recorded.¹⁰⁶ Especially absent are the heavy cast rings that appear to have represented some form of quasicurrency' (Christie 1992b: 6) known from inscriptions,¹⁰⁷ collections¹⁰⁸ and archaeological discoveries.¹⁰⁹ Instead, most of the present gold objects, and especially so the fragments of gold foils, would have been fittings for gemstones (Fig.2.3-43). This assumption is substantiated by both a comparison of dates and totals of finds of gold fragments and gems (Fig.2.3-44) and their distribution patterns (Fig.2.3-45).

The main concentrations of stones and jewellery (Figs.2.3-46, -47) show marked differences in their respective compositions: the proposed cache of gold objects in the lower midship is associated with high counts of pearls; starboard off the remains of the ship was found the highest amount of garnets, here possible related to the second highest count of crumbled

gold foil and other fragments of jewellery; rubies and, partially, sapphires were concentrated off portside. These variations appear to represent different batches of jewellery. The gems retrieved from besides the wreck in all probability were part of the deckload, and some of the stones and gold recorded between 40729 and 40818, widely scattered over the foreship and gridNW, could have belonged to any of these consignments.

The numerous 'beads' of-reportedly- glass, stone and coral approximately repeat the distribution patterns of pearls, gems and gold (Fig.2.3-48), indicating that at least some were included in consignments of jewellery. The data though does not allow to unambiguously distinguish between the various possible materials and shapes, and no totals can be computed. Except for their spread to gridNW, the dispersal of 'stone beads' follows the distribution of lapis lazuli objects (see Fig.2.3-23): many of the former apparently were fashioned out of the blue gem.¹¹⁰ None of the documented fragments of gold though carries insets of the azure stone, implying that lapis lazuli not necessarily was part of the consignments of genuine jewellery. The discrete diffusion of 'coral beads' over and off starboard bow might mark a distinct batch; to aft, however, they appear to follow the distribution of gold trinkets (see Fig.2.3-45). Records of glass beads' around [U15:ZF21] (Fig.2.3-49, above) could be related to a consignment of eyebeads.¹¹¹ Most of the identifiable rock crystal beads were found in the deep midship-aft hold, where they regularly were recorded together with gold objects (Figs.2.3-49, below, -50).

The disparity between the retrieved quantities of gems and gold fragments is striking. Just as the lapis lazuli sequins, many plain cabochons or ellipsoids might have awaited processing,¹¹² and many of the pierced stone, crystal, coral or pearls probably were beaded into any of the various necklaces and armbands that in medieval Southeast Asia were fashionable attire (see Fig.2.3-30). Some of the semi-precious stones could have had consequence by themselves: plain gems, preferably of red, blue and white colour, were a valued offering to the deities of the Hindu-Buddhist pantheon.¹¹³

Except for lapis lazuli, the exclusive product of Badakhshan, all of the other precious and semi-precious stones could have originated from any of their known deposits. Gems of the corundum family (sapphires, rubies and related stones) are found in numbers in the ranges of south-western Sri



Lanka;¹¹⁴ the Mogok and Kyatpyin valleys in upper Myanmar;¹¹⁵ 'everywhere in the mountains between the Sakhdara valley and the Pyandash' (Bliss 2005: 37) in the southern Pamirs and Badakhshan; and at Jegdalek in the southern Hindu Kush.¹¹⁶ All of these corundum deposits appear to be associated with finds of various types of garnets, and at least Badakhshan and Sri Lanka also produce rock crystal.

Writing in the early tenth century, Al-Rāzī (1937: 47) declares the true red ruby as 'the king of all precious stones', and a century later al-Blrum (1989: 29) knows the 'white, dust- coloured, black, yellow, and red' varieties of corundum to be 'of all stones [...] the first in grade, beauty and rank', so much so that 'God has likened the houris of Paradise to it'. The most celebrated gems of al-Bīrūnī's times were mined in 'very carefully guarded [...] mountain[s] adjoining the coast [of] Serandib' (*ibid*: 34, 47), our Sri Lanka, and in the Badakhshani Wakhan valley, separating the Pamirs from the Hindu Kush. Both areas also brought forth various minor kinds of ruby-like gems. Although they were possibly 'worked for more than 700 years' (Bowersox et al. 2000: 100), al-Bīrūnī (1989: 38f) does not mention the Jegdalek deposits, and has but vague second- and third-hand information about a possible further source 'beyond Serandib'.

Mining in Myanmar dates back to the first half of the first millennium. Although the quarries also produced some jade, until the Yuan Dynasty this source remained equally unknown to the Chinese.¹¹⁷ Already in Tang times 'pieces of lapis lazuli were lordly gifts' of which 'the finest jewelry was made' (Schafer 1985 [1963]: 232); up to the thirteenth century, however, the various manifestations of corundum found in both the vicinity of the deposits of the azure gem as well as in Sri Lanka were not a penchant of the jade-admiring Chinese: regarding valuable lithic products of the far West, neither the *Lingwai Daida* nor Zhao Rugua (1911: 73) note much more than a short reference to the 'cat's-eyes [and] blue and red precious stones' of Ceylon.¹¹⁸

Diverse Stones — Different Merchants?

Most of the gems would be produce of the western Indian Ocean; where they were set into jewellery yet remains guesswork. Ornaments of set stones could, conceivably, be related to the areas of the gems' origins. While the jewels' distribution over the site implies that there were several consignments

of evidently different composition, it though is difficult to distinguish possible batches by workmanship alone: objects of solid gold and trinkets carrying stones from widely separated findspots display comparable detail (Fig.2.3-51), of a style exercised by many a South, Southeast or East Asian goldsmith.¹¹⁹

Except for the apparent scarcity of solid objects, the few intact pieces remind of a number of gold finds on Java: although smaller and decorated less lavishly, the four-lobed box, Art.69081, repeats the shape of a well-known exemplar in the roughly contemporary Wonoboyo hoard,¹²⁰ marked as the island's produce by its idiosyncratic Hindu-Javanese ornamentations;¹²¹ the three fragments of braided gold 'chains' (Fig.2.3-52¹²²) compare well to a number of necklaces ascribed to the island.¹²³ Yet, the objects could almost probably¹²⁴ not be Javanese: our ship was only her way thither.

An area on the vessel's assumed course known for 'plenty of gold'¹²⁵ would be Su- varnadvīpa, the "Golden Island" Sumatra of Indian myth and inscriptions.¹²⁶ Referring to the jewellery found on the Intan wreck Flecker (2002: 77) speculates on 'the possibility that Sumatra [...] exported manufactured jewellery' and that 'some of the designs usually attributed to the central Javanese may actually have originated' in the former island. Other (though probably less important) sources of gold are found in the 'Golden Chersonese'¹²⁷ of Malaya and on Borneo.¹²⁸ Much of the gold circulating in the later Tang empire came from well-exploited deposits in Annam.¹²⁹

Gold, often in form of unidentified 'vessels' and other wrought items, was a regular compensation for the "tribute" offered by the various nations of the Southern Seas to the courts of the Tang and Sung,¹³⁰ and hence could have had a similar role in Chinese trade relations during the Five Dynasties. The box base, Art. 69081, for instance, not only has parallels with the Wonoboyo box, but repeats a well-known form of Tang silver- and goldwares;¹³¹ the small triangular hanger in Fig.2.3-40 recalls comparably shaped 'bracelets' found amidst an unquestionably Chinese treasure in the Belitung cargo.¹³² Many of the refined Chinese works in precious metals yet again were inspired by the 'Persian technique of beating gold and silver into elegant thin-walled forms [that during Tang times had] replaced the classical method of casting' (Schafer 1985 [1963]: 251). They often replicated Central Asian paragons: here especially of note are 'polylobed boat-shaped vessels', a rather characteristic and possibly Sogdian shape (Melikian-Chirvani 1970: 15f).



The proposed concentration of gold objects in the deeper central sections of the hold evidently is marked by comparatively low counts of rubies but high numbers of pearls (see Fig.2.3-44). Throughout all of Asia pearls were in vogue for applique works: 'garments ornamented with pearls' were among the presents received in 10x5 by the ambassador of Champa to the Song court (Bielenstein 2005: 45); in turn, Cholan envoys to the Celestial throne in 1015 and 1033 offered pearl-studded caps and belts.¹³³ For the Chinese, pearls 'stood for wealth and beauty and supernatural power', and their importation from the far South and West was 'received with gladness and even with greed'¹³⁴ (Schafer 1985 [1963]: 243, 244) — so much so that, as Zhao Rugua (1911: 73) would know from experience, 'foreign traders coming into China are in the habit of concealing pearls in the lining of their clothes and in the handles of their umbrellas' to evade taxation. The more fancied varieties were known as produce of Sri Lanka, throughout most of the eleventh century under Chola rule, and the lands of the Arabs;¹³⁵ in addition, the notoriously over-exploited oyster banks of south-western Guangdong and Annam yielded assumedly inferior but native returns.¹³⁶ With the help of a troupe of purposely drafted and trained divers, Liu Chang, Nanhan's last ruler, attempted to revitalise the pearl fisheries at this 'Pond of Shattered Hopes':¹³⁷

Each suspended a stone to his foot and went as much as 500 to 700 feet into the sea. One after another died of drowning. After a while the pearls filled the treasury to reple-tioa The pavilions and houses in which [the emperor] dwelled, their rafters, beams, screens and portieres, were one and all decorated with pearls, going the limit in elegance and richness.¹³⁸

Here we have one possible supplier for the thousands of tiny baubles in the Nan- Han/Cirebon vessel's cargo;¹³⁹ others though should be sought in 'the sea around Serandib as [well as] the Persian Gulf, and Bahrayn, Dihlak and Clysma, or [the] new diving site which has been recently discovered in Sifalah-i-Zanj' that Al-Bīrūnī (1989: 122) lists as sources for pearls. The most fabulous pieces (of which, however, none was found in this cargo) possibly came from Southeast Asia herself: Buzurg (1981: 56-7) knows of a pearl sold for '100,000 *dirhams* [yet] worth more than double', recovered from the belly of a fish caught at Kalah-Bar, the Merbok estuary in Malaya, that made the

fortune of a poor weaver's family.

Inscribed Gold and Beads

A fortune might also have been expected from the two 'golden' hilts, Arts.27851 and 155672 (Fig.2.3-53), respectively recorded on [J31:K31], off the starboard bows, and, reportedly,¹⁴⁰ during a last cleaning under the starboard remains of the ship. Both are made of gold-sheeted resin, a technique known from a number of about contemporary hilts and finials, used for weapons, umbrellas or representational purposes.¹⁴¹ The present hilts' stylistic similarities suggest shared origin and, possibly, ownership. Their findspots imply that they had been part of the deckload.

No remains of their blades, sheaths or any (given the hilts' opulence, quite likely) em-bellishments of the scabbards were retrieved. Had the hilts been parts of useable and borne weapons, I could imagine their employment throughout the climactic moments leading to the ship's sinking;¹⁴² their relatively small size and light weight but, hypothetically, high worth would have made them a chief target for any last-minute salvage attempts,¹⁴³ be it on the part of their owner(s) or any other knowledgeable person aboard ship. As they apparently went down with the sinking vessel, the hilts in all probability had been stowed out of easy reach - as was, assumedly, most of the jewellery still found on the wrecksite. The two hilts though were not necessarily part of a consignment of jewels: in the vicinity of Art.27851 only one tiny fragment of gold-leaf and a rather small number of beads and semi-precious stones were recorded.

On both hilts, the space supplied for tangs is not of the small diameter and often square shape of a keris' *paksi*, and their crossguards evidently would not allow for the Javanese blade's *ganja*. The shape of the tangs' holes suggests sturdy, one-edged blades, of a thickness, at the base of the spines, of more than 1 cm. Richadiana Kartakusuma (pers. comm., January 20x4) accordingly proposes parallels to Malay *badik*.

The octagonal quillon of Art.155672 is adorned with a short string of, conceivably, letters (Fig.2.3-54). Haryono (2008: 71) interprets the marks as a contraction of **لَا إِلَهَ إِلَّا اللَّهُ** *lāillāhallah*, 'there is no god but Allah'; Syahrowi R. Nusir (pers. comm., 2006) reads **لَا إِلَهَ إِلَّا اللَّهُ** a possible variation of the phrase, here with the meaning 'just Allah'. The hilts' workmanship and floral ornamentations



though remind more of Southeast Asian than Near Eastern paragons,¹⁴⁴ and the signs could equally be rendered into 'Old-Javanese' or '-Malay' Kawi¹⁴⁵ (Fig.2.3-55). The reading proposed by R. Kartakusuma (pers. comm., January 2014) would indicate the year 951CE, 17 years before the date found on the ceramics: if noting the date of its making, the hilt would have been in circulation for some time before our ship set sail. Whether it then had come aboard as a yet unsold article of trade (together with the second hilt the showpieces of a vendor of jewellery?), was "secondhand" merchandise¹⁴⁶ or a cherished personal belonging remains open to speculation.

The most probable interpretation would be a coarse lettering indicating the weight of the metal expended in the manufacture of the hilt. Such notations are known from a number of documented gold objects:¹⁴⁷ for instance, a gold-plated hilt in the Metropolitan Museum of Art, Acc. NO.1998.544.43, displays a comparable (though more elaborately written) string of letters indicating 'a weight in gold of two units *suvarna* and twelve units *māṣa*' (Griffiths forthcoming b). Assuming that the central letter is a somewhat flawed¹⁴⁸ rendering of <SU>, the 'three suvarna' here probably specified would correspond to about 114 gr of the metal.¹⁴⁹ A gold sheet of this weight, the approximate length of the hilt, 33 cm, and a thickness of 0.2 mm would have an average breadth of nearly 90 mm;¹⁵⁰ judged by visual inspection, the sheet here used might have been even thinner.

Arabic writing, however, is found on a number of wooden beads with an unquestionably Islamic background. The data contains three identifiable records of groups of such beads,¹⁵¹ all of which until 2008 were secured in a bank's safety box. It is likely that more of these beads were registered in yet unchecked records of comparable objects: K. Tauchman (pers. comm., August 2005) during a fleeting survey of the thousands of beads kept in the bank vault located 'more than forty such pearls'.¹⁵²

In the warehouse one of the sets was photographed and, partly, drafted (Fig.2.3-56). A number of beads belonging to Art.148328 could be examined on the day of their surfacing¹⁵³ (Fig.2.3-57). Some of the beads carry a simple fence pattern; the majority though bear the two words, الله and الملك apparently incised by repeated marks with a small chisel (Fig.2.3-58). On its own, اَلْمَلِكُ *al-Malik*, 'The Lord', could note the third of the *Asmā Allāh al-Husnā*, God's 99 beautiful names;¹⁵⁴ read as الله الملك (١) the phrase might stand in for اَللّٰهُ اَلْمَلِكُ

Allahu Almaliku, 'God, the King'.

The alternative reading *Almulku Lillahi*, 'The kingdom belongs to Allah', was reportedly engraved into a turquoise in a ring owned by the seventh Shīah *imam*, Musa ibn Ja'far al-Kadhim.¹⁵⁵ The stone was by 'Gabriel conveyed to the holy Prophet [who] bequeathed it to Imam Ali [ibn Abī Tālib, the first *imam* (632-) and fourth *caliph* (656- 661)]' (Haydar 2010), and thus became ibn Ja'far's heritage. A gem, here an orange camelian, with such an inscription is in the British Museum.¹⁵⁶

Another tradition, conserved in the *Kitāb al-Bāqiyāt al-Sālihāt*, notes an advice of 'Alī al-Hādī an-Naqī (828-868), the tenth Shīah *imam*:

The turquoise ring must carry the following inscription on one side,
Allah is the King, allahu almaliku اللَّهُ الْمَلِكُ
And on the other side of the ring, the following should be inscribed:
Kingdom is Allah's; the One almulku lillahi alwahidi الْمُلْكُ لِلَّهِ الْوَاحِدِ الْقَهَّارِ
and All-Omnipotent. alqahhari

These are the specifications of the ring that Imam Ali used to put. Before caliphate, Imam Ali inscribed the following on his ring, 'almulku-lillah', and when he became the caliph, he inscribed the following on it, "almulku lillahil-wahidil-qahhar. This ring secures against beasts and achieves victory in wars.¹⁵⁷

The second formula was found inscribed into a half of a mould, Art288i5 (Fig.2.3-59), presumably prepared to cast small '*wafaq* a kind of protective charms [...] from precious metals like gold or silver' (Utomo 2008: 75), of about 1.4 x 1.6 cm. Transcribing the words as al-malk lillah al-wahidal-qahhar, Utomo notes the writing as kufic, adding that 'if compared to the kufic script on the tombstone of Malik as-Saleh ([ruler of Samudra Pasai, Sumatra,] deceased 1297) it is still stiff and clumsy' (2008: 75). He translates, 'all might is owned by Allah, the One and Omnipotent', and relates the contents to His 99 idiosyncratic names. A phrase not far from the one proposed by Alī al-Hādī is found in Al-Quran 40:16, referring to the final judgement:

يَوْمَ هُمْ بَارِزُونَ لَا يَخْفَىٰ عَلَ اللَّهِ مِنْهُمْ شَيْءٌ ۚ لِمَنِ الْمُلْكُ الْيَوْمَ لِلَّهِ الْوَاحِدِ الْقَهَّارِ
The day when they come forth, nothing of them being hidden from Allah.
Whose is the Kingdom on this day? It is Allah's, the One, the Almighty.¹⁵⁸

I leave further exegesis to those more conversant in Islamic mysticism.



Of note, however, should be the potency of the locution: according to the *al-Bāqiyāt*, water divinated with Alī al-Hādī's ring once even healed a sick jinni.¹⁵⁹

On the occasion of the transfer of the contents of the bank vault to another one at the warehouse, Imam Fauzi, an archaeologist at the PanNas BMKT, managed to produce a roll-off of a yet undocumented pearl belonging to Art.128110 (Fig.2.3-60). The writing here incised appears to represent,

إِلَّا إِلَهَ إِلَّا اللَّهُ مُحَمَّدٌ رَّسُولُ اللَّهِ *aš-šahādah*, the first of the Five Pillars of Islam, underlining the assumption that the pearls were parts of a *misbaha*, the Islamic rosary. A complete string would have 100 beads; versions with 67 and 34 beads are known.¹⁶⁰ This bead could have been the *imam*, the leader' of the string. I cannot tell whether the various beads belonged to one or several *masabih*, and whether they are related to the mould: while the *misbaha* pearls were found around the aftship, the mould was retrieved in gridNW, off starboard bows on the fringes of the tumulus (Fig.2.3- 61). The mould's purpose, though, would undoubtedly be the manufacture of considerable numbers of charms that could convey its pious invocation.

Lastly, a Buddhist mantra was inscribed into the small gold foil, Art.148341, reportedly¹⁶¹ found under the aftship planking (Figs.2.3-62, -63):

[Obverse] namo ratnatrayaya nama °aryyava(lo)- / kitesvaraya bodhisatvaya maha(sa)- / tvaya mahaka(r) unikaya tadyaftha) / °om marutakuha x kamavra x (malya) [Reverse] (prabha)devl (°ada]lan driyase nam(u) / (dha) man de(v)l 'Homage to the Triad of Jewels (Buddha, Dharma and Samgha)! Homage to noble Ava- lokitesvara, the Bodhisattva, the great being, of great compassion. [The mantra is] like this: Om, ... of the wind ..., goddess who have the luster of..., you bear ...'. (Griffiths 2014: 157)

Griffiths (2014:1580 explains:

We have here a variation on dharani material of the type seen in the Ekadasamukha and the Sadhanamala. The palaeographic appearance of the script is consistent with a date in the ninth or tenth century. [...] I am unfortunately unable to identify the mantra part that begins with om, and am (therefore) unable to reconstruct the parts that are not formulaic. Since we find here the words maruta, meaning 'wind' and (if my reading is correct) driyase, meaning 'you are borne', it may be suspected that the dharani-WAS intended to protect against the dangers of voyage at high sea, and that the object on which it is inscribed was worn as an amulet, while the text was addressed to the goddess personifying the spell.

2.3.4 Bronze: Veneration and Vanity

If rolled into coils, such invocative plates could have been kept in the bronze amulet container, Art.7973 (Fig.2.3-64): a comparable object found on the Intan wreck apparently had held some lead-rich bronze' (Flecker 2002: 99), that, if worked into the form of a sheet, could have been a possible medium for engraving periapts. I do not know the contents of the present pouch; however, two small unopened coils of unidentified metal sheet, S509 and S564, might contain such invocations.

Ceremonial Objects

The ship carried not only pious petitions: a number of paraphernalia of Hindu- Buddhist ritual indicate the presence of practitioners of the creed. The most telling assemblage was found between 50525 and 50528, when the divers were working along the aft expanses of the proposed 'tween-deck in the deeper central hull (Fig.2.3-65¹⁶²). Such an ensemble could have fulfilled most of the ceremonial requirements of a travelling Buddhist monk.¹⁶³ If the statuette, Art.112537, represents 'Tārā as a Buddhaśakti, placed in the southwest [of a *mandala*] as a Dewi Pāṇḍarā' (Haryono 2008: 66), we would be facing a Tantric conviction; were it 'Vajraraga, the female Bodhisattva of love [and] one of the sixteen great Bodhisattva of the Vajradhatu *mandala*, where she sits south of the Buddha Aksobhya', she 'must be connected with Vajrayana Buddhist practices'.¹⁶⁴ Haryono (*ibid*) considers the goddess' likeness to be of the 'Śailendran style that developed in the eighth to ninth century in Java, Sumatra and southern Thailand'. The *ghanta* bell and the *vajra* are of a rather similar workmanship (of note are the lotus petals on their hilts) that could be the creation of many a Southeast and South Asian, and, possibly, Chinese foundry.¹⁶⁵ The wrathful open curved prongs' of the *vajra* and the bell's handle, though, would be characteristic of Tantric Buddhism from the eighth century on' (Barrett 1965: 49) - the Vajrayāna version should have its prongs closed. The *kuṇḍikā*, Art.112741, 'an essential utensil in the proper equipment of a Buddhist monk' (Coomaraswamy and Kershaw 1928: 123) might be a product of southern Thailand's Fine Paste Ware kilns.¹⁶⁶

Among the objects with an evident ritual function should be counted a further *vajra* sceptre, Art.27178, a bell without handle, Art.151406, and a number of figurines (Fig.2.3- 66). Of the latter, Art.30509 could represent



the 'mythical leonine creature, of Indian origin, called *vyala* ("bad, wicked")', here possible worked into a *kuṇḍikā*, or, if 'standing up on its back feet and surmounted with a tubular piece, a support or foot'¹⁶⁷ of some larger assembly. Although not of bronze, six further (fragments) of *śaṅkha* conches should also be included here (Fig.2.3-67¹⁶⁸).

The preliminary categorisation attempted at the Musée royal de Mariemont proposes a number of other bronze items of a possible pious purpose:¹⁶⁹ two probable alms-bowls; a number of (lion-feet) tripod stands; the more elaborated bronze lamps (or censers) and lamp holders; and fragments of possible *talam* plates, *amrita* vessels and plinths (for a selection, Fig.2.3-68). Lastly, there is a considerable number of often rather heavy bronze objects (Fig.2.3-69¹⁷⁰) that could have been parts of any of the various pedestals and standards shown on reliefs of Javanese temples (Fig.2.3-70).

Distribution of these items is shown in Fig.2.3-71. The cluster of ritual objects retrieved on the days when the divers were working along the 'tween-deck¹⁷¹ is obvious. The proposed pedestal elements appear to have dispersed from the foreship to grids, where they are associated with a number of tripods and the figurine, Art. 13570. Their findspots indicate that these objects had initially been stowed somewhere in the higher sections of the cargo, and therefore had come aboard after the ceramic freight. One of the assumed alms-bowls, Art.2319, and the remains of (a) ceremonial vessel(s) were recorded in the vicinity of a concentration of *talam* fragments at |Q2Q:T17|, marking a batch of engraved bronzes possibly related to the pedestals. As a whole, these objects could have been a consignment of paraphernalia intended for some religious edifice.

The *vyala*, |L36:L39|, was found in close vicinity to a lamp holder (Art.30154), a, I assume, censer (Art.29746), and the finial, Art.29952 (Fig.2.3-72). These objects might have been associated with the *talam* fragment, Art.28680, retrieved some days earlier. This group could mark an own, smaller set of ritual equipment; whether the second *vajra*, found on |L28|, or the *śaṅkha* conch, Art.26472, |H25:K25|, are related to this assembly is uncertain. All of these items, however, had initially been placed somewhere on the starboard foredeck, from where they had dispersed to gridW and NW.

The remaining objects appear to be unrelated to the possible lots discussed above: they were found considerably later off the starboard planking and to

aft of the wreck. Of interest is the concentration of conches off the aftship, where the third proposed alms- bowl and a further *śaṅkha* were unearthed somewhere between [Z28:ZF31] on 50823, a day covering 28 grid-points that is not displayed on the chart.¹⁷² Whether these conches were part of a commercial enterprise or personal belongings is open to speculation; all of these items, though, apparently were immediate part of the deckload, from where they had either dropped besides the hull or dispersed to gridE.

Mirrors

An important but so far unmentioned bronze implement of Hindu-Buddhist piety is the mirror: it represents 'the impossible mystery of transcendent immanence [in] a simile of the emptiness of all *dharma*s [...], unestablished, devoid of own nature, like reflected images in a mirror' (Bentor 1995: 57, 66); it could be used for augury and divination;¹⁷³ and, on a more practical side, as a powerful apotropaic repels daemonic spectres by a display of their very likeness.¹⁷⁴ Lastly there is the reflective surface's more worldly purposes in beautification and vanity (Fig.2.3-73) - which, however, for at least the more elaborate Chinese mirrors would be privilege of the mighty and wealthy.¹⁷⁵

The data holds 31 entries related to such aerose reflectors. Twelve of these are Chinese mirrors, characterised by their elaborate ornamentation and/ or the central loop provided for the string by which they would be held; the remaining entries record five handles, eleven surfaces and two complete examples of the, except for the handles, unadorned 'Indonesian'¹⁷⁶ version (Fig.2.3-74). Adding loose handles to surfaces, a concentration of ten mirrors of both Chinese and Indonesian origin was found over and off the bows of the ship; six were retrieved off the wreck's starboard sides; the remainder was scattered over the site, where three (fragments of) mirrors not shown in Fig.2.3-75 were retrieved from the very fringes of the mound of dispersed cargo. The complete mirror recorded on 50525, Art.111848 (Fig.2.3-76), may have belonged to the suite of ritual objects found in the vicinity of the 'tween-deck. Assigning ownership to any object found in between the various items that apparently had fallen from the deck to the starboard side of the wreck is impossible, and the wide scatter of the three mirrors found off the aftship does not allow to link them to the conches there registered.



The concentration over the foreship might be related to the other ritual objects found in their vicinity: three out of the eight mirrors recorded throughout 40604-40902 were registered on days with finds of other ceremonial bronzes (Fig.2.3-77). It is possible that the three mirrors found on 40904-07 at |D28:K26| belong to the same lot. This would underline Flecker's (2002: 60) observation on the much more numerous mirrors on the Intan wreck that tenth-century 'merchants specialised in the mirror trade' would have offered 'a choice of [both] Indonesian or Chinese mirrors to their customers'. Here, the possible association with other ritual bronzes though could imply that such an enterprise might have involved a wider range of objects of devout intent, and was not inevitably a commercial one.¹⁷⁷

I noted above that Indonesian mirrors would carry ornamentation only on their handles. Besides Art.111848, only three further photographs of such handles are available, and only one drawing of their embellishments appears to have been made (Fig.2.3-78). Equally, only some of the Chinese mirrors were cleaned and drafted (Fig.2.3-79). At least two of those for which drawings are available could question their proposed pious purpose. The 八卦 *bagua*, the Eight Trigrams of Daoist cosmology,¹⁷⁸ in the centre of the zodiac on Art.153158 (Fig.2.3-80) not strictly has a place in Hindu-Buddhist dogma. Art.26622, with a diameter of 27.5 cm the largest of the mirrors found, shows a pair of intimate parrots with their flowers and ribbons that may represent one of the well-known 'marriage mirrors':

By the middle of the Tang Dynasty [...] it had become the custom for the bride to carry in her lap a bronze mirror for averting evil influences as she rode in a sedan chair to the ceremony. [...] After the wedding this mirror would be hung over the new couple's marriage bed to ward off evil spirits and to ensure happiness. (Cammann 1955: 51)

As 'it was not uncommon for a good-quality bronze mirror to be used by several generations', any such speculum could have been acquired on China's 'second-hand markets [... where] international traders would have been ideal buyers, because for them fashionable design was of little consequence' (Louis 2011b: 214). We can only speculate on how many and which of these mirrors, instead of furnishing a cleric with the needs of his creed, were intended for the fairer sex's enhancements. Judged by their wide distribution over the

site, they certainly were not part of the bulk cargo of ceramics and metal implements the ship carried in her hold.

Stūpika?

A last group of objects with a possible ritual background are a number of small cones made of, assumedly, tin or lead¹⁷⁹ (Fig.2.3-81). All of the documented specimens¹⁸⁰ were found off the wreck's starboard planking; as most of such small and insipid objects did not attract much attention, many though went unrecorded. Corrosion impedes comparison of their various shapes - evident on most, however, is their manufactures' intention to reproduce more than a simple cone. A number of suppositions re their function have been forwarded: in the database they were recorded as possible weights; based on a number of pictures, Véronique Degroot (pers. comm., June 2012) assumes them to be net-sinkers. Noting their often rather intricate profiles, John Guy (pers. comm., Nov. 2005) could imagine these cones to be stūpika, small metallic versions of the common clay votive offerings common in both India and insular Southeast Asia.¹⁸¹ The opening running through their vertical axes, by Degroot assumed as eyes for the line fastening them to nets, then could have provided space for any additions -such as, possibly, small invocation in the style of S509 and S564- that might have accompanied their presentation to the gods. Among comparable objects retrieved from the approximately contemporary Karawang wreck is a distinctly stūpika-shaped cone that has the lower sections of its hole filled with a metal-like material (Fig.2.3-82). I am not aware of such finds in the Intan cargo. Lastly, however, by their mere material value these cones could represent some kind of coinage,¹⁸² thus appurtenances of a more secular idol among mankind's major deities.

2.3.5 Money and Bullion

Chinese Cash

The most recognisable of the various currencies carried aboard ship is the Chinese cash: 59 entries list nearly 5000 individual coins and two unspecified 'rolls'. Until 50408 only small numbers of coins were recorded; between 50418-50514, 50813-22 and 50903-10, however, counts rose drastically, marking possible hoards of these coins (Fig.2.3-83). The largest amount apparently



had been stowed somewhere in the aft of the ship, from where the coins had spread to gridE, indicating that they initially had been placed higher in the cargo, and possibly on the aftdeck. A second concentration was found in the vicinity of the proposed 'tween-deck deep in the hold, and a third somewhat off the starboard sides of the wreck.

In course of preparations for the Indonesian publication on the wreck Trigangga (2008) could examine 868 of the coins. Of these, 222 were legible. Eight were identified as 周元通寶 *Zhou Yuan tong bao*, a 955/6 issue by Shizong, emperor of the Later Zhou, mainly fashioned from confiscated 'Buddhist statuary of bronze [that] was mandated for recasting as coin'¹⁸³ (Ouyang 2004:115). The remainder are various editions¹⁸⁴ of 乾亨重寶 *Qian Heng zhong bao*, first minted during the period of the same name, 917-924/5, by Liu Yan, under the title Gaozu the first "emperor" of Nanhan. Of the latter, 'only some' (Trigangga 2008: 73) were of copper, the majority being made of a lead-tin amalgam (Fig.2.3- 84). Numbers of the same coins were found on the Intan wreck.¹⁸⁵ Such coins were valued at $\frac{1}{10}$ of the copper issue, and 'after the Qianhe reign [943-958] used only inside the city [of Guangzhou], outside which copper cash was circulated' (Guangdong, Provincial Museum ... 1989: 55¹⁸⁶). The inferences of these financial policies on the reconstruction of the itinerary of the Nanhan/Cirebon ship's tragic voyage are discussed in Section 4.1.

Taken off their strings, the coins in all probability were intended 'as much-needed small change in [Java's] domestic market circuit[s]' (Christie 1996: 267). Of the insular Southeast Asian coinage of larger denominations, the so called 'piloncito' and 'sandalwood flower' coins,¹⁸⁷ no example was found. As argued by Flecker (2002: 65) on an equal scarcity of indigenous money of higher values on the Intan wreck, their small sizes and high worth makes it likely that any such coins had 'been kept on the person of their owner [...] drifting away with the drowned merchants, and possibly contributing to their fate' by the wealth's weight.

Silver

Java has only limited resources of the precious metals commonly used in minting, and 'no archaeological evidence of ancient gold [and silver] mining has ever been found on the island'¹⁸⁸ (Miksic 1990b: 31). Hence, materials for

the apparently considerable amounts of coinage in circulation on the island had to be imported. No raw gold was retrieved from the present wreck; found though were fourteen silver ingots. Photographs and/or drawings are accessible for only seven of these bars. Their overall weight is reported as slightly more than 19 kg (Fig.2.3-85). I assume that these ingots were intended as bullion: referring to the tenth-century Wonoboyo hoard, Christie (1996: 249) argues that if even the wealthiest families of the state of Mataram stored their wealth in coins rather than ingots, it seems unlikely that ingots formed a regular part of the currency system'.

The larger part of the silver in circulation in China in the second half of the first mil-lennium was produced in the mines of Lingnan and Annam,¹⁸⁹ most of which between the fall of the Tang Dynasty and the rise of the Song was under the sway of the "Empire" of Nanhan. Southeast Asia's richest deposits are in Myanmar, possibly the ancients' Agyre, 'the Land of Silver',¹⁹⁰ where the metal is often found in the vicinity of gems of the corundum family; lesser sources are in northern Laos and Thailand.¹⁹¹ The imperative centres of silver production throughout the later ninth to the eleventh centuries though were its Central Asian deposits in Tashkent,¹⁹² in the upper Talas valley¹⁹³ and the Pamirs.¹⁹⁴ The output of these mines was traded along various branches of the Silk Road into the Celestial Empire and west and south Asia.¹⁹⁵ At least the quarries close to China's western borders contributed to the finances of the regimes of the Five Dynasties, cut off by war and unrest from their customary sources in the secessionist south. The Pamir mines, where 'production of silver from argentiferous lead peaked in the years ca. 850-960' (Blanchard 1994: 7), lie in proximity to possible sources of many of the precious stones in the ship's 196 cargo.¹⁹⁶

The ingots fall into two classes. Type (i), akin to a substantial number of silver found on the Intan wreck, are quadrangular slabs with concave sides and "folded corners", either 'excess silver that dried on the edge of the mould [and then] was folded under the ingot' (Flecker 2002: 84) or 'a folded wrapping of thin silver sheet' (Twitchett and Stargardt 2002: 35);¹⁹⁷ type (ii) is a distinctively thinner and less regularly formed version without the folded corners.¹⁹⁸ Inscriptions on the "wrappers" and on the ingots themselves identify the silver found on the Intan wreck as 'revenue collected from the sale of salt' (*ibid.* 38), under the Tang dynasty a state monopoly that probably



was continued by the various polities of the Five Dynasties and Ten Kingdoms era. Twitchett and Stargardt (2002: 48) propose the Intan ingots to be compensation for 'exotic spices or aromatics' paid to, presumably, Southeast Asian 'merchants or envoys who had brought the goods to Guangzhou'.¹⁹⁹ The documentary available for the ingots found on the present wreck does not note any legible writing;²⁰⁰ however, their wrappers apparently have not been opened. Correspondence of their shapes and the proximity of time and place of the Intan and Nan- han/Cire-bon wrecks imply a similar lane of distribution.

The three type (i) ingots were found on, respectively, 40714, 40724 and 40804, in deeper layers of the heap of cargo, and hence could have come aboard together with the ceramic cargo (for this and the following, Fig.2.3-86). In their vicinity a small amount of gold leaf and some precious stones were found (see Fig.2.3-44): it is possible that they were part of a consignment of jewellery stuffed in the lower hold.

All except one of the ingots of the second type, however, were found in gridNW, and, apart from for the two bars located besides the wreck's starboard planking, were recorded in higher levels of the tumulus - these apparently were taken aboard after the bulk of the Chinese ceramics. Compared to unwrapped silver bars found on the Belitung wreck,²⁰¹ their shapes are less regular, indicating that the ingots were produced in *ad hoc* moulds of sand or clay.²⁰² The concentration of six ingots around [F31:I31], 40915, indicates a distinctive consignment; the bars recorded on 41103, [O35:(540)], and 50923 and 50926, off the starboard sides of the wreck, could have been part of this lot. No substantial finds of jewellery were recorded on these dates (see Fig.2.3-44); on 40916, however, the gold plated hilt, Art.27851, was retrieved from [J31:K31]. The silver's chemical footprint,²⁰³ and especially the high percentage of gold in the metal, parallels the composition of the silver from the Intan wreck.²⁰⁴ The latter possibly was produce of mines in the Guiyang Jian 'industrial district' in today's Guizhou, between 951 and 963 under the control of Nanhan.²⁰⁵

Local Currencies?

Frequently seen were unassuming small ingot-like "rods" of, uniformly, about 6 cm length, produced of an argent metal with a melting point of about 200°C.²⁰⁶ Only two of these objects, Art.6540, 'small tin ingots', were registered in the spreadsheets kept on salvage location, but about 60²⁰⁷ of

these rods were collected in the samples database, often taken from "remains" left besides the washing table or found in the warehouse (Fig.2.3-87). Many of the less corroded objects display a "seam" or "suture" running along their length. One of the items registered under Art.6540 indicates that these seams could be the corroded result of "rolling" a rectangular sheet of the metal into a rod (Fig.2.3-88).

Similar objects were found in the Karawang cargo (Fig.2.3-89) and on the Intan wreck. Mitchiner (1979: 398, Fig.5.87) pictures comparable items, described as 'tin or *gangsa* (tin/copper alloy) ingots that were used for currency in the Malay Peninsula, where the tin was mined, from around the 13th century'. Referring to finds in the Intan cargo, Flecker (2002: 64) argues that 'it seems that this currency was in circulation at least three hundred years earlier than previously thought, and over a much wider area'.

Remains of twine found in the openings of this 'canoe currency' imply that these small ingots were fastened onto strings that could have served as their "wallet". This relates the rods to a number of "clasps" or "hanger ingots" of, apparently, the same material: here the bent "hooks" would have held the ingots to their "purse" (Fig.2.3-90). Analogous objects are known from the Intan cargo, but not from the (possibly earlier²⁰⁸) Karawang site. Numbers of various shapes of such items are offered on the antique markets of Indonesia, often noted as 'mediums of barter used in Java and Sumatra frequently found in Jambi and Palembang'.²⁰⁹

Flecker (2002: 64) divides the Intan 'clasps' into four types; those shown in Fig.2.3-90, of which six were sampled, match his type 3D. The variation seen in Fig.2.3-91 appears as a short, two-clasped version of Flecker's three-pronged type W. The Intan rods and clasps are of a tin-lead amalgam, proposedly to increase both corrosion resistance and malleability, which allows the lugs to be clenched [...] and unclenched without breaking off (Flecker 2002: 65). None of the Nanhon/Cirebon objects was analysed, but by analogy of their shapes and generally negligible corrosion I assume the 'type W' "hangers" to be of the same alloy. Many of the objects of other types had been subject to more severe weathering and thus probably contained a lesser amount of lead. Their (presumably rather small²¹⁰) monetary worth would have been guaranteed by the value of the material, possibly measured by weight. Here, shape could have indicated heft; how one distinguished between different



alloys yet remains an open question.

The various shapes known from the Intan, this and the diverse undocumented finds offered on antique markets indicate the existence of numerous "mints"; all of these, however, produced a "stringable" type of small ingots that apparently captured enough confidence in their monetary value. As proposed by Indonesian antique collectors, it is likely that the small stupika-shaped cones with their central hole in Fig.2.3.-81 above could have fulfilled a comparable function.²¹¹ To this class of "tin currency" might also belong the various types of "rings" -due to the often rather sharp burr on their insides unwearable as such- found mainly off the ship's starboard planking (Fig.2.3-92).²¹² Any such "currencies" would have been the antecedents of the tin 'animal money' minted in various Malay states from the fifteenth century onwards.²¹³

2.3.6 Lesser Metals

Java, the most probable destination of our vessel, has no large exploitable deposits of metal ores.²¹⁴ Accordingly, a wide variety of crude and wrought metallic materials were considerable segments in the cargoes of, e.g., the Karawang, Intan and Java Sea wrecks, all foundered on their way to the island. The Nanhao/Cirebon vessel also carried at least²¹⁵ 40 t of ingots, bars and readily fashioned implements of various metals. Besides various unidentified metal objects, a number of adze heads, small blades, ingots and a broken bronze 'spoon',²¹⁶ had found their way into the 'scrap-box', Art.10383 (Fig.2.3-93; for the box see Fig.2.3-3), indicating that even damaged metal implements yet had a certain worth. The salvage operations, however, concentrated on the ceramic cargo and other valuables, leaving us with only fragmentary information re the ship's cargo of metalwares.

Non-Ferrous Metals

A considerable amount of, possibly,²¹⁷ tin and lead came in larger ingots of various shapes (Fig.2.3-94²¹⁸). Readily identifiable are the "truncated pyramids" in Fig.2.3-95: Flecker (2002: 82) pictures similar objects of almost pure tin found in the Intan cargo, and notes finds of moulds for such ingots in various places in Malaya. He assumes that preindustrial processing of tin bearing ores could not have produced such purity; 'therefore the metal

has been obtained from smelting cassiterite tin sands' that are abundantly found throughout Southeast Asia.²¹⁹ Throughout the last two centuries of the first millennium, the main producer were 'the famous mines of al-Qala' (Ibn Khurdādhbih, second half of the ninth century²²⁰), 'a tin mine, as such does not exist in any other part of the world' (Abu Dūlaf, ca. 940²²¹), close to Kalāh Bār in today's southern Kedah, Malaysia.

While several hundred of these "pyramid" ingots were retrieved, only eight are unambiguously identifiable in the databases.²²² No overall numbers are available. Only three are associated with grid records, which here can be corrected with references to the wreck: according to the divers' reports the ingots were concentrated around the proposed 'tween-deck (Fig.2.3-96). At least some of the ingots initially had been stacked atop the deck's planks: their piles apparently were high enough to have allowed some to slip over the side planking of the ship. Several of these tin "pyramids" were joined base to base in pairs,²²³ indicating that they, as proposed by Flecker (2002: 82) for such finds in the Intan cargo, were 'stacked with alternate ingots placed upright and upside-down, to fully utilise hold space'. Their high specific gravity represents a considerable weight; as this was not distributed along the bilges,²²⁴ it has to be assumed that the metal was taken aboard after the hold to fore and aft had been filled with other cargo, here mainly the Chinese trade ceramics and, as shown presently, domestic ironwares.

It is more difficult to determine origin and contents of the second type of ingots (Fig.2.3-97). By resemblance of their shapes with those found on the Intan and Belitung wrecks, these slabs possibly are lead.²²⁵ No results of an eventual analysis of the material have been made available. Despite the considerable numbers found (see Fig.2.3-93), only four could be sampled. Only two of these are associated with grid records. Divers, though, consistently reported the ingots to be associated with the "pyramid tin". Lead is found in volume in Myanmar; here it was mainly won as a by-product of silver mining, where, however, 'much and perhaps most was discarded in the slag' (Bronson 1992: 82). Both Java and Sumatra have 'numerous but small' (Bronson 1992: 78) deposits. Malaya, on the other hand, is relatively poor in the metal.

Portside aft off the wreck were recorded about 5,000 'blades', or, judged by the sockets opposite to their mostly blunt tip, "lanceheads" of a soft silvery metal decorated with a wide number of cast motifs²²⁶ (Fig.2.3-98; for



their distribution, Fig.2.3-96). Several hundred of the same objects were in the Intan cargo, but 'nothing even remotely similar has been found in the literature' (Flecker 2002: 46). The softness of the metal precludes their use as weapons.²²⁷ Besides the mere value of their material, here perhaps presented in 'an odd form of ingot', Flecker *{ibid}* suggests a ceremonial purpose: thoroughly cleaned the 'blades' acquire shiny argent surfaces, where their various motifs become pleasantly visible; displayed on a staff they would have commanded ample admiration. The considerable numbers of such lanceheads found in the present cargo imply that their suppliers expected abundant demand, be it for the material itself or for the blades' possible representative intent. Paraded at court and temple or as accoutrements of royal or liturgical cavalcades, such shiny lances could well have helped to epitomise 'the radiant image [... of] the cultural ideal of the consummately expressive state' (Geertz 1980:18-19) that in many a Southeast Asian society substantiated worldly and spiritual leadership.

Iron

More pragmatic means of might, actual weaponry, are commonly fashioned from ferrous materials, of which, however, after a thousand years in a marine environment regularly only concretions remain (Fig.2.3-99).²²⁸ Some of the smaller consignments of arms apparently were carried on deck;²²⁹ for most, however, no grid records are available. Several of such calcareous blocks had contained tightly packed blades (Fig.2.3-100). While the contents of most concretions remained unidentifiable beyond that general notion, some had preserved their packing materials in the conglomerate of corrosion products and lime: for instance, S262, an opened block of, presumably, iron bars, after cleaning showed impressions of coarse hessian and rattan bindings (Fig.2.3-101) akin to the wrapping of a comparable concretion found on the Java Sea wreck.²³⁰

Only two (fragments of) weapons not embedded into concretions were recorded (Fig.2.3-102). Art.27852, grip, crossguard and lower forte of a sword, was retrieved on the same day as the gold-plated hilt, Art.27851, at [J31:K31]; Art.127739 was found at JZD21: ZL21], off portside aft, in the vicinity of inscribed *tasbih* pearls and some jewellery, items possibly carried somewhere on the aftship. The comparatively good preservation of the latter's blade

might point onto some kind of carbonised yet forgeable iron. I am not aware of any further documentation of these two arms.

The scrap-box, Art.10383, also contained several "double-axe"- or "sole"-shaped iron²³¹ ingots (Fig.2.3-103). These (due to the evident quality of the material?) would have been taken out of one of the about two dozen concreted packs of such iron bars stowed above floors C8-10 in the lower hold (see Fig.2.3-96). Five²³² of the packs were surfaced; due to the lock-down of the warehouse in course of the various legal complications around the find only two could be examined briefly in November 2007. The proposed base and sides of the roughly cylindrical packs were made of tightly spiralled windings of a cane-like material (rattan?), and their top openings covered with rough matting (Fig.2.3-104). One pack contained 50, the other 51 variously sized ingots of the same basic "double-axe" shape. Considering the time the iron was submerged and adding two years without further efforts at stabilisation and conservation, the ingots were surprisingly well-preserved. Although of generally the same shape, the variations of sizes and profiles indicate that the ingots were produced in *ad hoc* moulds or crucibles (Fig.2.3-105).

Notwithstanding the sufficient number of possible samples and the presence of suitably equipped laboratories in Jakarta,²³³ the material was not analysed. One of the ingots though could be submitted to a traditional smithery in Majene, South Sulawesi. The craftsmen praised the quality of the iron and produced two *badik*, a local type of knife (Fig.2.3-106): the material is not cast iron, but forgeable. It accordingly has been suggested to be Indian wootz steel.²³⁴

In the late first millennium, the main centres for the manufacture of refined crucible iron were southern India, Sri Lanka and Fergana and Merv in Central Asia. Such steel' was produced by a number of methods, ranging from carburisation of ore or wrought iron to co-fusion of ferrous materials with high and low carbon ratios,²³⁵ The outcome could be low carbon, high carbon, or cast steel [that is] virtually free from slag and non-metallic impurities¹ (Feuerbach 2006a: 13), thus not necessarily only the carburised crucible steel commonly summarised under 'wootz'. The material was widely traded throughout all of Eurasia; tenth-century China knew it as *bin tie*, a produce of the Western Barbarians that could fashion blades as hard and sharp that [they] can cut metal and hard stones',²³⁶



This western metal features in a list of Song imports, compiled around 999,²³⁷ and Wagner (2008: 271) relates its commerce with 'the rise of Arabic trade by land and sea'. Al-Idrisi, writing-around 1150, yet knows another tale:

People of Zabag [Sumatra] come hither [Sofala, Southeast Africa] for iron, which they carry to the continent and islands of India where they sell it for good money, because it is an object of big trade and it has a huge market in India. For although there is good quality iron in the islands and in the mines of that country, it does not equal the iron of Sofala for its quality and its malleability. The Indians are masters in the arts of working it. They prepare and mix the substances so that through fusion one gets the soft steel normally called India steel. They have factories that make the best swords in the world. [...] Nothing cuts better than this iron from India. Everybody knows that and nobody can deny it.²³⁸

Indonesian' sailors' long-standing initiatives in eastern Africa have been noted in Section 1.3: unquestionably such enterprise could have been underway before IdrisTs times, and point onto a possible source of the ingots carried aboard the Nanhan/Cirebon ship. The locale of the packs of ingots, somewhat afore the proposed 'tween-deck, might have still been accessible after the ceramic cargo had been taken aboard, thus allowing their loading in any port of call on the way to Java. However, I could not detect the distinctive form of the ingots in the illustrations of wootz crucibles available to me - conical or aubergine shaped (South India) or elongated, pear-shaped or light bulb shaped (Sri Lanka)' (Feuerbach 2006a: 13), all of these crucibles produce cakes' of steel, a shape distinctively different from the "double-axe" form of the present bars.

A variation of this shape has been seen in the Chinese silver carried on the vessel. Zhou Qufei (1977:103) notes that at least in the twelfth century 'the best quality [iron] of the whole empire' was produced in the mines and forgeries of the Wuyi mountains of Fujian, a cradle of China's iron industries and one of the Celestial Empire's sources of silver; still in the Guangzhou of the eighteenth century, a number of 'iron pagodas' and 'pillars that had previously decorated one of [their] many palaces [...] were the most informative physical vestiges of the Southern Han' (Miles 2002: 56), substantiating the city's role as a tenth-century centre of metalworks. Chinese ferrous technology knew of two methods to produce refined crucible iron: decarburisation of high-

carbon cast iron through a second heating²³⁹ and 'high-temperature co-fusion' of cast and low-carbon wrought iron.²⁴⁰ The *Song hui yao* contains a list of 'iron mines and smelters'²⁴¹ that includes a number of production sites in southern China, underlining the possibility that these "double-axe" ingots could be a Chinese product. Just as noted above for Indian iron, I am unaware of finds of crucibles of the distinctive shape of the ingots.

No information is available re the contents of the concretions reportedly located on midship portside above frames C10-12²⁴² (see Fig.3.2-7). Found on what would be the larboard extremity of the proposed 'tween-deck, these could have been loaded after the ceramic cargo. The vast majority of iron implements, however, was found under tightly packed stacks of pottery in the lower aftship along floors C16-18 and, on starboard, C19-20 and C21-23 (see Figs.2.3-96 and 3.2-1,-7), and would have been taken aboard before the ceramics were laden. The considerable weight of the concretions did not permit their surfacing; the divers though unanimously described the foremost of the calcareous lumps as stacks of wok-shaped pans and cauldrons (Fig.2.3-107). Import of such ironwares into metal-deficient Java is widely reported:²⁴³ 'through economies of scale [and] advanced technology', Chinese production of these articles of regular domestic use was well competitive with any Southeast Asian manufacture, and the Celestial Empire until the arrival of European contenders 'held a virtual monopoly on these almost indispensable items' (Flecker 2002: 86). It though has been observed that the mass-produced Chinese iron implements were of a lesser quality than Indian and Southeast Asian products.²⁴⁴

2.3.7 Miscellaneous Objects

Various well used whetstones (Fig.2.3-108) imply that many an iron implement carried aboard ship needed to be honed. Also made of harder stone, a number of thinner 'slates' (Fig.2.3-109) could have fulfilled the same function; judged by traces of usage, such thin yet resilient plates could, as still seen in traditional kitchens in Indonesian villages, have likewise been useful in dressing food. This would associate them with a number of *batu giling*, the 'Indonesian' grinding stone, and the attendant rollers (Fig.2.3-110). A set of such a grinder base and its roller was found on 40608, [Q22], here associated with a complete stove of, again, a type still in use today (Fig.2.3-111).



Distribution of all whetstones, 'slates', grinders and stoves that can be identified is found in Fig.2.3-112. The distinct division of the objects to star- and larboard off the ship's topsides indicates that much of the cooking took place on "catwalks" along the rails: the central deck apparently was not accessible for such activities, implying that it was covered with cargo. The concentration of kitchen utensils over [L22:T23] also points onto culinary activities on the foreship, in view of the unavoidable smoke emissions a prudent choice for a sailing vessel on a downwind course. The small sizes of the stoves would not have allowed for catering to larger number of diners; hence several galleys were kept. I assume that feeding the (if we take the ships Faxian travelled on as benchmark²⁴⁵) 200-odd persons on board was arranged in messes,²⁴⁶ perchance organised around kinship or shared origin or profession. As objects in frequent use possibly were not tied down particularly, we probably are missing considerable numbers of further stoves that had gone overboard during the foundering of the vessel.

Pastimes

Besides considering the day's cuisine,²⁴⁷ 'playing games, chatting and telling stories, singing songs, and reading were possibly, and in that order, the most common diversions' (Perez-Mallaina and Phillips 2005: 154) for crew and passengers on Spanish vessels of the sixteenth century. Six hundred years earlier, pursuits in whiling away the tedium of a sailing voyage could not have been much different. Reading probably was uncommon among the ship's company; still, fragments of manuscript covers²⁴⁸ (Fig.2.3-113) found off the starboard sides of the vessel at [O32:Y32/250-350] attest that a small store of books was carried aboard ship. These could well have been religious treatises accompanying wandering clerics: Sen (2004: 120) notes that between 977 and 1023 several hundred of such scriptures were presented to the Song court by foreign monks; Yijing (2007 [1896]: here, xxxvi) commissioned several shipments of volumes of Sutras and Sastras' translated in Śrī Vijaya. Faxian (2010 [1886]: 112) even tells us that he protected his treasure of holy books from being 'cast overboard by the merchants' aboard his ship during a storm.

Readily identified as related to games and gaming²⁴⁹ are a number of dice (Fig.2.3- 114²⁵⁰) and the 'gaming pieces in the form of acorns (Krahl et al. 2011: 233) known from the Belitung²⁵¹ and Karawang wrecks (Fig,2.3-115; "type 1").

A possible second, to the best of my knowledge undocumented shape is shown in Fig.2.3-116 ("type 2"). Writing around 950, Mas'ūdi (1864: 8) notes that in India 'the most frequent employment of ivory is in the manufacture of games of chess and nard': appropriately, a number of wrought pieces of ivory are listed as game or ornament' in the excavation data (Fig.2.3-117). The available documentation covers only some of these objects²⁵² leaving a number of ivory fragments unidentified.

In total; (remains of) eight dice were registered.²⁵³ Six of these were found outside of the ship's remains; indicating probable use on deck (Fig.2.3-118). Art 112749 (retrieved on 50528) belongs to the objects unearthed in the vicinity of the proposed 'tween-deck in the central hull; and might be related to Arti00422 (50430): the deck. apparently was not only a haven of piety.²⁵⁴ Only off the starboard remains of the ship dies were associated with other objects possibly related to game-playing, inferring that most of the numbered cubes were used for gambling. Of note should be Art.7272/3, a die found over the foreship.

Though popular acuity delegates the invention of dice to Palamedes; as 'the wisest of pastimes [...] to while away the dreary hours [during the siege of] Troy. (Brenk 1998: 267²⁵⁵), dicing has an equally long history in India:

A very interesting Rigvedic hymn (X, 34^[256]) which can hardly be dated much later than 1000 B.C.; contains the lament of a gambler, who, unable to resist the fascination of the dice, plays from morning to night, though fully aware that he is mining his happiness and his home. [... I]n post-Vedic times the passion for dice had become general among [Indian] princes, Thus, two of the heroes of the Mahābhārata, King Yudhisthira and King Nu- la, are both described as having been so far carried away by the frenzy of the game as to stake and lose their very kingdoms. (McDonell 1898:120)

Playing dice duly found its way to insular Southeast Asia: relief 76 on the "hidden foot" of the Borobudur depicts a dicing scene,²⁵⁷ and gambling is mentioned in the (Javanese) Taji inscription of 910.²⁵⁸ Wagering carried social consequence - a Sumatran legal code of the early fourteenth century sets out fines for gambling with dice (and possibly associated brawls) even before listing penalties for theft and murder.²⁵⁹ Not surprisingly, the Yingyai Shenglan characterises the inhabitants of early fifteenth-century Palembang



as 'much given to gambling'.²⁶⁰

While dice found at Harappan sites display a number of variations in the arrangement of their digits, since the early centuries CE most cubes have opposite faces summing up to 7.²⁶¹ The latter type was known in China by the end of first half of the first millennium CE,²⁶² thus at about the time when Asia's international trade relations by both land and sea were gaining momentum. The dice found on the Nan-Han/ Cirebon wreck I could examine follow the modern configuration of their numbers, as does a die found on the ninth century Belitung wreck.²⁶³

One would expect the more intricate shapes shown in Fig.2.3-116 to have belonged to games employing more than one type of stones, the probably most popular of which would be variants of chess. Chess-type games 'spread to Thibet, Burmah, Siam, Ceylon, and Java [...] doubtless direct from India' (McDonnell 1898:131²⁶⁴) at some time in the first millennium, and were 'introduced to China during the early Wei state era' (Shen 1996: 97). By the tenth century a range of variants of chess were popularly played throughout the Old World: writing around 950, Mas'üdi (1861: 173-4) could report on 'the various theories [...] the Greeks, Romans and other nations connect [...] with chess', and on 'es-Süli and el-'Adeli, who are the best players in our days'.

The 'acom'-shaped stones shown in Fig.2.3-114 are comparable to pawns in documented sets of the game. However, the more intricately decorated ivory (see Fig.2.3-117) does not match the either more abstract or figurative designs known from historic Asian chess sets.²⁶⁵ Particularly absent are pieces corresponding to the idiosyncratic "M"-shaped rook and the shah and firzin with their "recessed" heads. The most profuse finds of acorn shaped stones were made off the starboard planking; a second possible concentration was uncovered off port, repeating the division in star- and larboard lots observed for galley utensils and whetstones. None of these though produced the numbers of stones commonly associated with chess-like games.

Nuts, pebbles or other comparable items could easily be fashioned into simpler game- pieces²⁶⁶ for any of 'the many popular board games of the backgammon type' (Reid 1988: 196) played throughout Asia; such stones, however, could hardly be distinguished from ordinary debris. Other materials for the production of game-pieces frequently mentioned are semi-precious stones, glass, horn and exquisite woods.²⁶⁷ Here immediately employable in

games could have been the crystal 'stoppers' or 'seals' and the numerous lapis lazuli 'discs'.²⁶⁸ The main concentrations of the latter, however, were found in gridNE (see Fig.2.3-23), a quarter particularly void of the ivory objects proposedly related to games. These "sequins" also are generally fairly small (the largest measuring 2.2 cm, with an estimated average of less than 1 cm) and thus would appear rather impractical for game- playing on a rolling ship. By their distribution alone it is more difficult to differentiate the findspots of crystal 'stamps' (see Fig.2.3-19) from those of possible game-pieces; a crosscheck of the dates of their respective unearthing though shows apparent differences (Fig.2.3-119). Moreover, none of the ivory objects matches the distinctive shapes of the crystals, and hence could not have been paired with the former as opposing game-stones.

In the data noted as possible game-pieces are a small number of shallow convex "cylinders" of milky quartz or marble (Fig.2.3-120). Comparable objects were found on the Java Sea, Intan and Karawang (Fig.2.3-i2i) wrecks. Indentations, holes and insets (Fig.2.3- 122) in such stones imply that their precise mass had consequence,²⁶⁹ thus marking them as possible scale weights. Interestingly, in the fourteenth-century Sumatran law code mentioned above penalties for rigging weights immediately follow those for gambling.²⁷⁰

Weights, Scales and Lamps

Besides the six quartz or marble weight pieces,²⁷¹ about 30²⁷² further possible weights were registered (for a selection, Fig.2.3-123). Twelve of these are not associated with grid records. Four were found along the grids fringes of the mound; three off the aftship; the remainder off the starboard planking. Weight values were recorded for 24 of the pieces (Fig.2.3-124). It appears that corrosion and attached concretions add onto their possible denominations: most of the weights retrieved from the present wreck are somewhat heavier than pieces of approximately equivalent weight found in the Karawang, Intan and Java Sea cargoes,²⁷³ and therefore generally range above the most common 'Javanese' units of the first millennium²⁷⁴ (Fig.2.3-125). The overall correspondences though strongly suggest that (most of?) the pieces belong to the insular Southeast Asian system of weights.²⁷⁵

Only two bronze fragments, Art.6541 (Fig.2.3-126), found on T22:W22/150|



off the portside planking, definitely are remains of scales. A number of other fragments were recorded as such (Fig.2.3-127). Not all of these may have been parts of scales: S561, for instance, reminds more of a Chinese-style key than of its proposed purpose (Fig.2.3-128). If initially belonging to scales, the "pointer-needle", S635 (Fig.2.3-129), with its fine pivots would have been a surprisingly contemporary contraption.²⁷⁶

A number of possible arms or hangers initially registered as parts of scales were later associated with bronze lamps (Fig.2.3-130). Three lamps of a well-known domestic type²⁷⁷ are identifiable in the data (Fig.2.3-131). Two were found off the aftship, and one off the starboard hull.²⁷⁸ The lamps' wide dispersal over the site indicates that they either had been in use for lighting purposes or were personal possessions. Their central hangers recall the shapes of a number of lamps of high-fired earthenware, again found scattered widely over the site (Fig.2.3-132). At least two of the latter show signs of usage. A second type of bronze lanterns resembles the more simple earthenware oil lamps of a type still used today (Fig.2.3-i33). Art.5375, retrieved from [W22:Y23], is a fragment of a "candelabrum" of a number of such lamps (Fig.2.3-134).

Faunal Remains

Widely scattered over the site were pieces of raw ivory, some of which apparently were parts of tusks of a considerable diameter (Fig.2.3-135). Most of such ivory splinters were sampled from "left-overs" found on deck of the salvage vessel or in the warehouse; it thus is impossible to draw reliable distribution patterns for the recorded objects. No complete tusks were retrieved. The ivory was not analysed.

Several of a number of (fragments of) various kinds of tusks and horns of other animal species apparently had been decorated or even worked into hilts or handles (Fig.2.3-136²⁷⁹). Arts.141217 and 141218 come from abaft the hull; the others were dispersed over the site. As far as can be told, these objects were not related to a possible consignment of crude ivory. No grid record is available for B/ A62, possibly associated with S401, found off the starboard planking. The horns remain unidentified.

Three teeth and a jawbone containing three molars were recovered. Two of the former, from besides the starboard hull, are teeth of unidentified larger

animals (Fig.2.3-137). Flecker (2002: 96) pictures a tooth found on the Intan wreck that appears comparable to S474, there fittingly described as a 'molar with well-worn crown [...] probably belonging to a large herbivore'. These teeth could have been both objects of wonder and raw material for glyptics. The jawbone, S293, found somewhere off starboard aft between [Z33: ZC38], might be from a smaller carnivore, possibly a feline (Fig.2.3-138).

The third tooth by size and shape could be a slightly carious human molar (Fig.2.3- 139). The tooth was found on 51006, off the starboard remains of the vessel. Intended for analysis in a laboratory in Europe, it was not registered in the database. I am not informed of the results, and do not know its present whereabouts. It is surprising that only one of the, ideally, 32 teeth of a human was retrieved. For the single human tooth found on the Intan wreck, Flecker (2002: 93) argues that the absence of buccal roots suggest that 'the tooth was lost at or before the time of death, and the removal involved considerable force'. Here, just the same, one of the roots appears to be broken off.

About 15 fragments of probably identifiable bones were sampled (for a selection, Fig.2.3-140). Lisbeth Mieras, a forensic doctor, in course of a brief informal examination in January 2006 considered only three of the bones as possible human remains (Fig.2.3-141). Animals, both alive and conserved, conceivably were part of the ship's provisions: most of the fragments were found off the starboard planking, indicating that they initially had been stowed somewhere on deck of the vessel, where they would have been in easy reach for the ship's complement. Living beings not able to escape the foundering vessel, however, would have either been trapped in between cargo or the fragmenting hull, or had been sufficiently (and, I assume, involuntarily) secured.

The *Lingwai Daida* notes seaborne slave trade at the example of Champa: 'as the country is extensive, but the number of inhabitants only small, they often buy male and female slaves, so that the trading ships carry hither human freights' (Zhou Qufei 1977:37²⁸⁰). Especially Middle Eastern merchants were known for their considerable investments in the business;²⁸¹ Southeast Asian shipping though was the principal carrier of the substantial supplies arriving at the ports of Tang China.²⁸² Suitable human material promised lucrative dealings: a hold 'full of creatures handsomer and more graceful than anything [...] would have made our fortune, and that of our grandchildren',



laments a tenth-century slave-trader over a lost freight (Buzurg 1981:19). However, in case of shipwreck it apparently was not uncommon to at least temporarily free such cargo of its bonds - Buzurg (pgs.82-3) thus tells of the deplorable fate²⁸³ of a 'pretty young female slave' who together with some crew and passengers managed to briefly rescue herself into the rigging of a foundering vessel.

Aromatics and Drugs

'Liberal use of odoriferous gums and resins' not only 'breath[ed] supernatural wisdom through the worlds of nature and human affairs' (Schafer 1985 [1963]: 156-7) of the Tang Empire, but, for this very reason, was an inevitable ingredient of Hindu-Buddhist rites throughout all of Asia. Our vessel carried an unquantified amount of such substances (Fig.2.3-142²⁸⁴). The assumption that these materials are aromatic resins is based on the odours they emit when singed: no identifications of the examples conveyed to the Musée royal de Mariemont in June 2007 are yet available.²⁸⁵ The glassy resinous structure of S566 and, possibly, S259 recall pure grades of camphor, a product of Sumatra and Borneo;²⁸⁶ the latter though could also be an unblemished variety of frankincense. S477 with its crystalline inclusions might be a lesser sort of that famed "Arabian" incense.²⁸⁷ Both camphor and frankincense were a major re-export of Śrī Vijaya. Recognising camphor as a product of Borneo, Zhao Rugua (1911: 193) explains:

The common report that it is also found in San-fo-ts'i is an error; the fact is merely this - that, owing to this country being an important thoroughfare for the traffic of all foreign nations, the produce of all other countries is intercepted and kept in store there for the trade of foreign ships.

The same was valid for frankincense, derived 'from the depths of the remotest mountain valleys' of the Arab lands, from where

it is transported on elephants to the Ta-shi (on the coast); the Ta-shi load it upon their ships for barter against other goods in San-fo-ts'i; and it is for this reason that the incense is commonly collected at San-fo-ts'i. (*ibid.*: 195)

The other substances sampled could be any of the various resins and

aromatics known to have been marketed in Sumatra.²⁸⁸

An airtight “zipper-pack” with material of S257 last closed in late 2006 emanated a hashish-like smell²⁸⁹ when opened in June 2007; S515 (Fig.2.3-143) was identified as opium by a marine posted aboard the salvage vessel as invigilator on the occasion of a singeing test of a small quantity of the substance. I am no expert on the early history of and trade in these intoxicants,²⁹⁰ but besides recreational use note their potential as antihistamines, sedatives, analgesics and anti-diarrhoeal agents.²⁹¹

Chemicals and Minerals

None of the various substances suspected to be raw materials for further processing into pigments, metals or other materials was recorded systematically in the on-site spreadsheets. Sampling was only possible during the author’s presence aboard the salvage vessel, and, as is the case for aromatics and drugs, often recorded items found in the vicinity of the washing tables. It thus is impossible to determine overall amounts and, in most cases, findspots of the materials.

A frequently found chemical was orpiment, the famed arsenic-sulphur yellow²⁹² (Fig.2.3-144). It was identified as such by an analysis conducted via the Musée royal de Mariemont in 2005,²⁹³ the results of which I do not know. Tang China reportedly imported her stocks of “king’s yellow” from Champa and Cambodia;²⁹⁴ as a product of solfatarian activities, the dye could have also come from the vicinity of any of the multitude of active, dormant and extant volcanoes found throughout Southeast Asia. The volcanoes nearest to the ship’s assumed course would be in Sumatra and Sunda.

Two concretions found on deck of the salvage vessel contained an anthracite-black, petrol-smelling yet powdery substance, possibly a petroleum-based tar. The material was packed into flat boxes of metal-sheeted timber tied together with rattan (Fig.2.3-145). The sophistication of the containers should indicate the substance’s worth. No analysis of the samples submitted to the Musée royal de Mariemont has been forthcoming.

Various “opened” rocks and pebbles contained mineralic ores (or, in cases, their corrosion products). Visual identification divides these into five main categories (Fig.2.3-146). According to the divers’ reports, material alike S224 and S270 was found in considerable amounts in the lower hold; the



others were sampled off the deck of the salvage vessel. Again, no results of an eventual analysis of the numerous samples have been made available.

A small number of ceramic shards²⁹⁵ display the turquoise-green glaze on a thick yellow-sandy body (Fig.2.3-147) characteristic for Early Islamic Persian pottery.²⁹⁶ A well-known product of late first-millennium Iran found in numbers at the port-site of Sirāf,²⁹⁷ these fragments mark one of the possible western termini of the extensive trade relations reflected in the non-ceramic cargo. In contrast to the green-glazed Yue Yao (which, besides, might have been inspiration for the Persian potter²⁹⁸), such Iranian ceramics here obviously were not export wares but objects of domestic use.

Though significantly less voluminous than the cargo of Chinese stonewares, much of the merchandise of a western origin yet represents considerable investment. Many of the latter commodities are the manufacture of individual and often singular workmanship, a stark contrast to the mainly mass-produced ceramic freight²⁹⁹ and, as far as can be told, the cargo of domestic metalwares. This "western" cargo often was stowed in disparate batches: the glasswares obviously came in several consignments; there were at least three different loads of jewellery. While it is possible that their owners had to split their goods into separate spaces still void of other cargo, I suspect that different batches here represent different traders: the most obvious example are the precious and semi-precious stones of possible shared origin found in distinct and separate concentrations. In any case, most of these lots were found atop the main shipment of china and metal implements or in quarters still accessible after the ceramics had been laden. They therefore had come aboard only after the hold was filled with ceramics, and possibly so in later stages of the vessel's passage. I shall return to these observations in Section 4.1.

(Endnotes)

1. See, eg., Pliny the Elder, *Natural History*, XXXVI, 87.
2. TransL Kahle 1937: 334.
3. Transl Lamm 1929-30: 509/138.
4. E.g., Contadini 1999: 323f; Jenkins 1986: 23, 27; Kühn 2010: 20; Kröger 1995: 35; Simpson 2007: y6f. For the present purpose, see the perfume flasks M.73.5.711, Los Angeles County Museum of Art (http://www.lacma.org/islamic__art/Popups/popup_

- fig14.htm,) and N0.73.40, Toledo Museum of Art (<http://www.kombluthphoto.com/HistoricalGlass6html>, both last accessed 2013-09-17).
5. On location, about 150 beads were registered as 'Gl[ass]Pc[arls]' and given the codes 'Gl' or 'Glass' for their material. None was photographed. For only 43 of these beads registration entries made in the warehouse are available; of these, thirteen were photographed or drafted. The distinctions here made are based on the available photography and any remarks that might denote rock crystal (eg., descriptions given in the warehouse, or colour codes like 'transparent' or 'translucent').
 6. Cf Carboni 2001; Kroger 1995: 3ff; Whitehouse 2010.
 7. Cf Lledô 2009a: 243, 2009b: 253.
 8. 15 such samples were submitted to the Musée royal de Mariemont in June 2007.
 9. See Section 2.1: 93; and Figs.2.1-4, -10, -15.
 10. Cf Section 2.1: 86f for a description of such processes.
 11. No count of these small shards was attempted, and none were entered in the spreadsheets kept on location.
 12. See Fig.2.3-10: the 37 entries often record more than one item.
 13. Bivar 1970: 4f.
 14. Van Doorninck 2009: 4.
 15. Kühn 2010:15, 22.
 16. Additional to the references cited by Guillot, cf Inv.-Nr.I.2/60,I.2205, Museum für Islamische Kunst, Berlin (Kühn [ed] 2010:100-1,116-7); Acc.N0s.51.1.54, 54.1.107, 55.1.131, 73.1.30, 97.1.1, Corning Museum of Glass (www.cmog.org, last accessed 2013-11-09).
 17. Guillot 2012: 4. cf the 'small wide-mouthed, [drinking] jugs [...], very occasionally inscribed with such uninteresting remarks as "Blessings on the owned" observed, by Wilkinson (1943a: 179) in Nishapur.
 18. Eg., Cullen 2009: 237; Kühn [ed] 2010:106-9; Acc.Nos.53.1.56, 53.1.58, 53.1.60, 60.1.2, Coming Museum for Glass; Acc.Nos.30.40.6, 37.40.34, 48.101.282, Metropolitan Museum of Art (<http://metmuseum.org/Collections/...>, last accessed 2013-11-07; the latter two flasks were found at Nishapur, Iran). Kröger (1995: 137), however, argues that 'numerous finds suggest that they were made in all the Islamic glass centers where engraved glass was manufactured'.
 19. For the possibilities of such an analysis see, eg., Brill 2001; Henderson et al. 2005; Lankton and Dussubieux 2006; Mason, Farquhar, and Smith 1992; Paz 2010.
 20. See, eg., Brill and Fenn 1992; Zhao Rugua 1911:16 fn.1, 116, 135, 227f; Chou Ch'ü-



- fei 1977: 45–6; Meyer 1992: 97ff; Schafer 1985 [1963]: 235!–; Welters 1976: 42–3, 72.
21. Flecker 200X 87–9.
 22. The tenth-century Persian poet Ahmad Daqiqi Tusi, as quoted by Wilkinson (1943a: 175).
 23. Al-Bīrūnī quoting the tenth-century Persian solon al-Ṣāhib b. 'Abbād (Kahle 1936: 326, my translation).
 24. Arts.WH35, WH61, WH62, WH78, WH82, WH120, WH121.
 25. See Fig.2.3-10 and, eg., A1IS.S333, S368, S372, S387, S432, S463, S532.
 26. ... or even, as was the case with oil made of the balm of gilead, 'exceedingly precious, its cost [being] double that of gold' (Schafer 1985 [1967]: 187) in late Tang times.
 27. Eg., Daryaee 2003: 3; Loewe 1971:175; Ricks 1970: 351.
 28. Krahel et al. (eds.) 2011: Art2005.1.00548.
 29. See Touw 1982: 72f.
 30. Kuwabara 1928:19–20; Schafer 1985 [1967]: 173.
 31. Bielenstein 2005: 43, 51, 370–1.
 32. Bielenstein 2005: 59.
 33. Laufer 1919: 332.
 34. As quoted in Lauffcr 1919: 333.
 35. Wu Renchen's account of Nanhan, quoted in Schafer 1948: 60; cf. Miles 2002: 54.
 36. For the use of fragrances in medieval China see Schafer 1985 [1963]: 157ff.
 37. A product of the roots of *Saussurea costus*, a plant indigenous to Kashmir, and since antiquity an export of Sindh (see the *Periplus of the Erythraean Sea* [Huntingford 1980; Schoff 1912], Sects. 39, 49). 'The kind which came sea-borne by the way of the Indies [to Sung China] was the best quality, whereas that coming overland from the West was poor' (Schafer 1985 [1967]: 172).
 38. The resinous exudate of the tree *Liquidambar orientalis*, 'native in S. W. Asia Minor, and exported as far as China' (Schoff 1912:128). As was costus oil, liquid storax was one of the ingredients of the 'regal ointment' produced for the Parthian kings [*ibid.*: 112].
 39. Zhao Rugua 1911: 61.
 40. Cf. the small flask Inv.-Nr.I.6123, Museum für islamische Kunst, Berlin, that contains a 'brown powder [that] blended with water can be mixed into a white maquillage' (Kühn [ed.] 2010: 106).
 41. Only one of the records, Art.78242, was noted as 'Cr[ystal]' on location. Three of the crude rock crystal blocks were marked as 'Tr' in the field 'Material'; seven entries as

- ?'; and the remaining objects as 'Gl' or 'Glass'. Serial codes given on location break into one instance of 'Cr', ten times 'Gl.', 17 'Gl[ass]Pe[earls?]', three 'Qufartz?' and eleven 'UN'; the remaining are various single entries. Photographs are available for 39 of the objects, and 33 were re-registered and described in the warehouse.
42. Numbers noted in the spreadsheets kept on location and the warehouse records differ.
 43. $\frac{2}{3}$ of cubes of the reported measurements multiplied by the specific weight of rock-crystal, 2.65g/cm³.
 44. See Kahle 1936: 332-3. Referring to Ferrand, Kahle translates Al-Bīrūnī's 'islands of el-Dībaġat' as 'Laccadives and Maldives', a geologically unfeasible suggestion that, however, has frequently been repeated (see, e.g., Contadini 1999: 320).
 45. Kahle 1936: 333b
 46. See, e.g., M.110-1966 at the Victoria and Albert Museum, London.
 47. <http://www.bridgemanartcom/en-GB/asset/693479//islamic-art-kohl-container-rock-crystal-inv-n- i5448-fatimid-i2th-century-mia-o8-07-09-047>, last accessed 2012-10-24.
 48. Eg., Contadini 1999: 325ff Erdmann 1959 passim, Valdes 2007.
 49. See, e.g., Contadini 1999: 320!; Lamm 1929-30: 177ff; Pinder-Wilson 1954: 84f.
 50. Kahle 1936: 332.
 51. Cf. al-Maqrizī's description of the various crystal objects in al-Mustansir' treasure, looted in 1062 by Turkish mercenaries (Lamm 1929-30: 511f)
 52. 'If you let the sun shine through them on tinder, it takes fire immediately' (Groeneveldt 1960 [1880]: 83).
 53. Schafer 1985 [1963]: 237.
 54. Rosenthal's translation (2012:148); cf. Kunz 1938 [1913]: 181.
 55. See, eg., Kiang and Tan 1993; the respective articles in Savage-Smith *fed.* 2004; Xiong 2007; Yano 2005.
 56. Eg., Reg.Nos. 1867,0729.2, OA.632 or AF.517, British Museum, London (http://www.britishmuseum.org/research/collection_online, last accessed 2013-11-07).
 57. <http://cirebon.musee-mariemont.be/the-cargo/search-cargo.htm>, 'crystal', last accessed 2013-10-09.
 58. Inv.-Nr.I.6123, Kühn (ed) 2010:108-7.
 59. Cf, eg., the Ager chessmen, Inv.-N0.1473, Museo Diocesano, Lleida (<http://www.museudelleida.net/content/view/153/95/lang,english/>, last accessed 2013-10-07) and in the Béhague Collection (Lamm 1929-30: Taf.77:15); Acc.No.1972.9,28,



- Metropolitan Museum of Art; or Fig.9 in Suren-Pahlav 1998.
60. See Sect2.i: 97: due to distortion of the grid, the records right abaft the wreck include a considerable 'blank' area
 61. See pg.175 above.
 62. See, however, Acc.N0.08.202.28, Metropolitan Museum of Art; or Reg.No.1 988,0130.1, British Museum.
 63. For the bird see, e.g., Inv.-Nr. 2225, 2226 and 2227, Neumann 2008: 340-1; #12102012 offered at <http://www.ancientresource.com/lots/cylinder-seals-bullae/sasanian-persian-seals.html> (last accessed 2013- 12-01); or groups 25a and 36a in Gobi 1973 [*Tafeln* 10 and 13], For the bull, AccNos. 55.49.107, 62.66.17 and, especially, 99.22.73 in the collection of the Metropolitan Museum of Art (Brunner 1979: 33,1978: 78, 79); or the 'Sasanian domed intaglio' offered at <http://galletytulip.com/artifacts/file.html> (last accessed 2013-11-28).
 64. Erdmann 1969:116, quoted in Neumann 2008: 338.
 65. Soucek 2002; Kalus 1986.
 66. See, e.g., Zhao Rugua's reference (1911: 60) to the 'king [of Śrī Vijaya's signet [ring] used as a seal' for official documents. Numerous inscribed rings are known from finds in Java and Barus (Miksic 1990b: 109f) and the Intan wreck (Flecker 2002: 72). John Miksic (pers. comm., February 2004) informs me of a motif in the Rāmāyānā, where 'Garuda proves that he has seen Sita by showing Rama her ring', and of the signet ring Manohara left for Sudhana when returning to her native lands.
 67. 'In Zoroastrianism birds were considered as guardians of nature, and thus as opponents of Ahreman, the Iranian devil' (Neumann 2008: 340); the zebu would represent the 'primeval bull, whose sacrifice gave birth to plants and animals' (Duchesne-Guillemin 1970: 98; cf. Brunner 1978: 78; Scott 1984: 222). For frequency of their occurrence on seals see Balzer 2013: 35ff; 77f, 94f, 109f; Göbl 1973: 9f; Mehendale 2002.
 68. Göbl (1973:10) notes its possible presence on such seals as 'alleged' and 'not really fitting into the canon'.
 69. Boyce 1979: 156f, 166f; Hinnels 2008.
 70. See Section 1.3: 69, fn.63.
 71. For a recent overview see Re 2011: 5ff or Krassmann 2010; for the lapis lazuli of Badakhshan, Yurgenson and Sukharev 1985. The Chagai quarries, though undoubtedly reported by local inhabitants, have as yet not been confirmed by independent surveys and are subject to debate (e.g., Law 2008: 809ff). For a

- discussion of possible (minor or depleted?) Iranian and Azerbaijani sources see Moorey 1999: 86f. The confirmed deposits along the southern shores of Lake Baikal, Siberia, were located only in the eighteenth century.
72. See, eg., McIntosh 2008:167f; Tosi and Vidale 1990.
 73. Eg., Herrmann 1968: 22ff; *Lapis Lazuli Mining...* 2007; Wood 1872: iyoff.
 74. Frankfort 1984; McIntosh 2008:185.
 75. Simomn 2010.
 76. Judged by the quantities emerging on the antique markets of Jakarta in the months after the official salvage campaign, an informed source estimates an amount 'of at least 2 tons'. Looting of the crude stones was organised by one of the officials previously supervising the salvage. Reports of these activities to the agencies involved in administration and protection of the find proved futile.
 77. S54, S106, Si 65, S166, S189, S271 and S612.
 78. For the possibilities of an analysis of lapis lazuli see Lo Giudice et al. 2009 or Re 2011.
 79. Besides a small number of tin "lance heads" (see below), all of the objects recorded between 50610 and 50620 are export ceramics.
 80. See Sections 2.1: 98 and 3.2: 263f.
 81. Carboni and Whitehouse 2001: 35-6.
 82. Herrmann 1969: 24, 26; Wood 1872: 171.
 83. The Art# noted in the warehouse notations mistook the ring for the star-shaped bead, Art 141206,
 84. For the flower see Brunner 1979: 40f; Parsa 1960:127-8,107ff; or Touw 1982: 71-2; for the pegasus, a possible Greek import (Ettinghausen 1972:14ff), or potential canine griffon, Brunner 1978: 8off.
 85. Additional to the sources noted in fhs.63 and 67 above, see, e.g., the Cans Collection ('Sasanian Seals', <http://ecai.org/sasanianweb/>, last accessed 2013-12-04); Gyselen 2007; or Horn und Steindorff 1891.
 86. E.g., Inv.-N0s.70.06, 70.16-7 in the Gans Collection; Acc.No.62.66.7 in the Metropolitan Museum of Art; or 70.15 in the A. Saeedi Collection (Gyselen 2007: 88). Acc.N0.62. 66.8 in the Metropolitan Museum of Art or Reg.No.i936,1116.4 at the British Museum show some similarity in the plant's execution, but miss its very base, as to be seen presently, the most important portion of the motif (Oestigaard 2005:119ff).
 87. Cf, e.g., Jaina 1995: 171ff; Tadvakar 2012: Chptio, 'Kalash', unpg..
 88. Robinson 1991: 49, 52 Fig.8; Lee-Niinioja 2011: 48; Miksic 1990a: 119, 124/5.



89. Besides flowers, a *pūrnaghata* vase could contain a wide range of objects that symbolise worldly and spiritual abundance (Agrawala 1965: passing).
90. See Christie 1996: 262, 272, 1999: 233f Wicks 1992: 248f; cf. variations of the 'Śrī mark' on Javanese signet rings (e.g., Miksic 1990b: 79f).
91. Even as a mere receptacle for the sacred fire, vases were only introduced in the fifteenth century (Boyce 1979: 172); cf. Duchesne-Guillemin 1966; Modi 2011 [1937].
92. For the s.c. 'Ghadaiya Paisa' coins see Abels 1982, Singh 1988 or Sharma 2001: 136c
93. See, e.g., the reverse of a coin of Ardashir I pictured in CIAS und, or Brunner 1978: 119ff.
94. Bekhradnia 1994; Jamshedov 1992; Kennedy 2008: 229ff; Scott 1984. In the early eleventh century, lapis lazuli was also traded by Jewish merchants (Chaudhuri 1985: 12, quoting a Cairo Genizah document).
95. Flecker 2002 72f; Miksic 1990b: 79ff, 110; AccNos. 1998.544.297, 1998.544.299 or 1998.544.302 in the Metropolitan Museum of Art No such rings were recorded in the present cargo.
96. See the use of this Classic Malay phrase in various *hikayat*, Shaari 2001: 12, 78.
97. Cf Section 2.1.
98. Cf, e.g., Djafar 2010: 100, Foto 3.60; Pojoh 2008c: 62.
99. Beads and their chemical composition are a major marker of migrations and trade-relations: see, e.g., Basa 1992; Cayron 2003, 2006; Indraningsih 1985; Francis 1990, 1991, 2002; Lankton, Dussubieux and Rehren 2008; Ramli et al. 2011. None of the 'beads in this cargo were analysed for their chemical footprint
100. Out of 995 confirmable entries, only 149 note only one item.
101. Art 126943, 50624, pearls.
102. The material was not analysed: 'Javanese gold' (see below) often is electrum (Riederer 1994: 48f).
103. For a discussion of comparable objects in the Intan cargo see Flecker 2002: 74.
104. See Section 2.1.1: in between these dates the salvage approach was changed from a 'layered' to a 'frontal' one, causing considerable distortions in the grid records.
105. For overviews see Miksic 1990b: 41ff, 1999.
106. Informed sources though estimate that about 20% of the larger pieces of gold, and especially so various rings, were smuggled, off the site by a number of Indonesian divers.
107. Barrett Jones 1984: 34.
108. Eg., Miksic 1990b: 71ff; Suhadi 1999; or the Samuel Eilenberg-Jonathan P. Rosen

Collection of Indonesian Gold in the Metropolitan Museum of Art

109. See, eg., the Wonoboyo hoard (Haryono 1993; Wahyono 1994); or the gold objects in the Intan find. (Flecker 2002: 71ff). There yet should be at least one such ring: 'a gold signet ring with an inscription in a South Indian script is mentioned at <http://cirebon.musee-mariemontbe/the-cargo/coins-and-inscribed-objects.htm?lng=en>, last accessed 2014-01-07, but not identifiable in the available data and photographs.
110. Cf. the unidentified photos in Pojoh 2008c.
111. Here classified as such by multiple colour codes and descriptions like 'beads, different colours'.
112. Cf. Miksic 1990b: 8off.
113. For their use in *peripih*, ritual foundation boxes for monuments, see, e.g., Miksic 1990b: 43; Muslim 2011: 15 Santiko 2006: 374.
114. Herath 1984.
115. Ehrmann 1957; Waltham 1999.
116. Bowersox et al 2000; Bowersox and Secretariate ... 2007.
117. Egreteau 2012: 92; Schafer 1985 [1963]: 223ff.
118. Zhou Qufei 1977: 41.; cf. Schafer 1985 [1963]: 222ff, 1985 [1967]: 158f; Shen 1996: 26f.
119. See, for India, eg. Krishnan, Kumar and Ramamrutham (2001) or Weihreter 1993; for mainland Southeast Asia, Richter 2000; for maritime Southeast Asia, Miksic 1990b, Kal (ed) 1999; for China, Kelley 1984. For the possibilities of analysis of the material itself see Riederer 1994,1999.
120. No. Inv. 8965, Museum Nasional, Jakarta.
121. Cf. Molen 2003; see, however, fn.131 below.
122. Besides the two fragments in the figure, Art6099.
123. Eg., Miksic 1990b: 66-7; or. AccNos.1998.544.218-20, 223-4, 2001.794.19,116,118 in the Metropolitan Museum of Art
124. Discussing comparable finds on the Intan wreck, Flecker (2002: 77) admits that 'of course, the jewellery could have been worn by Javanese merchants returning from a trading journey'. This, however, implies that their owners had remained on the sinking ship to the very seabed, a rather unlikely scenario (cf. pg.213).
125. The *Akhbār al-Sīnd wa'l-Hind*, around 850, Ahmad's translation (1989: 35).
126. See Section 1.2: 33, 37.
127. Jacq-Hergoualc'h (2002: 66), Meulen (1974: 4f and Wheatley (1973 [1961]: XXIf) shed doubt on this designation; Miksic (1999: 19f) however notes finds of ancient



- gold jewellery in the vicinity of small-scale pre-European mining enterprises.
128. Bronson 1992: 83; Edwards McKinnon 2000: 218f
 129. Schafer 1985 [1967]: 162f.
 130. Bielenstein 2005: 97.
 131. See Hobson 1926: Plate IXa.; or the silver container found in the Belitung cargo (Cat. No.292; Qi 2011: 224).
 132. Cat.No.12, Krah, et al. (eds.) 2011: 230; Quek and Norman (eds.) 2003: 44.
 133. ... , and 'real pearls' counted in tens of thousands of ounces (Bielenstein 2005: 77-8).
 134. For the latter attitude see Buzurg's (1981: 65f) story of a merchant destroying nine often 'unique' pearls before surrendering one of these 'objects of desire' to the rulers of, apparently, Wuyue or the Southern Tang.
 135. Zhao Rugua 1911: 72, 116, 229; Zhou Qufei 1977: 42, 44.
 136. Schafer 1985 [1963]: 243b 1985 [1967]: 16of.
 137. Zhou Qufei's (1977:124) twelfth-century appellation for one of the pearl grounds; cf. Schafer (1952:164).
 138. *Sung Shi* 481.5698c, Schafer's translation (1952:162).
 139. Nanhan's pearls were, at least, traded with the northern Chinese courts (Schafer 1952: 163).
 140. The Treasure, 47'30"-49'.
 141. Eg., Acc.N0.1998.544.43, Metropolitan Museum of Art; Miksic 1990b: 93, 116f; or, most obvious, a finial reportedly found in northern central Java, now in the National Museum, Jakarta (Cat.Nr.A85/1555; Ong 2010: Fig.15) and the various handles and finials in the Wonoboyo find (Haryono 1993; Wahyono 1994: 33ff).
 142. Cf. Elinder and Erixson 2012 and opening paragraphs of Section 4.1.
 143. Cf. Flecker (2002: 65) on the scarcity of gold coins on the Intan wreck (pg.197 below).
 144. See fn.141 above.
 145. Throughout 'this period we are unable to distinguish Javanese and Sumatran forms of the Kawi script' (Griffiths 2012: 210); cf. Kozok 2006: 45ff.
 146. Cf. the fictitious fate of the 'ivory sheaths with golden ferules [... and] the jeweled hilts' of Karain's and his brother's *badik* in J. Conrad's *Karain: A Memory* (1897).
 147. Haryono 1993: 29,1999: 70.
 148. Here, perhaps due to a want of space, missing a clear vocalisation mark (A. Griffiths, pers. comm., January 2014).
 149. See, e.g., Christie 2004: 92; Rahardjo 2002: 318.
 150. $\{114\,000\text{ mm}^3\text{ [=gr of water]} / 330\text{ mm} / 0.2\text{ mm} / 19.3\text{ [specific weight of gold]} =$

89.496 mm}

151. Arts. 127747, 128110, 148328. The beads were recoded under 'stone' and 'glass' on location; in the warehouse the two former entries were given the addition 'Coral Beads inscripted'.
152. Eg., Art. 155673, 'stone beads', in the warehouse added 'Coral Beads not inscript', or a number of <loc> 'glass beads' with the colour code 'black'.
153. According to the dating function of the camera the photographs were taken on 50905, not 50910, the day of their entry into the spreadsheets. I here follow the date of the photographs.
154. Eg., Samat 2001: 13ff.
155. Baqir Sharif al-Qarashi und: 59.
156. Reg. N0.1943, 1009.1.
157. Here in the translation found at <http://www.duas.org/travel.htm>, last accessed 2013-12-14.
158. Pickthall's translation. 'Kingdom' here follows Shakir's version.
159. <http://www.duas.org/travel.htm>.
160. Miller 2002: 84f; Zaghlool 2010.
161. The plate was surfaced and given to the author by a diver on 50907, but registered only on 50910.
162. No photographs or drawings are available for the, presumably, bronze alms-bowl, Art. 112252, 50526.
163. Lydia Kiefen, pers. comm., October 2012.
164. <http://cireboan.musee-mariemont.be/the-cargo/secondary-cargo/metalic-objects/buddhist-ritual-objects.htm?lng=en>, last accessed 2013-12-19; cf. Haryono 2008: 66. There yet is the 'Astamahabhaya Tara, who protects sailors from ship-wreck' (Patra and Patra 2004: 111).
165. Eg., Scheurleer 1992; Reg. N0.1948, 0716.11, British Museum; Acc. N0.1994.605.43, Metropolitan Museum of Art.
166. See Section 2.2.3.
167. ... thus true to its known 'role of protector in the architecture of temples': <http://cirebon.musee-mariemontbe/the-cargo/secondary-cargo/metalic-objects/worship-or-domestic-objects.htm?lng=en>, last accessed 2013-12-24.
168. Arts. 137180 and S380 are not shown. Cf. <http://cirebon.musee-mariemont.be/the-cargo/secondary-cargo/jewels-parade-weapons-gemstones-pearls-shells/conch.htm?lng=en>, last accessed 2013-11-28.



169. '[...] although we cannot be certain of this as they were not found in a religious context they may simply have been items in domestic use' (<http://cirebon.museum-mariemontbe/the-cargo/secondary-cargo/metalic-objects/worship-or-domestic-objects.htm?lng=en>, last accessed 2013-12-24). In the database these objects are marked as 'ritual objects?' in the field 'type general'.
170. Here not pictured are Arts.1080, 4230, 6102,10643, 13942,14689,15471-3,16757, 29746, 29952, 111597.
171. The grid records here were mistaken: see Sections 2.1: 98 and 3.2: 263.
172. See Section 2.1:102.
173. Eg., Way man 1974: 262ff
174. Eg., Haryono 2008: 68.
175. Cammann 1955: *passim*, Louis 2011b: 213ff
176. For the choice of this term see Flecker 2002: 54f.
177. Cf. pg.194 above.
178. Cf. Cat.290, 2005.1.00849, Belitung wreck, Louis 2011b: 214ff
179. See below: as for any other objects of comparable material, no chemical analysis is available.
180. Besides the objects in Fig.2.3-81, ArtS365, S508 (3 pcs.), S564 (2), S568 (2), S637.
181. See Flecker 2002: 42f; Miksic 1990a: 34f O'Connor 1975.
182. Small numbers of such objects are now and then offered on Indonesia's antique markets, mostly described as 'tin money' (here, <http://goedangdjadoel.com/2011/02/javaconetinmoney/>, 'from a dig in an area in East Java'; cf. <http://goedangdjadoel.com/2011/12/ancient-trade-tools-stupa/#more-15191>, 'from some archaeological site in Java'; both last accessed 2013-12-29). See, also, pgs.200ff below.
183. Shizong argued:
"The Buddha viewed his human existence as unreal, yet out of an urge to profit mankind, he chose to retain his true body. Having once chosen to forgo personal salvation to profit the world, how could he possibly begrudge us a bunch of bronze statues?" (Ouyang 2004:115)
184. Trigangga (2008: 74) notes 'about 80 combinations' of various mintmarks found on the coins.
185. Flecker 2002: 62k The Karawang cargo, on the other hand, yielded only a couple of these coins: here the majority were various issues of the *Kai Yuan tong bao* of the Domesne of Min, Fujian (c.910-945).
186. Cf. Elviri 1973: 150f.
187. See Christie 1996,1999: 229ff; Flecker 2002: 65ff; Miksic 1990b: 37ff.

188. 'So many coins-were discovered in Java that even- before 1900 the Batavian Society (the forerunner of the present Museum National, Jakarta) stopped acquiring them' (Miksic 1990a: 38). Cf. Wicks 1986: 47ff.
189. Schafer 1985 [1963]: 255; Louis 2004: 149.
190. Suarez 1999: 61f. Agyre is not among the destinations of commercial interest mentioned in the the first- century *Periplus of the Erythraen Sea* (see, eg., Huntingford 1980 [1976], Schoff 1912); Arab and Persian sources of the first millennium do not note Myanmar as a source of silver (see Tibbetts 1979a); and neither the *Lingwai Daida* nor Zhao Rugua mention such produce. Burma's historically most productive mines at Bawdwin appear to have been exploited only in the second millennium (Bronson 1992: 82).
191. Bronson 1992: 82; Flecker 2002: 85.
192. 'In the valley of the Angren and the mountains of Karamazar' (Blanchard 1994: 7).
193. Blanchard 1994: 7, 2001,1: 23off; Rubinstein 2002: 132f,
194. Mines in operation throughout the late first and early second millennia were at 'the rivers Bazar-Dara, Torguz-Bulak and Shugnan' (Blanchard 1994:7) and in the Sasyk valley near today's Murghab (Ranov, Veher and Besenval 2004: 21),
195. Blanchard 2001,1: 282ff, II: 557ff.
196. ... and at least Bazar Dara was a Zoroastrian settlement (Ranov, Veher and Besenval 2004: 18).
197. Based on the available photographs, drawings and measurements, presumably, Arts. 7975,13371,17755.
198. Judged by the spreadsheets kept on location, Arts, 27716, 27717, 27718, 27719, 27774, 27775, 31077, 31078, 128115,151867,153179.
199. Cf. the '52,000 taels of silver' (1,950 kg [!]; Zhao Rugua 1911:101 and Bielenstein 2005: 78, both quoting the *Songshi*) paid for the "presents" of Chôlan envoys to the Song court in 1077, or the 10,500 tael (slightly more than 390 kg) given to ambassadors of Śrī Vijaya in 1079 (Groeneveldt 1960 [1880]: 61, again from the Song- sh/). Somewhat more realistic appear the 2,000 tael (75 kg) given to an emissary of Cengtan, an unidentified country in the western Indian Ocean, 'in consideration of the very great distance he had come' in 1083 (Bielenstein 2005: 79).
200. The faint traces of scratchmarks on the underside -of Art 17755 (see Fig.2.3'85) appear to- be imbedded into a layer of concretion and/or residue, thus possibly not in the silver itself. I am not aware of the ingot's present location.
201. Krahel et al (eds) 2011: 232, #33; Quek and Norman (eds.) 2003: 52.



202. Cf. late Roman silver ingots found in Britain (eg., Reg.Nos. OÀ.247 and 1855,0815.1-3, British Museum).
203. Two samples taken 'from "type (ii) ingots 'analysed at "the "University of Liège Archaeometry Laboratory (PIXE) are made of silver of between 870 and 900 thousandths, alloyed with gold (> 2%),.. copper in very variable proportions and lead in the proportion of 0,4 % and 1.3 %' (<http://cirebon.musee-mariemontbe/the-cargo/main-cargo/ingots/silver-ingots.htm?lng=en>, last accessed 2012-12-07).
204. Cf Flecker 2002 84.
205. Twitchett and Stargardt 2002: 48f
206. Informal tests with an infrared thermometer on objects of S478, 2004-09-29.
207. The shut-down of the warehouse in 2006 impeded further documentation of the smaller objects; at least one bag of such items found in one of desalinization pools, 8632, remained unopened
208. Liebner 2009d: 6.
209. E.g,<http://panjalukediri.blogspotcom/2013/05/media-barter-timah.html>, allegedly from Kediri; <http://goedangdjadoel.com/2012/06/tin-bones~money-lot-5pcs~1887/>, 'south Sumatra'; <http://goedangdjadoelcom/2012/06/media-barter-timah~logo~ikan-1894/>, 'Sumatra and Malay Peninsula'; <http://www.tokokuno.net/2012/02/media~barter-ukuran-jumbo.htmk> 'Musi river' (all last accessed 2013-12-31).
210. Cf the worth of the stringed leaden coins' of Java against silver in the seventeenth century (Groeneveldt 1960 [1880]: 57).
211. See fn.182 above.
212. As is the case with the other small tin "money ingots", these rings were not collected consistently, For comparable, but Interrupted ring' "currencies" of various materials see Mitchiner 1998: 28F
213. Flecker 1900: 65; Shaw and Kassim 1970,
214. Bronson 1992,1997,
215. No overall figures are available; the one proposed here is based on rough calculations made in 2005 together with the chief divers of the operations.
216. The object is noted only as Art.S.N.C.08 at <http://cirebon.musee-mariemontbe/la-cargaison/recherche- dans-la-cargaison.htm?lng=fr&doc=933>.
217. Again, no chemical analysis is available; for the proposed identifications see presently.
218. Here not pictured, are a number of substantial "wheels" of about 1 m diameter that due to their weight were kept aboard the salvage vessel and. eventually became one

- of the charges in the 'Cirebon Case' (see Section 1.1: 21)
219. Bronson 1992: 83-4.
220. Cf. Section 1.2: 33.
221. Tibbetts 1979a: 39.
222. S207 (1 pc.), S209 (3 pcs.), S210 (1), S397 (fragment), and Arts.3982 and 3983.
223. Cf. the ingots found, on the Pulau Buaya wreck (Ridho, Edwards McKinnon and Adhyatman 1998: 67).
224. Prudent seamanship demands heavier objects to be distributed as deep and. wide as possible throughout the cargo hold: cf. Section 3.2: 265.
225. See Flecker 2002: 83, 2011:107.
226. The available data groups these lanceheads into about 40 types, of which I only have the drawing shown in the figure.
227. The Intan lanceheads proved to be of tin with 1% of lead (Flecker 2002: 46).
228. For an overview of the chemical processes here at work see Hamilton 1999: 'Metal Conservation; Ferrous Metal Corrosion'.
229. Thus were the two concretions in Fig.2.3-99 found besides the starboard planking (S354, |033:Y33|, S406, |031:W31|).
230. Flecker 1997: 78,
231. Here identified as such by the "typical" smell and stark staining qualities of sea-water corroded iron.
232. S241, S649 and S650. The remaining unopened packs did not receive registration numbers,
233. PT. SUCOFINDO, Indonesia's material testing bureau, assured me of their competence for such analyses.
234. L. Heymans, pers. comm., March 2013; I. Caldwell, pers. comm., December 2013. For the somewhat re-cent origin of die term see Feuerbach, Balasubramaniam and Kalyanaraman 2007.
235. Eg., Bhatia 1994; Bronson 1986; Srinivasan and Ranganathan 2004; Verhoeven 1987; Wagner 2008: 264ff.
236. The *Tangshu*, Schafer's (1985 [1963]: 263) translation.
237. Bielenstein 2005: 97; Zhao Rugua [Hirth and Rockhill] 1911:19.
238. *Kitab Ruyar*, Section 8 (of the first climate), Derideaux's translation.
239. Bronson 1997:98; Wagner 2008: 344k
240. Wagner 2008: 258ff.
241. See Wagner 2008: 295ff.



242. For the numbering system of frame stations see Section 3.2: 245, fn. 17.
243. For an overview see Flecker 2002: 87.
244. Bronson 1997: g8f; Heng 2009:157.
245. Faxian 2010 [1886]: Chpt.40; cf. Zhao Rugua [Hirth and Rockhill] 1911: 30-1.
246. Cf. catering aboard ships of the Dutch East India Company (Boxer 1963: 93!).
247. Barend-van Haeften 1996: 35!.
248. Marked as such by the holes for the string passing through covers and pages: see Kumar et al. 1996.
249. Here, in all probability, not merely playing games, but genuine gambling, a well-known pastime of sailors. For ineffective attempts to interdict wagering on dice games on board (European) ships see, eg., Perez- Mallaina and Phillips 2005:154f; de Hullu 1913: 522. In the foreign quarters of the Guangzhou of the twelfth century 'gambling appears to have been prohibited, but the game of chess was allowed' (Zhao Rugua [Hirth and Rockhill] 1911:17 fn.1).
250. Here not pictured, Arts.7272/3 (two fragments of the same die), 29795, 100422, 112749.
251. Reg.N0s.2005.1.0054 6-1/4-4/4.
252. Cf. the opening remarks of this section.
253. Arts.7272 and 7273 probably are parts of the same die.
254. See pg.192f above.
255. Palamedes' inventions noted in Sophocles' fragment 429 mention 'not merely dicing, but [...] a game of skill corresponding to our backgammon' (Pearson 1917: 85). The 'chief lists of the inventions of Palamedes are to be found in Geor[gias' *Defence of Pal[amedes]*' (ibid: 87): 'I claim also to be a benefactor of Greece, present and future, by reason of my inventions, in tactics, law, letters (...), and the game of *draughts* as a pastime' (<http://www.humanistictexts.org/gorgias.htm#1>, accessed 2011-08-08; my italics).
256. For an English translation see <http://www.sacred-texts.com/hin/rigveda/rv10034.htm>, last accessed 2011-08-11.
257. See <http://masterpieces.asemus.museum/borobudur/map-theme6.html#76>, last accessed 2011-08-09.
258. Barrett-Jones 1984: 35.
259. Kozok 2006:109, 2004: 65.
260. Groeneveldt's translation (i960 [1880]: 75); cf Mills 1970:102,
261. Cf. e.g.; Dales 1968:19; Ghosh 1990: 178f; a picture of a Harappan dice is found at

- http://www.harap-pa.com/induss/page_420.html (last accessed 2011-08-07).
262. Cf Needham et.al. 1972: 328f.
263. Flecker 2001: 342; Krahl et al (eds) 2011: 42-3, 232, Reg.NO.2005.1.00545.
264. Cf, e.g., Josten 2003; Kraaijeveld 2000. In medieval Sumatra, Indian influence include[ed] the names of the days, creation myths, [...] and the game of chess' (Hoogervorst 2012: 58).
265. Besides the objects noted in fn.59 in this section, see the varieties of chessmen illustrated in Eder 2007 or at <http://history.chess.free.fr/history.htm>, and here especially the objects known from insular Southeast Asia (<http://history.chess.freefr/mainchator.htm>, last accessed 2013-09-24).
266. Thus, probably, S451, from a photo identified as areca nuts by Naniek Wibisono (pers.comm., 2011-08- 15). In the databases, however, the items in question are listed as 'ivory'.
267. See, e.g., Zhao Rugua [Hirth and Rockhill] 1911:17 fn.1, quoting the *Pingzhou Kedar*; Whittaker 2006.
268. For the crystals see pg-175f above; for the lapis lazuli, pg.179ff.
269. Flecker 1997: 82, 2002: 68f.
270. Kozok 2006: 109, 2004: 65.
271. Additional to the objects in Figs.2.3-119 and 121, Art.7820.
272. See the opening remarks to this section.
273. For the latter see Flecker 1997:83, 2002: 67f
274. Christie (2006: gif): 1 tahl [750-768 gr] = 20tahl = 320masa; cf. Wicks 1992: 254f
275. For a detailed discussion see Flecker 2002: 6gff.
276. If already in use on the Eastern Seas of the tenth century, a compass would possibly be comparable to its Chinese paragon, a 'magnetized needle floating on water in a small cup' (Needham, Wang and Lu 1971: 563) and not a pointer-shaped apparatus; cf. Flecker 2002: 90f
277. <http://cirebon.musee-mariemontbe/the-cargo/secondary-cargo/metalic-objects/worship-or-domestic-objects.htm?lng=en>, last accessed 2013-12-24; Flecker 2002: 46.
278. Art.108233, [ZA22:ZA34], Art.117121, [ZE23:ZE30]; Art.153180, [031:W31].
279. Here not pictured; Art 149946; B/ A12, S357.
280. Cf Zhao Rugua 1911: 48.
281. See Section 1.3: 8of
282. Chin 2009 [2004]: 59ff; Schafer 1985 [1963]: 45f

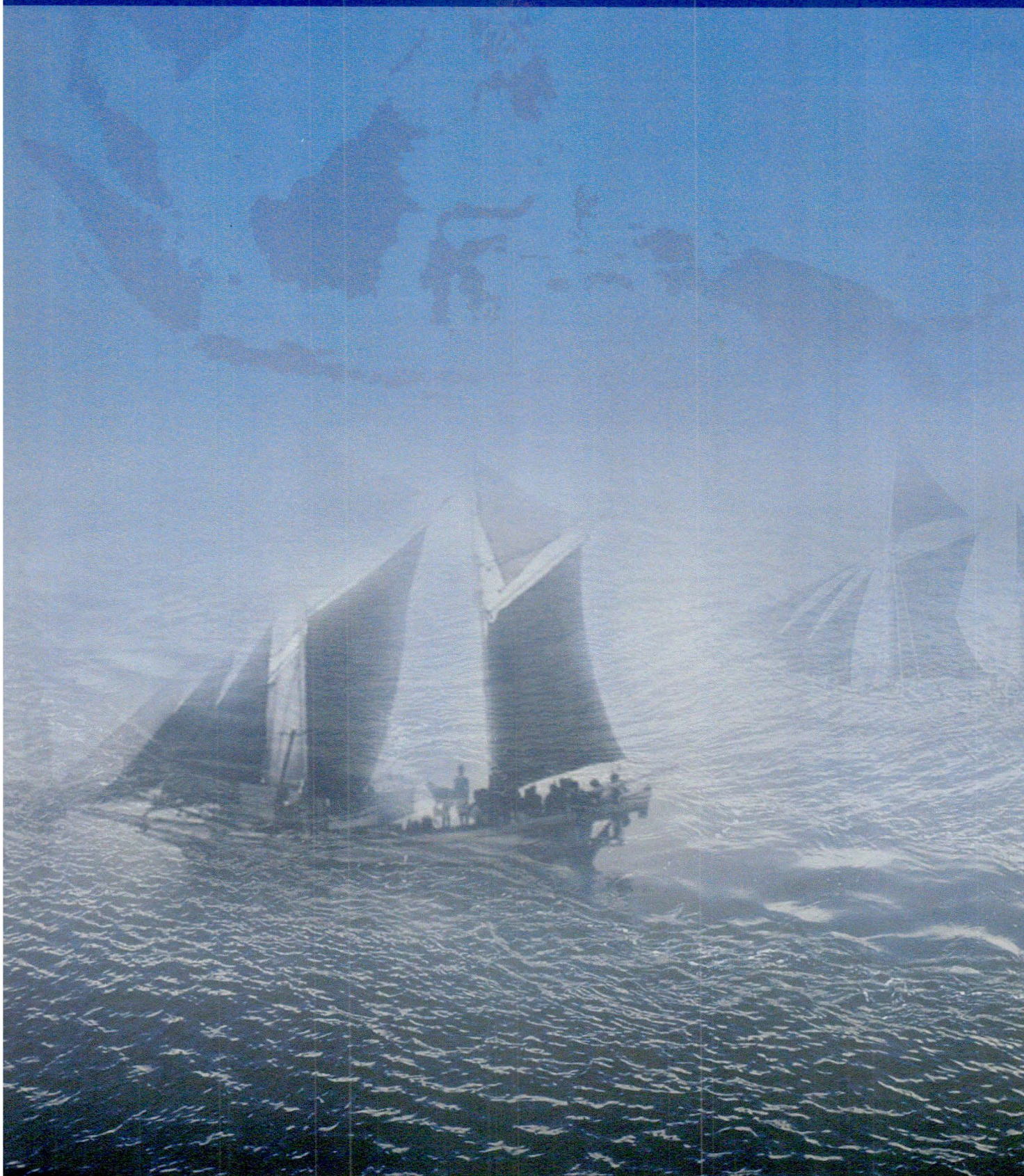


283. Our Persian captain relates that much to the disgust of other survivors caught in different parts of the vessel's rigging, a sailor who had scrambled into the same segments of the wreckage as the girl 'repeatedly had his ways with her'. By the next morning, however, both had been swallowed by the raging seas.
284. Not pictured: S190/1, found on deck of the salvage vessel, by structure and smell comparable to S566; S340, 50920, and S560, 51005, comp. S399; S366, 50923, comp. S351. No records of these substances were found in the spreadsheets kept aboard the salvage vessel, and no overall amounts were recorded.
285. For the possibilities of such analyses see Burger et al. 2010.
286. See Section 1,3: 33, 37.
287. ... and on the occasion of a ceremony requiring such aromatics was readily accepted as such by Sula- wesian master shipwrights. Frankincense is a product of the Hadramaut and Somalia (Schafer 1985 [1963]: 170).
288. For an overview see Wolters 1967, Chpts. 7 and 8.
289. Witnessed by the author and a number of customs officials when opening a pack intended for the Musée royal de Mariemont at Schiphol Airport, 2007-06-01.
290. Grinspoon and Bakalar [1993: 2] claim that marihuana 'was certainly cultivated in China by 4000 B.G and in Turkestan by 3000 B.C. [and] has long been used as a medicine in India, China, the Middle East [and] Southeast Asia' Chopra (2006 [1933]: 202-3) notes early references to opium in third-century BCE Greece and 'Chinese works mentioning] the Arabs exchanging poppy heads with Chinese merchants'.
291. For marihuana see Grinspoon and Bakalar 1993 or Robson 2005; for opium, Chopra 2006 [1933]: 203ff.
292. See, e.g., Feller et al. (eds.) 1986-2007: III, 47ff; Orna 2013: 9.
293. The person in charge promptly informed the diving crew to handle the arsenic substance with care.
294. Schafer 1985 [1963]: 214.
295. S494, S521, S593 and WH93-6.
296. See Whitehouse 2011.
297. Whitehouse 1968:14.
298. Hall 1934: 58.
299. See Section 2.2.2.i: even the most elaborate ceramics, the finely incised stonewares, were possibly produced using templates or moulds.



The Siren of Cirebon

A Tenth-Century Trading Vessel Lost in the Java Sea



3 The Ship

Ships, famously, are 'the most complex artefact routinely produced prior to the Industrial Revolution (Gibbins and Adams 2001: 280). Pomey (2011: 27) reasons that:

The construction of a ship and its employment [...] represents for the society that undertakes the endeavor a considerable effort in terms of savoir faire, technical means, supply, and development of materials. And in terms of social and political organization, it implies the conjunction, coordination, and application of the necessary means.

As outlined in Section 1.2, The various states that dominated the late first millennium AD historical scene in Insular South-East Asia [...] were no doubt complex enough polities to provide sufficient financial means, manpower and organisational capacities to succeed in building large vessels' (Manguin 1989a: 212). Yet, until the discovery of the Nanhan/Cirebon wreck the technical solutions essential to such an undertaking had to remain unstudied.

The first section in this chapter summarises our current understanding of the technical traditions of shipbuilding in the Indian and Western Pacific Oceans. I will describe how a number of present-day shipbuilding techniques of the region firmly stand in a millenniallong tradition of naval constructions, an expertise labelled "contemporary traditional" boatbuilding in the following.

The considerable complexity of the Nanhan/ Cirebon ship is illustrated in the second section of this chapter: here, a virtual remodelling and analysis of her remains will demonstrate that the vessel was a product of conscientious and detailed planning. The third section attempts a reconstruction of the ship.

3.1 Ships of the Indian and Western Pacific Oceans

Indirect proof of human activity on the Eastern Seas¹ predates by millennia archaeological finds, iconographie representations or textual records of the sea-craft of the area. Already the settlement of Melanesia and Australia, well under way 'by at least 40 000 years ago' (Bellwood 1985: 98), must have involved negotiating of the deep-sea channels between the Sunda and Sahul shelves and the Melanesian islands themselves;² Pawley (2007:38) accordingly argues that 'it is inconceivable that such a series of ocean crossings could



have been made without seaworthy craft'. While the first humans moving throughout the Western Pacific Ocean may have been accidental foragers not overly dependent on long distance communications,³ recent archaeological finds 'strongly suggest that some form(s) of inter-island trade or exchange [...] have an antiquity in Melanesia extending back at least 20,000 years' (Kirch 1991:146). Although as yet no corresponding discoveries are reported for Southeast Asia, we here have to assume comparable developments.⁴

In insular Southeast Asia, the skills and craft necessary for intentional and extensive blue-water navigations arrived with speakers of Austronesian languages. Their seaborne migrations throughout the Pacific and Indian Oceans were prompted by the development of oceangoing outrigger boats and the sophisticated and significantly uniform navigational techniques still noted in the ethnographic record of the area.⁵ Doran (1981, here: 21) suggests that during the first half of the last millennium BCE a center of complexity of Austronesian boat traits [developed] in the islands surrounding Sulawesi: such 'center[s?]' of innovation' (*ibid*) could have been cradle to the 'sophisticated watercraft [...] with advanced sails and methods of plank-fastening [and] manned by Southeast Asian sailors' (Hoogervorst 2012:187) that from the first centuries CE onwards carried diplomatic and economic missions to the ports of southern China. The discussion of the mechanical solutions adopted in insular Southeast Asian (here, following Mahdi [1999], perhaps better, "Western Austronesian") boat-building below will illustrate that these practices are integral elements of a highly specialised technical tradition characteristic to the region.

However, as noted by Carr Laughton (1925:1-2),
of all things the ship is the most cosmopolitan. From some date [...] so early as to be beyond the reach even of conjecture, she was already fit to go from one country to another; and in the intermingling of cultures begun by that intercourse the ship herself was of necessity influenced. [...] For the most part such adoptions proceeded from the ordinary interchange of ideas [...] there have been, probably at all stages of world history, many examples of the deliberate adoption of foreign methods.

The distribution of the idea of outriggers as a stabilising device for watercraft along the Austronesians lanes of migration and commerce

throughout the Indian Ocean is a case in point⁶ and the following will add further characteristics shared by the ships plying the seas between Eastern Africa and insular Southeast Asia. Chinese-operated overseas shipping, on the other hand, gained momentum only in the ensuing centuries - accordingly, until at least the end of the first millennium CE 'there is no trace of Chinese boat technology in Austronesian boats, or vice-versa' (Horridge 2006:144).

To delineate the basic differences between the various technical traditions, I shall begin with a description of the main characteristics of East Asian shipbuilding, to be followed by an overview of maritime technologies observed in the Western Indian Ocean. The remainder of this section will attempt to outline our present knowledge of Western Austronesian boat construction and pose a number of general observations on the possible configurations of the vessels sailing on the pre-modern Eastern Seas.

Sources on first-millennium ships and shipbuilding are limited: in the entire expanse between Africa and Southern China there until now are only about a dozen documented finds of wrecks unequivocally dated into this period. Besides the present one, only three⁷ of these finds still had (partly) retained their structure; the remainder are (fragments of) planks and other components.⁸ In between the extant iconography - a number of reliefs and murals, and representations on coins and graffiti - only some panels on the ninth-century Borobudur temple and one of the sixth-century paintings found in the Ajanta caves illustrate constructional details of the ships of the era. Literary sources are fragmentary and mostly incognisant of maritime matters. For a comprehensive appraisal we accordingly have to include both later materials and the ethnographic record: the shipbuilding technologies of the western Indian Ocean, insular Southeast Asia and the South China Sea belong to distinct and clear-cut technical traditions that in many a place were continued to the present day.

Eastern Asia: Chinese Traditions⁹

As yet, there is no explicit proof of extensive Chinese maritime activities before the advance of the Song dynasty: Heng (2009: 30-1) observes that 'we know nothing about Chinese shipbuilding technology [be]fore this period! [... and] no seagoing vessel of Chinese construct, dating before the thirteenth century, has yet been discovered¹⁰. Later sources and the ethnographic record



imply that Chinese ships can be broadly divided into two main types, ie., 'the large flat-bottom vessels of the North China Seas and the inland waterways [and] the keeled vessels with a distinct V-shape from the Southern part of China' (Green 1997:1). The former is 'box-shaped [and] the hull is closed to bow and stern by bulwarks' (Wieg 1990: 21), so does not have stem- and stern-posts and the associated "pointed bow (and, often, stern), but may be compared to the half of a hollow cylinder or parallelepiped, bent upwards towards each end, and there terminated by final partitions' (Needham, Wang and Lu 1971: 391). Such ships have no pronounced keel,¹¹ but are built around a 'flat or slightly rounded' (*ibid*) floor section that connects to the side planking in an often rather hard chine reinforced by wales.¹² Most of these watercraft were employed in China's widespread inland waterways;¹³ it, however, is this kind of ship that in popular perception embodies the 'typical Chinese "junk" (Green 2001: 81¹⁴).

In contrast, early sea-going vessels of China's southern seaboard were built with lower parts [which] sheer obliquely like the blade of a knife; this is valued because it can break through the waves in sailing. [...] The sailors are not afraid of the great depth of water, but rather of shoals, for since the bottom is not flat, she would heel over if she went aground on an ebb tide. (Xu Jing, 1124, on Fujian vessels, as quoted in Needham, Wang and Lu 1971: 430)

This, undoubtedly, is the description of a vessel with considerable deadrise, as described presently, one of the characteristics of the earliest sea-going Chinese ships recorded in archaeological contexts. The flat-bottomed vessels of Northern China and the ships that took Xu Jing to Korea, nonetheless share 'the use of watertight¹⁵ bulkheads, which in China extends as far back as the late Han dynasty' (van Tilburg 2002: 93): their hulls were not reinforced by the framework of floors and futtocks common to most non-Chinese boat building traditions, but employed athwartship partitions 'made with strong planks fitted together'¹⁶ that 'firmly join [...] the two walls [of the hull's side planking] with immensely large baulks of wood fastened both in length and breadth by huge nails' (Ibn Battuta, around 1350; Mackintosh-Smith's translation [2002: 224]).¹⁷ The Moroccan traveller here also notes the 'exclusive use of iron nails and clamps' in fastening together the various

members of a hull, since 'as early as the third century CE' (Manguin 2012a: 566) a further feature characteristic to Chinese shipbuilding. Lastly, we have to mention the median rudder, China's (to quote Needham 1970b) archetypical 'Contribution to Vessel Control', in use as steering device for ships since the Later Han dynasty,¹⁸ about a millennium before its appearance in Europe and some seven centuries before its first mention in a Middle Eastern source.

I know of no archaeological finds of sea-going ships dateable into the first millennium that match the above criteria. The oldest wrecks of blue-water traders in Southern China documented in a Western language are the Ningbo wreck, possibly of the eleventh century,¹⁹ and the late thirteenth-century Quanzhou ship²⁰ (for these and the following locations of wrecks see Map 2). Reports on two further -proposedly- Chinese wrecks of the early second millennium, the Nanhai N0.1 and Huaguang Reef N0.1 ships, 'are expected to be available in the near future' (Kimura 2010:15). Both the Ningbo and the Quanzhou wrecks have bilges with considerable deadrise and keels extended to bow and stern by 'strongly raked' timbers that possibly were 'surmounted by transom[s]' (Burningham and Green 1997: 36). Their planks are fastened to one another by skew nailing along their seams, and connected perpendicularly by nails to (rather thin) frames which in turn hold a number of bulwarks. Bulkheads and main planking of the Quanzhou ship are additionally fastened by recessed iron brackets.²¹ The latter vessel carries two layers of planking;²² the planks of the inner layer are rabbeted and joined partly in clinker, partly in carvel techniques; her outer planks are carvel joined, the planking being irregularly nailed with light nails to the inner planking (Burningham and Green 1997: 37/40). The Ningbo wreck was not fitted with multiple layers of planks.

By the fourteenth century²³ a number of the technical traits observed on the above vessels appear on shipwrecks that, judged by the hardwood timbers they are built from, were constructed in Southeast Asia. Vessels of this so called 'South China Sea Tradition' combine the use of bulkheads and multiple, nail-fastened layers of planks with the edge- to-edge fastening of their planking by wooden dowels characteristic of Southeast Asian shipbuilding.²⁴ It would be this kind of vessel that the Middle-Javanese *Kidung Sunda* notes as the '*jong sasana*, such as was made in the land of the Tartars and was copied since the war of King Wijaya [with the Mongol invaders of



1293]' (Berg 1927: 77, quoted in Reid 1992:181). Such ships would have been among the possible forebears of the multi-layered 'leviathan' (*ibid*: 179) bottoms of Java and Sumatra encountered by the first Portuguese intruders.²⁵ These developments, however, postdate the vessel here examined by half a millennium.

The Western Indian Ocean: Sewn Vessels

Horridge (2006:145) claims that most likely the earliest trade routes of the Indian Ocean developed about 5000 years ago between the Indus Valley and the Persian Gulf, possibly contemporary with initial Austronesian expansion in Southeast Asia'. The very first watercraft employed in maritime long distance exchange along these trade routes yet may date back for still a further two thousand years: pieces of a bituminous material with attached barnacles found in Ubaid horizons have been interpreted as fragments of the waterproof coating used to cover a reedbundle hull, represent [ing] the earliest boat remains in the Middle East, and the oldest known sea-going boat remains yet identified' (Carter 2006:55²⁶). Slabs of bitumen with impressions of wood in finds dated to around 2300 BCE, then, would mark the appearance of planked ships in the area.²⁷ Cuneiform tablets from the late third millennium BCE hence not only mention timber deliveries for shipyards, but also the second component of Western Indian Ocean boat-building, rope, in all probability used to "sew" the planking.²⁸

Plank fastenings 'sewn like clothes with twine',²⁹ consistently -and often with an undertone of wonder on part of the observer-feature in the early descriptions of Middle East and Indian ships: '[On] all the boats which are found in India and on this sea the planks [... are] fastened together [not] by iron nails going through and through, but they are bound together with a kind of cording' (Procopius [1914 I: xix], ca, 545); 'they build the boats by binding together planks of wood [... with] cords made from coconut fibre for lashings [... and] neither nails nor iron plates are used' (the *Yiqie Jing Yinyi* by Huai Lin, 817³⁰); 'the vessels of these Indies be of a marvellous kind[;] for although be very great, they be not put together with iron, but stitched with a needle, and a thread made of a kind of grass' (Jordanus [1863: 53-4], writing on the ships of Malabar in the 1330s³¹). This method of connecting plank strakes was noted by the anonymous author of the first century *Periplus of*

the *Erythraen Sea*³² on the sewn boats called *madarate* from Omana', and observed on the ninth-century Arab or Persian shipwreck found off the island of Belitung,³³ For larger vessels sewing since around the early sixteenth century was progressively replaced by a variety of other fastening methods;³⁴ surviv[ing] longest with artisanal fishermen' (Gilbert 1998: 47), this practice yet until recently was (and in a number of places, still is) the technique of choice for the construction of smaller boats along the coasts of India,³⁵ the Arabian peninsula³⁶ and Eastern Africa.³⁷

Apart from variations in local detail, the general arrangements³⁸ seem essentially unchanged over time and space (Fig.3.1-1). Wadding material is laid over the seam from inside, or, less commonly, both in- and outside, and sewing rope then is reeved through holes passing through the edges of the planks and tightened over the wadding; 'the wadding would provide a cushion for the stitching cordage [and] when immersed in the sea [...] would expand, further tightening the stitching' (Vosmer 2011:127). As frames and other strengthenings obstruct the sewing process, they can be added only after all plank seams are completed³⁹ Accordingly, sewn ships have to be constructed as plank shells, with floors and futtocks "inserted" and lashed (or, in more recent times, nailed or dowelled) to the hull through holes in the planking.⁴⁰

The resulting hulls, to a certain degree⁴¹ are flexible [...], and the cord gives the planks more pliability' (Agius 2008:164). Vis-à-vis Indian and Yemenite ships' Ibn Battuta explains:

For th[e] sea is full of reefs, and if a ship is nailed with iron mills it breaks up on striking the rocks, whereas if it is sewn together with cords, it is given a certain resilience and does not fall to pieces. (Mackintosh-Smith [ed] 2002: 233)

Strains affecting a sewn hull would, first of all, trigger longitudinal shear of the planks along their seams. The ethnographic record thus notes the use of wooden dowels in between planks that, just as the diagonal parts of the sewings, apparently serve to reduce possible longitudinal movements of the plank strakes.⁴² The East African *mtepe* reportedly is both 'sewn and pegged together, [...] in such a manner that the strakes are first pegged [...] and] thereupon sewn edge-to-edge' (Prins 1965:121).⁴³ Dowelling, though, is



not a regular feature' of contemporary Middle Eastern vessels if dowels are 'used to hold a plank in alignment before the frames are fitted, [...] it is just an irregular expedient' (N. Burningham, pers. comm., March 2013). In any case, no dowels used for edge fastening' (Flecker 2000: 211) were found on the only published ship remains of the first millennium built in this tradition, the Belitung wreck mentioned above.

Most sewn ships in the iconographie and ethnographic record of the Indian Ocean parade distinct keels and stem- and sternposts,⁴⁴ and, since at least the second half of the tenth century, median rudders.⁴⁵ In contrast to the northern Chinese 'slung sliding rudder' that is 'held to the hull primarily in wooden jaws or sockets' (Needham, Wang and Lu 1971: 632), the available iconography seems to show rudders fastened to a sternpost by pintle and gudgeons or some system of lashing' (Agius 2008: 206). Such an arrangement is attached rather undemandingly onto sharp-ended hulls, and Agius (2005: 43) accordingly contends that 'the early Arabian, Iranian and Indian ships were probably double-ended, designed as such to mount a steering oar close to the sternpost'.⁴⁶

It should be emphasised that iconographic 'information about the craft which ailed the Indian Ocean [in the first millennium] is disappointingly meagre' (Deloche 1996: 204): as yet, the Belitung ship is the only documented find of an early sewn vessels.⁴⁷ Hence we can add only one further piece of information on constructional details that with some certainty has parallels in iconography and the ethnographic and archaeological records. The sixth-century painting of a sea-going ship in cave #2 at Ajanta⁴⁸ apparently depicts beam ends protruding through her hull at a level somewhere below the sheerstrakes; these could correspond with the through-beams on, e.g., Omani fishing craft,⁴⁹ the *mtepe* of Lamu⁵⁰ or the Belitung wreck.⁵¹ Besides counteracting oblique stresses that would compress and spread out a hull when, for instance, working in high seas, 'through-beam suggests the development [...] of a deck supported by these beams well above the sea level' (Roberts 1994: 25, on the example of medieval European boat-building). Likelihood or absence of decks on ships of the first millennium and possible connections with the issue of rigidity of such assemblies will be debated below; through-beams, however, are also depicted on a number of reliefs portraying sea-going vessels on Java's ninth-century Borobudur temple, to

be discussed presently.

Southeast Asia, First Millennium: Stitched, Dowelled and Lashed-Lug Tradition

The possibly earliest reference to ships of Southeast Asia are the KoXavSiOTuiovra *kolandio* (*phonta*⁵²) the very large [ships] which make the voyage to Chryse⁵³ mentioned in the *Periplus of the Erythraean Sea* of the late first or early second century CE,⁵⁴ These ships have been related to the 'K'un-lun po, the great ocean faring ships [... of the] aliens, many of them Southeast Asians' (Manguin 1950: 275-6), mentioned in Chinese works from the third century onwards. Hoogervorst (2012:192) maintains that there is little evidence that Chinese seafarers frequented the Indian coast at the time the *Periplus* was written, [and] a Chinese etymology of *colandia*, therefore, is rather far-fetched'; Christie (1957: 346-7) though argues that *kuan-luan-tan*, the reconstructed form of an expression describing a Southeast Asian ship in a sixth-century Chinese commentary, considered as the Chinese equivalent of a Greek representation of a native South East Asian term is probably as close as could be expected'.

Whether they brand the same type of vessels or not, both the *kolandiophonta* and the *kunlun bo* share their great size. A quotation from a lost Chinese account of the late third century explains:

Foreigners call ships *po*. The biggest are 20 *chang* or more in length, and two or three *chang* above the waterline. Seen from above they resemble covered galleries. They carry six to seven hundred men and a cargo of 10,000 *hu*. (Taiping Yulan, 769, Christie's translation [1957: 347])

These measurements have been understood to indicate a vessel of about 170 feet overall, with a freeboard of some 16 feet or more' (Christie 1957: 347) and a carrying capacity of 'c. 600 tons deadweight' (Manguin 1993b: 262). Allowing our Chinese observer the liberty of an exaggeration by, let us say, a factor of two, we arrive at values that are well in the range of the Nanhan/Cirebon ship.⁵⁵

The text continues:

The men from beyond our frontiers use four sails for their ships, varying with the size of the ships. These sails are connected with each other



from bow to stern. [...] The four sails do not face directly forward, but are made to move together to one side or the other with the direction of the breeze. [...] The pressure [of the wind] swells [the sails] from behind and is thrown from one to the other, so that they all profit from its force. If it is violent, they diminish or augment [the surface of the sails] according to conditions. This oblique [rig], which permits the sails to receive from one another the breath of the wind, obviates the anxiety attendant upon having high masts. (First part Wang Gungwus translation [1958: 38]; second in Manguin 1997b: 262)

The fore-and-aft sails here apparently described are a feature of many a type of outrigger craft in the ethnographic record.⁵⁶ However, in contrast to the outriggered ships and boats that are so closely related to the Austronesian migrations of the last millennia BCE or a number of sea-going vessels depicted on the Borobudur, an eight-century Buddhist temple on Java,⁵⁷ the Kunlun ships of the Chinese sources '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' (Manguin 1993b: 263). As the physics of buoyancy and weight restrict effective use of outriggers to boats of not much more than 'about 10m hull length' (Burningham 2005:11), such tackle would, moreover, not seem a sensible solution for bottoms approximately three times as large. As a rule, the outrigger boats of the Western Pacific are built-up dugouts, a constructional approach that further limits their possible size. The huge *bo* of the Chinese records, thus, would have been singlehulled and plank-built vessels.

The earliest find of a planked ship in Southeast Asia is the Southwest Malaysian Pontian wreck, possibly a small coastal trader dated to 293±60CE by I4C.⁵⁸ The extant structure 'consist[s] of parts of four planks, seven ribs and the stern post, [i.e.,] the fragments [of] the stern ends of a keel-piece, the first strake on the port side and the two lowest strakes on the starboard side' (this and the following, Gibson-Hill 2009 [1952b]: 144; and Figs.3.1-2 and -3). On the inward surface of this "keel-piece"⁵⁹ are protruding lugs with 'a high but narrow ridge, through which two rectangular holes are cut'; corresponding lugs, in line with those on the keel-piece, are found on the planks. The planks are connected edge to edge by wooden dowels and additional pairs of stitches of fibre running through holes besides the extremities of the lugs. In contrast to the sewn ships of the Western Indian Ocean, here the stitching rope is

not continued along the plank seam, but 'each tie passes [only] through two opposing holes bored diagonally through the inner edges of the planks, so that the cord is exposed only to the inside of the boat'; hence my above choice of "stitched" vs. "sewn". The assembly was reinforced by frames laid perpendicular over the lugs to which they apparently had been lashed.

Gibson-Hill (2009 [1952b]: 144) found the remains of the Pontian vessel to be 'all heavy timbers, crudely cut and finished'. Plank fragments of finer workmanship and comparable features are reported from fifth- to seventh-century horizons at a number of sites in Palembang, the location of a major Sri Vijayan entrepot. As a rule, these fragments display rectangular lugs with holes for attaching frames, carved out at regular intervals on the planks' inner surfaces, and had apparently been connected to one another by edgefastening through both stitching rope and dowels (Figs.3.1-4, -5). The planks found at Sambirejo⁶⁰ 'appear to have belonged to a class of light and swift vessels that could be compared to the Malay *lancang*-i.e. "swift"- of modern times' (Manguin 1993b: 261), not the large vessels of the Chinese reports. Several of the 'two dozen' fragments of planks unearthed at the Kolam Pinisi site some 10 km from Sambirejo, however, had been parts of 'a large, sturdy hull that had its planks stitched together and fastened to the frames by way of lashed lugs' (Manguin 1996a: 185; Fig.3.1). Evidently, all of these structures exhibit the characteristics of a specific technical solution, since its recognition as such coined "Stitched and Lashed-Lug Tradition". Spatial and temporal distribution of the known finds⁶¹ confine this shipbuilding method to the Southeast Asian waters of the first millennium, and 'usually' associate it 'with Austronesian boat builders [... and] specifically with Malay World shipping' (Manguin 2009b: 1, 4).

The overall arrangements of vessels built in this tradition are best observed at the Punjulharjo find, by ¹⁴C dated to 1290±40BP,⁶² and besides the Nanhan/Cirebon wreck the only presently known vessel of the second half of the first millennium that retained a coherent structure (Figs.3.1-6, -7; cf. Figs.3.3-7, -8). Manguin (2009b: 3-4) 'by extrapolation [...] estimates the following rough, preliminary measurements: 17m in length, a beam of 5.7m, and 2.3m depth "under the deck"'; a medium-sized vessel, thus, 'possibly used for offshore fisheries or as a patrol boat' (P-Y. Manguin, pers. comm., October 2012).



As on the fragments from Palembang described above, here the planks of the remaining strakes are held together by dowels inserted into the planks' edges and additional stitchings that pass through holes drilled from the inside of the planks to the edges along their seams. The latter holes regularly flank lugs carved on the inside of the planks (Fig.3.1-8), and the hull was reinforced by frames lashed to these lugs. The lashings in most cases interconnect planks in two to three strakes, and so compress the plank seams vertically (Fig.3.1-9). Above the floor planking a number of stringers and thwarts were preserved, the former apparently running longitudinally over each of the "rows", the latter following the "columns" of these lugs. On the stringers were placed bifurcated stanchions supporting the thwarts and, possibly, further longitudinals that did not survive. These beams would have divided the hold into a number of compartments. The vessel has no pronounced nor squared keel, but sports a 'bottom plank, or keel piece, [...] indicat[ing] a flat bottomed bilge hull amidships' (Manguin 2009b: 6). To bow and stern the planking is closed by "wing-planks": instead of stem- or stern-posts, here V-shaped timbers placed horizontally over the keel-planks' tapered extremities connect to the hood ends of the strakes on both lar- and starboard (Figs-3-i-io and 3.2-12).

Leaving aside the Nanhao/Cirebon wreck for the moment, the chronologically next documented finds of ship remains with comparable features belong into the twelfth to fourteenth centuries. As evident on the Butuan wrecks⁶³ or the Paya Pasir finds (Fig.3.1- 11),⁶⁴ by then stitching had been replaced with plank fastening with dowels only, [with] rope fastenings surviving only between plank lugs and frames' (Manguin 2009b: 6-7). Manguin hence supposes a progressive evolution from the 'many stitches and few dowels [...] in earlier boats such as the Pontian' wreck to 'later [ships with] fewer stitches and more dowels', and assumes that stitching of planks was discarded entirely by 'the early 2nd millennium AD'. It will be shown in the following section⁶⁵ that for at least larger vessels this change had already occurred by the tenth century. The next step, replacing the lashings between planks and frames with dowels, was taken in the Western parts of the Malay Archipelago in, presumably, the sixteenth century.⁶⁶

Lugs and Thwarts: An Austronesian Heritage

The Butuan and Paya Pasir remains share the broad and flat keel-piece observed on the Pontian and Punjulharjo wrecks. To the best of my knowledge, the chronologically latest find of a vessel of this kind in an archaeological context is a wreck discovered at Bogak, North Sumatra, by 14C dated to '240±i2oBP' (Koestror 2012: 9); Horridge (1978: 301) illustrates extant planked vessels built upon a broadened keel from Eastern Indonesia. It has been argued that such 'keel-piece[s ...] show clear signs of having evolved from [the] dug-out base' (Manguin 1996a: 184) of the five-part canoe typical of Oceania and outrigger-canoes of Austronesian peoples' (Green et al. 1995: 180). To build such craft, one or more washstrakes are added onto a dugout by a variety of assembly routines that, as a general rule, in course of time and from East to West throughout the Pacific progressively advance from stitched to dowel fastenings. To bow and stern the hull is often closed by V-shaped "wing-planks" placed atop the dugout base;⁶⁷ it apparently is this practice that developed into the bow- and stern-wings of plank-built craft in the archaeological and ethnographic record⁶⁸ (Fig.3.1-12). At least smaller planked vessels built with such 'bifurcated stempieces'⁶⁹ have no room for stem- and stern-posts: among the remains found at Pay a Pasir are two stepped "stem-wings", one of which accommodates at least six plank strakes.⁷⁰ As seen on the contemporary *sandeq* or the historic *kora-kora* of the Moluccas and Philippines, the bow-wings are often built up to high pointed prows.⁷¹ Where a washstrake only is employed, the bows are often closed with short and light decks of planking or matting.⁷²

In most of the craft observed in the Western Pacific, the assemblage of dugout base and washstrakes is reinforced by thwarts or ribs (or combinations of both) that are fastened to lugs carved out of the inner surface of the dugout and, in most cases, the washstrake(s). Horridge (1978: 39) hypothesises:

The projecting lugs on the planks were originally lashed to flexible ribs which were pulled down in tension, and the resistance to bashing and opening of the planks lay in the prestressed compression of the hull while resistance to crushing sideways lay in the transverse supports and internal frame. [...] First a shell was made by sewing or dowels. Then a tough flexible bough is bent into the boat, lashed first at the gunwales, then pulled down tightly to the other lugs, so cramping [dugout base] and planks together.



However so the implementation -with or without thwarts, flexible or rigid, or a combination of all traits (Fig.3.1-13)-, it would seem that this procedure derived from a common Austronesian practise of lashing outrigger beams onto thwarts that in turn are held by lugs in a dugout base (Fig.3.1-14). Nooteboom (1932: e.g., 37b 49, 51, 69, lojf) notes that throughout the Malay Archipelago these lugs are provided even in dugouts that will not be built up with washstrakes and/or outriggers, and describes them as a 'peculiarity that is virtually innate to the canoes of the whole of Indonesia' (*ibid*: 191). Trailing a widespread use in Western Austronesian languages,⁷³ such lugs are commonly called *tambuku*, its classic Peninsular Malay form;⁷⁴ I below will follow this convention.

Both the built-up dugout and the planked vessels of these traditions are constructed "shell-first", i.e., the planking of the vessel is assembled before any internal strengthenings are "inserted". The eighteenth-century shipwrights of South Sulawesi thus buil[t] their proas [.. .] by doweling the planks together, and [.. . only] then fit timbers to the planks [.. .]. In Europe we build reversely; we set up the timbers first, and fit the planks to them afterwards' (Stavorinus, 1798: II, 260-1).⁷⁵ The shape of a "planks-first"-built hull is construed by the run of the planking alone; consequently, planks are, as far as possible and necessary, carved to their shape, and more rapid changes in the geometry have to be achieved by sequences of shorter planks.⁷⁶ For larger vessels, the ethnographic record notes complex assembly procedures, so called "plank patterns", that stipulate placement, length and shape of a hull's planks.⁷⁷ To achieve symmetry, it is common to fit pairs of planks simultaneously to lar- and starboard of a hull under construction. Wallace (1962 [1890]: 321-2) observed on the lashed-lug boats of the Eastern Indonesian Kei islands:

To make each pair of planks used in the construction of the larger boats an entire tree is consumed. It is [...] cut across to the proper length, and then hewn longitudinally into two equal portions. Each of these forms a plank by cutting down with the axe to a uniform thickness [...] Along the centre of each plank a series of projecting pieces are left, standing up three or four inches, about the same width, and a foot long; [!:] these are of great importance in the construction of the vessel.

Here, *tambuku*-lugs would have been carved out of the rounded outer surface of the log, thus cutting away, if present, any sapwood; the flat,

"inner" face would then become the outward side of the planking (Fig.3.1-15). Positioning of the lugs defines the frame stations, by their very nature perpendicular to the run of the planking. The initial arrangement of the *tambuku* on keel and garboards accordingly has to be followed throughout the subsequent strakes of planking, thus constraining the possible sizes and shapes of the individual planks. In insular Southeast Asian "contemporary traditional" shipbuilding routines that employ dowelled framing and, consequently, flush planks, concept and function of such lugs survived as an integral means for devising a hulls blueprint: in the sophisticated layouts of the contemporary Konjo and Mandar shipwrights of Sulawesi, "measurement units" called *tambuku* are marked as small protruding blocks on the keel and define positioning of dowels, frames stations and plank lengths (Fig.3.1-16). Evidently, *tambuku* lugs are a fundamental component of a highly developed tradition of Southeast Asian naval constructions that can be traced back to the very beginnings of Austronesian boatbuilding.

Floors and futtocks of shell-first built hulls are, necessarily, not a self-supporting framework; their initial impact lies in tackling with the longitudinal and vertical stresses along and in between planks and strakes.⁷⁸ To counterbalance lateral forces, most of (not only) the lashed-lug vessels in the ethnographic record therefore are reinforced by a variety of stringers, crossbeams and longitudinals (Fig.3.1-17). As supposed above for the fastenings of outrigger beams, Horridge (1978:18) hypothesises that 'the internal supports of the original Indonesian plank boats were simple transverse supports', and illustrates a number of boat models that are strengthened by crossbeams alone. Master shipwrights of Lemo-Lemo, South Sulawesi, described a pattern 'in use five to seven generations ago' (Liebner 1993: 30; cf. 1992: 74), where rows of transverse beams were set into a shell of thick planks and fastened by twisting rattan loops tightly around these thwarts. Wallace (1962 [1890]: 322) notes that in lashed-lug vessels of the nineteenth century Kei islands crossbeams are secured to the projecting pieces of the plank [s] by a strong lashing of rattan' before frames are set into the hull. Such 'tiers of lashed thwarts' (Flecker's [2002:139- 40] 'guarded opinion' on the internal strengthenings of the Java Sea Wreck) would have divided a hull into compartments akin to those reported for the South China Tradition, here but without bulkheads. It might be no coincidence that in the best documented



type of contemporary lashed-lug vessels, the Lamaleran tena, the hull is conceptualised in a sequence of compartments, 'each named either for the gear kept there or for other purposes connected with the composition or use of the boat' (Barnes 1996: 226). In a cargo vessel of size such compartments could easily stand in for the *petak*, the cargo spaces chartered out to individual merchants mentioned in Malay and Bugis maritime law codes of the fifteenth and seventeenth centuries (see Section 1.3). However, in the archaeological record generally remains not much of such crossbeams¹⁷⁹ and, as to be described presently, the only vessel portrayed on the Borobudur that allows for an unobstructed view into her hold (panel i.53[lw]®°)⁸⁰ shows no internal strengthenings other than frames and one stringer.

Iconography: The Borobudur Vessels

The only known representations of Southeast Asian vessels indisputably⁸¹ dated to the first millennium are found on the Borobudur, Java's celebrated Buddhist *stupa* constructed around the turn from the eighth to the ninth century.⁸² Besides a number of dugouts and a pleasure-craft, eight of the panels on the temple's walls depict vessels that by context and layout classify as sea-going ships. Three of these are single-hulled;⁸³ the remaining panels show outrigger vessels that in public reception became the epitome of insular Southeast Asian ships of the late first millennium.

While the reliefs of the single-hulled vessels do not present much detail, several of the outrigger craft are portrayed in vivid and often surprising particulars: it would indeed be ignorant not to see 'the hand of the gifted artist' (van Erp 1923:19) in, e.g., the dramatics of Maitrakanyaka's shipwreck on panel 1.108, or the nearly three-dimensional representation of the well-known bottom carrying the minister Hiru to Hiruka (1.86; Fig.3.1-18). I certainly agree with van Erp (1923: 24) that, contrarily, for panel 1.88, located just a few meter from the former vessel, 'the sculpture of the creative artist here served as a model for the less gifted imitator' (Fig.3.1-19).

The extent of corresponding features shared in between the four elaborately worked outrigger vessels intimates that their sculptor portrayed a distinct class of vessels of his time. He was familiar with details that could only be known to someone who had built and/or sailed on such ships: the arrangement of the outrigger beams and the attachments of the floats are

presented in consistent, meticulous and practicable detail; the ship on panel 1.53 clearly depicts doubled frames and a stringer placed over the turn of the bilges of the vessel, an indeed feasible feature a layman would probably not be aware of (see Fig.3.2-61); the toils of Maitrakanyaka's crew on the vessel's halyards (realistically shorn through blocks at the top of the masts), sheets, backstays and the mainyard leave an acute and rather accurate impression of a sailing vessel in peril.

While the layout of the intricate superstructures of the ships repeat a common theme, a number of divergent details (such as the straight stanchions supporting rowing galleries and upperdeck on panels 1.108 and 2.41 vs. the curved timbers on 1.86) indicate that the artist nonetheless was aware of differences in between vessels of this class. I concur with Petersen's impression (2006: 52) that 'the sculptor [...] had tried to be realistic', and could imagine that he had worked on boatyards: the intricate woodworking skills of a shipwright would have been a helpful proficiency when it comes to moulding the soft andesite used for the temple's panels. 'Only the sizes of the people seem to have been exaggerated' (*ibid.*) - a technique, though, that not only here accentuates the dramatic momentum of the representation (Fig.3.1-20).

I will refer to a number of constructional details of these ships in course of the following two sections; here, then, a general overview of their characteristics will suffice. The outriggered vessels (and even the longboat on 1.119) carry the canted rectangular sails that until recently were set on most insular Southeast Asian sailing craft, today commonly known by their Indonesian name {*layar* ["sail"]} *tanja*. Except for the ship on panel 2.41, the vessels step two masts, all of which seem to be pivotable bipods. As a rule, the foremast carries the ship's main sail, and smaller canvas is set on the mizzen. The rigging is represented in considerable detail, with clearly distinguishable sheets, halyards, vang, stays and shrouds that closely follow the examples known from the ethnographic record (Fig.3.1-21). All of these ships (and the small pleasure craft on panel 1.115) carry lateral rudders of a type well known from both archaeological finds as well as recent vessels (Fig.3.1-22; cf. Fig.3.3-31). This combination of quarter rudders and tilted rectangular sails is accepted as the prominent means of propulsion of insular Southeast Asian craft, both past and present.



All of the vessels have an upper deck -whether planked or not will be discussed presently- raised above the hull. On the bottoms on panels 1.86, 1.88, 1.108 and 2.41, this deck tops an intricate assembly of beams, stringers and stanchions that Petersen (2006: 53) interprets as a 'grid-structure, placed upon thwarts which reach out over the sides of the basic hull, [which] was then tied to frames' that extend above the sheerstrakes. Comparable structures are known from a number of historic records and models of eastern Indonesian vessels (Fig.3.1-23), and, perhaps, recall the 'covered galleries' of the Taiping Yulan. The last three of the ships listed above are equipped with sweeps, operated by rowers whose 'heads come into view behind the openings' (van Erp 1923: 19) in the upperworks. It accordingly is generally assumed that these structures represent 'rowing galleries [...] that we should perceive, as a whole, built onto the planked hull[s] of the ship[s]' (Heide 1928: 350).

To fore and aft the superstructures on all outrigger vessels are closed with, proposedly, 'high screens made from timber battens and woven bamboo lathe sheets' (Burningham 2005:13), and, as Heide (1928: 348) suggests, 'two suspending braces worked into wings [that] support the superstructures of these galleries'. Where details can still be discerned, a number of constructional features of these screens (for instance, the yokes carrying the lower extremities of screens' timbers) seem to be about similar on all of the vessels (Fig.3.1-24). Van Erp (1923:19) here feels reminded of the high-raised bow and stern of the Moluccan *kora-kora*, and considers these structures to be wave-screens; Heide (1928: 351) proposes that they are necessary to secure the joining between the two galleries [on port and starboard ... and,] further, that bowmen could position themselves hidden behind these corfs whenever war would be waged on sea', intimating that these vessels not necessarily were mere traders.

Burningham (2005: 13) notes that such raised bow screens would severely obstruct the sight of the helmsmen: 'it would have been like driving with a screen on your windscreen' had they been installed on the replica ship he constructed in 2003. He argues that the Borobudur vessels are 'war galleys, used to carry nobles and religious leaders, [...] with] defensive screens at bow and stem, covered galleries for oarsmen, and outriggers that probably served as platforms for men wielding paddles and as anti-boarding barriers' (2005: 10). By their respective narrative context, among the outriggered craft

only Maitraka-nyaka's vessel is a trader; all of the other ships are vehicles of diplomacy and fate.⁹²

Judged by the possible size and number of their rowing-ports, Heide (1928: 349) supposes a total length of 12 to 15 m' for the largest of these vessels. *Samudra Raksa*, the 2003 reconstruction of such a ship sailed to Madagascar and Ghana, was given a length of a little above 19 m;⁹³ Petersen (2006: 53) assumes the length of the ship on panel 1.88 to be 16.4 m at waterline, and 23.4 m overall; van Erp (1923: 33) estimates 25-30m. For his initial 1:20 scale model Petersen, 'based upon the assumption that it had a form like most of the double outrigger canoes known from South East Asian waters' (2006: 54), proposed a length:beam ratio of 8.7:1, and a top deck of a height sufficient to allow rowers to stand on a deck covering the planked portion of the hull. Despite its outriggers, the model, with its high metacentric height and narrow hull, capsized in both windy and calm conditions' (*ibid.*).⁹⁴ Following calculations of the buoyancy of floats 'which we presume [were] bamboos' (Beale 2006: 26), Bumingham (2003: unpg.) reckons that:

Outriggers of about 300 mm diameter [the largest diameter reported for *Dendrocalamus giganteus*, the Giant Bamboo' of Southeast Asia] with buoyancy of about 1.3 tonnes would be required by an outrigger vessel a little more than 14m long. Such a vessel, designed with a long narrow hull would scarcely have the capacity to carry the proposed passengers, provisions and cargo. Therefore [...] it is not possible that an outrigger vessel, designed to derive all its stability from outriggers, could be built of a size large enoughf ... If the outriggers are not primarily intended to provide stability another explanation of their use is required. Like the outriggers of the 19th century bouanga from New Guinea, drawn by Capt M. Paris, the outriggers might be seats for paddlers to propel the vessel in calms and in martial use. If the outriggers are not designed to be the vessel's primary source of stability then the hull form will not be a typical outrigger canoe hull form. Instead it will have a broader, more stable and more capacious hull.

Such hulls would, necessarily, have to be constructed from planks. However, none of the vessels depicted on the Borobudur -with or without outriggers, large or small- shows specific details of their planking; 'that the hulls indeed are built up of planking [...] is shown by a few seams of planks' (van Erp 1923: 27) visible on stem and, by now only faintly,⁹⁶ bow of the ship on relief 1.53 (Fig.3.1-24, -25).



Except for the doubled frames topped by a stringer shown in the hull of the latter vessel,⁹⁷ the reliefs are equally silent about the ships' inner strengthenings. All bottoms without outriggers display high raised bows and stems, and neither they nor the outriggered vessels exhibit any clear notions of stem- or stemposts. The ship on panel 1.86, perhaps and, if so, rather faintly, shows a squared stempost under her bowscreen (see Fig.3.1- 24) - the run of the two strakes of planking on the vessel on relief 1.53, though, seems to imply that at least here bow and stem were closed by the V-shaped wing planks noted in the archaeological record. I assume that our apparently acutely inquisitive and knowledgeable sculptor would have outlined stem- and sternposts had they been present on the boats and ships that he had observed and, possibly, built. However, the 'very fine details [of the temple's reliefs] were molded using [...] white plaster and then painted' (Miksic 1990aa: 26), and it is conceivable that any possible specifics the sculptors wanted to include in their representations were worked into this, now lost, coating.

Planked Decks and Rigid Hulls?

Our last observations on the Borobudur vessels come from the three single-hulled ships on panels 1.23, B1.54 and B1.193. The first two of these reliefs are damaged and/or partly unfinished. None displays the informed detail of the outriggered vessels discussed above. There are no grid-like superstructures; except for their raised bows and sterns, they generally have a flat sheer line. We are not informed about their steering gear. All three step but one mast and set, as far as can possibly be construed,⁹⁸ the oblong *tanja* sails of the outrigger craft. Judged by the number of people on board these vessels, the reliefs yet were not thought to represent smaller bottoms: according to their narrative contexts,⁹⁹ at least the ships on panels B1.54 and B1.193 illustrate merchantmen on drawn-out voyages.

The vessels on panels 1.23 and 61,54 unmistakably display beam-heads protruding through the hulls at some distance below the sheerstrakes. Such through-beams are shown on the sixth-century ship depicted in cave #2 at Ajanta and are reported for the Belitung wreck as well as a number of recent types of watercraft of the 'Western Indian Ocean'¹⁰⁰ Through-beams are also found on a number of recent vessels from the Indonesian island of Madura¹⁰¹ As illustrated for European ships of the Late Middle Ages, such beams would

be related to the development of weatherdecks;¹⁰² indeed is it evident on the panels that passengers and crew stand on decks that correspond to these beams. The outriggered vessel on panel 1.86 clearly carries a top-deck of single grating;¹⁰³ the representations of the single-hulled ships, though, show no further detail.

There are no early textual sources known to me that describe decks on Southeast Asian ships. For the watercraft of the Western Indian Ocean it is commonly assumed that 'nor are the vessels ever are decked over, but open, and they take in water to such an extent that the men always, or almost always, must stand in a pool to bale out the water' (Jordanus 1898: 26). The Journal of Vasco da Gama's first voyage, however, notes that 'The vessels of this country [India] are of good size and decked' (Ravenstein [ed.] 1898: 26). Agius (2008:160), referring to a number of early sources, explains:

Most of the Indian Ocean ships were undecked, apart from a fore and aft deck, but some had full decks; the seventh/thirteenth century *Maqāmāt* illustration depicts probably more than one deck. Cargo ships seem to have had no decks and crew and passengers slept on top of the cargo. The absence of decking on such vessels was an advantage for it gave greater accessibility to the cargo [...]. Of course, decks on warships were essential for fighting men to use as a platform and for the carrying of war machines.

As a variety of built-up outrigger canoes in the ethnographic record carry foredecks, it would seem odd to assume that Southeast Asian shipwrights and mariners of the first millennium were not aware of the seakeeping qualities of decked ships. (Through-)beams and permanently fixed planked decks, on the other hand, are a decisive step into the direction of a rigid hull,¹⁰⁴ that, to a certain extent, would contradict the unavoidable flexibility¹⁰⁵ of a lashed-lugged (or sewn) vessel. The often intricate frameworks of traverse and longitudinal timbers of the lashed-lug ships in the ethnographic record conceivably serve to distribute stresses throughout the plenteous number of lashings they are interconnected with. Strains caused by these stresses would innately concentrate at the weakest points of such an assembly. In a shell-first built hull rigidly connected by through- beams and closed by a planked deck these would be found around the various lashings of frames and other strengthenings; hence, possibly, none of the rather small surviving lashed-



lug craft are fitted with rigid decks. For larger sea-going vessels, however, a “planked weatherdeck” would not necessarily be of the rigid structure firmly attached to the hull known from European ships, but could have consisted of fixed fore- and aftdecks and additional loose planks laid above the topmost thwarts, and may have been covered by tarpaulins of hide or fabric.¹⁰⁶

Were it not for the greatly oversized people on board, the raised bows and the structure built upon and over the stern of the vessel on relief B1.193 would compare favourably to the profiles of a number of Southeast Asian ships depicted in the *Miller Atlas* of c. 1519, and especially so to the ship on the upper right corner of the atlas’ sheet on the Moluccas.¹⁰⁷ Another version of an aft-deck, a platform projecting over the vessels’ stern, is illustrated on both the largest of the Borobudur ships and the Ajanta mural (Fig.3.1-26). Such solutions remind of the extended poops seen on contemporary traditional Indonesian vessels such as the *patorani* or *pinisiq*,¹⁰⁸ and thus possibly represent a longstanding feature of the seacraft of the area.

Southeast Asian Shipbuilding European Reports: Jong of the Sixteenth and Seventeenth Centuries

The early European intruders into the Eastern Seas noted indigenous sailing craft ‘called *junco*, a standard Portuguese transcription of Malay or Javanese *jong*’ (Manguin 1993d: 198¹⁰⁹), which, ‘to the sailors’ surprise [...] more often than not [were] larger than their own vessels’ (Manguin 1980: 267¹¹⁰). As the huge Sumatran ship confronting Alfonso de Albuquerque on his way to the conquest of Malacca was ‘very tall, [...] with Albuquerque’s flagship’s] aft castle barely reach[ing] her bridge’, and built of ‘four superimposed layers of planks’ that ‘would not be penetrated [by] our biggest canon’, she could only be taken after ‘the two rudders she carried outside [were] torn away’.¹¹¹ The smallest of the ships in the fleet counterattacking Portuguese Malacca in 1513 ‘could not have been less than two hundred tons burden’ (Pires [1515] 1944:188), and ‘the largest [bottom] seen by men of these parts so far’ was said¹¹² to be a vessel built in the Javanese town of Jepara around 1510, carrying] a thousand fighting men on board [...], an amazing thing to see, because the *Anunciada* [a vessel in the defenders’ fleet] near it did not look like a ship at all’. Most of the early descriptions of the bottoms met in Southeast Asian waters iterate the various characteristics noted above:

Pigafetta remarks on the ships of Brunei that they 'carry as great a burthen as our vessels', and are 'constructed [...] of planking fastened one piece to another by wooden pins' (Pinkerton [ecl] 1812: 355); a Portuguese cleric in 1582 portrays 'very big' ships, built 'with wooden dowels inserted into the seams of the planks' and carrying two masts and up to three rudders, 'one on each side and one in the middle' (Manguin 1980: 267-8). A Spanish ecclesiastic observer left a detailed description of the construction of lashed-lug craft in the seventeenth-century Philippines,¹¹³ mentioning frames tied to (in Visayan) *tambuko* and crossbeams 'only a meter or so apart down the whole length of the boat [...] like the rungs of a ladder' (Scott 1981: 76).

Travelogues, reports and maps of the sixteenth and seventeenth centuries contain the earliest European drawings of such vessels. Most of these representations do not note much detail: thus are multiple masts, quarter rudders and overhanging aftdecks shown on several of the vessels depicted on the Miller Atlas (1519) or seen anchored on an anonymous map of Jambi of the 1670s (de Rover and Brommer [eds.] 2008: 256; Fig.3.1-27), but even confirmable details of the vessels' rigging are missing.¹¹⁴ Some particulars though are found on two drawings of, respectively, a 'Malay *lancara*' and a '*Junco* or *Soma* of China' found in Eredia's *Description of Malaca* of 1613 (Fig.3.1-28). Both ships carry lateral rudders; and while there are no overhanging poop-decks, they display superstructures built over crossbeams that are laid above the sheerstrake of a planked hull. The 'Chinese *soma* has a square stem, the Malay vessel is double-ended and sports decorated stem and stern heads. Both appear to be rigged with Chinese batten-lugs sails, a feature that is also noted on many a Malay vessel of the late nineteenth and early twentieth centuries.¹¹⁵

The earliest detailed European representations of insular Southeast Asian ships are pictured in Lodewijk's journal of the first Dutch voyage to the Malay Archipelago, published in 1598 (Fig.3.1-29). Here displayed are two larger vessels, one setting a two-masted tilted rectangular *tanja* rig, the other what would seem two batten-lug sails. Both vessels carry lateral rudders. The stern of the latter vessels on first view seems akin to that of Eredia's *somar*, here, however, the square portion of the aftship clearly is an overhanging poop. The hull is planked all the way to her rails, showing no superstructure built upon a planked section. The *tanja*-rigged vessel, obviously of a greater size than the batten-



lug rigged one, has such a superstructure, clearly placed upon crossbeams that are laid above the sheerstrake of a planked hull and constructed from two washstrakes of matting or decorated planks.¹¹⁶ She carries a large deckhouse, and her crew are shown standing on a deck that seems to correspond to the lower washstrake; there is no overhanging poop-deck. Sail plans and the vang, backstays and sheets of this ship and the two smaller boats carrying the same type of sails are reproduced in a detail that could only be based on the acute observation of an eye familiar with sailing craft.¹¹⁷ Variations of these vessels are repeated on a number of Dutch maps and prints (Fig.3.1-30).

Manguin (1993d) and Reid (1992) elucidate how most of these vessels fell victim to Portuguese cannon and the changing economic climate after the arrival of European fleets in the Indian Ocean. In at least those areas that were exposed to the growing Western presence, this decline was probably paralleled by a number of changes in boat-building methods.¹¹⁸ Except for the early modern Chinese vessels trading between the Malay Archipelago and Southern China, the ensuing centuries saw smaller ships plying the Indian and Western Pacific Oceans, many of which were built in combinations of indigenous and European techniques.¹¹⁹

The very first photographs and surfaced plank samples of the Nanhan/Cirebon wreck displayed dowel holes, some of which still contained dowels, and lugs and holes resembling *tambuku* frame-fastenings (see Fig.3.2-5), unmistakable features of Western Austronesian ship-building. As detailed above, these traditions rely on distinct technical solutions, the most prominent of which would be shell-first construction with edge-fastening by dowels, sophisticated patterns for the sequence of plank assembly, and frames lashed to lugs that are left protruding on the inside of the planks of a hull.

L. Andaya (1999 [1992]: 28) argues that 'Southeast Asia's long contact with the Arabs, Indians, and the Chinese was principally by sea, and therefore it was inevitable that many nautical ideas and techniques were transmitted'. Due to our present lack of knowledge of the configuration of early seacraft of the western Indian Ocean¹²⁰ the scope of possible diffusions of naval technology throughout the Indian Ocean is open to speculation. Manguin (1980: 274) remarks re the parallels between the ships depicted on the Borobudur and in the Ajanta cave, that it 'remains to be proved whether the artist [of Ajanta] wanted to represent a foreign ship or the result of technical affinities between

the two areas'. Hoogervorst (2012:195), however, assumes that the 'shared set of features' between these representations could support 'a scenario of cultural cross-fertilisation between South and Southeast Asia by at least medieval times, if not earlier'. Southeast Asian contributions apparently had a wider impact to the region's naval traditions: dissemination of the outrigger as balancing device for smaller craft throughout the Indian Ocean is the case most evident;¹²¹ another example would be the Maledivian *dhoni* with its multi-planked hull, edge-joined with dowels and a sleek sophisticated appearance', features that 'reflect a clear Southeast Asian tradition' (Green 2001: 69).

I observed above a number of Chinese influences (e.g., the adoption of bulwarks in dowel-fastened vessels or the use of batten-lug sails for historic ships of Malaya) onto the shipbuilding traditions of the Western Pacific and the Indian Oceans. Except for the spread of the median rudder, though, diffusion of Chinese technologies occurred only in course of the second millennium.¹²² It even is hypothesised that the very rise of an own southern Chinese overseas trade could be related to West Austronesian maritime activities in that region: the 'V-shaped hulls with keels [and] rigging of multiple masts and sails' of the earliest Chinese wrecks yet known could be 'South-East Asian techniques developed in earlier times for high-seas navigation [that] were adopted and adapted by the Southern Chinese when they started developing their own ocean-going navy at the beginning of the 2nd millennium A.D.' (Manguin 1984: 200; 1993b: 272).

In any case, though Chinese sources of the first millennium mention presence of ships hailing from the Western Indian Ocean in the Celestial Empire's southern ports, 'the only descriptions available are those of the South-East Asian *kunlun bo*, which clearly impressed the Chinese observers' (Manguin *op.cit.*). The next section will attempt to examine an example of such a bottom.

(Endnotes)

1. Marlow's epithet for the Asiatic waters to be traversed by the barque Judea (Joseph Conrad, *Yout*).
2. For concise overviews see Kirch 2010:135F Pawley 2007: 37f.
3. For possibilities and chances of Pleistocene voyagers in the area see Irwin 1994:18-30; cf. Connel, Allen and Hawkes 2010: 58ff.
4. For discussions of the distribution of obsidian, one of the markers of early seaborne



trade, in insular Southeast Asia and Melanesia see Summerhayes 2009 and Spriggs et al. 2011.

5. Eg., Ammarell 1999; Gladwin 2009 [1970]; Horridge 2006; Lewis 1994 [1972]; McGrath 1988.
6. Reviewing the available evidence, Hoogervorst (2012: tgif) states that 'all traditional dugout canoes of East Africa evolved from a single prototype [and] there is little doubt that this boat type originated in insular Southeast Asia¹; cf., eg., Hornell 1934: 319[^] 1943; Mahdi 1999.
7. The Pontian, Belitung and Punjulharjo wrecks discussed below. There is a number of documented wrecks of the first half of the second millennium, of which, however, only the Butuan finds and a small number of fragments unearthed in Sumatra belong into the technical tradition relevant here.
8. For a. concise list of such finds in Southeast Asia see Manguin 2009c: Slides 66–7 and forthcoming.
9. Cf., eg., Flecker 2002:130b, Manguin 1993k 26y£
10. Northern Chinese boatbuilding methods have not much of a bearing on the shipwreck here under discus[™] sion; as at least the former is related to these Chinese traditions, I omit a discussion of Korean and. Japanese shipbuilding. The interested reader here is referred to the respective sections in Green 1996, 2001; and Ki- mura fed) 2010.
11. 'Much discussion surrounding Chinese hulls has ie the past centered around the question of the absence or presence of a keel' (van Tilburg 2002: 96[^] cf. Green 2001: 8if).
12. See, eg., Needham, Wang and Lu 1971: 397b Nooteboom 1950: 6, Figs. 1-3.
13. Eg., Sowerby 1929; Wieg 1990: passim. Nooteboom (1950: 5) remarks for vessels of this type that 'most of the seagoing ships of China since long were vessels for inland, waterways made suitable for blue-water navigation, [,,,] One indeed expects that this hull shape originates in a river raft that at the front is it bent upwards by gradually fastening planks to it..
14. Cf., eg., Pickfcrd and Hatcher 2000: 71, 77; <http://www-news.uchicago.edu/releases/05/o5o8o4.zheng-he.shtml> For East Asian perceptions of such vessels see Green 1997: Figs.10-33.
15. Green (2001: 86) notes that statements about watertight bulkheads [...] present an apparent conflict with the archaeological record'. Cf. Cai, Li and Xi 2010.
16. An unreferenced translation of Marco Polo's description of Chinese ships in Needham,

Wang and Lu 1971: 467.

17. For a discussion of such bulwarks see Cai, Li and Xi 2010.
18. See Needham, Wang and Lu 1971: 649-50,
19. Kimura (2010: 6) dates it as 'Song (or Yuan Dynasty)', Green (2001: 90) notes a number of 'Early Northern Song' coins found as an offering for 'good-luck or longevity' in between stem and keel of the ship,
20. See, e.g., Green, Burningham and Museum ... 1998; Green 2001: 8jf; Kimura 2010: 12.
21. Green, Burningham and Museum ... 1998: 288.
22. Cf. Jordanus (1863: 54-5) early fourteenth-century observation of the 'Very big [ships of] Cathay, [...] being made of three thicknesses of plank, so that the first thickness is as in our great ships, the second crosswise, the third again long-wise'.
23. ,i.e., as judged by the presently available archaeological data. It has recently been supposed that already 'a carving of a ship at the Bayon in Cambodia (c. 1185 C.E.) [depicts] intermingling of components from the two traditions, with bulkheads from the Chinese tradition coexisting with a keel and true stem- and stern- posts from the Southeast Asian tradition' (Wade 2003: 5).
24. Flecker 2007; Manguin 1983,1993b: 265[^]
25. Cf. Manguin 1993d and pg.238f below.
26. Cf. Carter 2012; Cleuziou 2003; Connan et al. 2005; and Vosmar 2003 for a possible shape of such boats.
27. Cf. Cleuziou and Tosi 1993.
28. Carter 2012: 365b Potts 1997:126.
29. 'Friar John of Montecorvino of the Order of Minor Friars (d c. 1328), describing] the ships of the Arabian sea' (Agius 2008: 163). To mark the differences of the Western Indian Ocean technique with a Southeast Asian one to be discussed below, I here will use "sewing" for sutures where the rope runs continuously over the plank seams, and "stitching" for discontinued ones. It should be noted that 'sewn-plank boats are used, or are known to have been used, in every region of the world apart from Australia [...]. It seems likely that the earliest plank boats were built of sewn planks' (McGrail 2010: 101; cf. Muller 2004).
30. Here in Christie's translation (1957: 350).
31. The sources here chosen are, not at all, singular ones: see Agius 2008:149C Moreland 1939, Moreland and Bum 1939 or Wiebeck 1987: 29f for further eyewitnesses, both Asian and European.
32. Here, Huntingford 1980 [1976]: 40.



33. See Flecker 2000, 2001a, 2011a.
34. See, e.g., Agius 2008:165b Moreland and Bum 1939; Prados 1997.
35. Eg., Shaikh, Tripati and Shinde 2012; Kentley 1996.
36. Eg, Agius 2005; Green 1996: io6f
37. ... as, for instance, the sambo and mtepe of Lamu, besung as 'beautifully built - by skilled craftsmen — without the use of nails - but fastened only with chord / it was sewn with chord - each plank - without any bulge - every crack being filled so as to leave no space' (Ahmad S, Nabhany 1979: 9-11;), Cf Geider 1988; Gilbert 1998; Prins 1965.
38. For a detailed description see Wiebeck 1987: 66f and Plates 41-2.
39. Agius 2008: 156; Wiebeck 1987: 69.
40. See Flecker 2000; 206-7 for the arrangements on the Belitung vessel.
41. Referring to the Jewel of Muscat, a tentative reconstruction of the Belitung wreck (see Vosmer 2011), N. Burningham argues that 'having built a sewn plank vessel [...], I can say that they are at least as rigid as normal planked vessels' (pers. comm., January 2013). Nonetheless, 'it is general believed' that most contemporary sewn vessels are employed as surfboats because 'metal fastened boats [... here] would be more vulnerable than a flexible sewn boat' (here, Kentley 1996: 251; cf, e.g., Chaudhuri 1985:149b Ray 2003: 6of). Hourani (1963: 96) notes the opinions of Arab observers; Sheriff (2010; 88f) gives a number of further rea-sons, among which are the ease of repairs of sewn planking and the, compared to iron implements, better availability and cheaper price of coir rope
42. For a discussion of early European sources mentioning a possible use of nails and/or dowels in the construction of sewn vessels see Moreland 1939: yof and Manguin 2012a: 552-3. Edge-to-edge fastening with dowels is, however, a distinctive feature of West Austronesian shipbuilding.
43. Cf. Agius 2008:164. The available sources offer rather contradictive descriptions of how the dowelling was executed (Adams 1985: 3if, 34 fig.17; Green 1996: 90, 2001: 65-6; Prins 1965:123).
44. Scc, c.g., Agius 2005 passim.; Dclohc 1996: 200, 202-3, 206; Hawkins 1977; Osamu 2000; Wicbck 1983.
45. The date of an Arabic Ms. that contains a description that 'would closely agree with the tackle-controlled axial rudders which have lasted in use in Arabian waters to the present day' (Needham, Wang and Lu 1971: 652; cf. Agius 2008: 206, Hoogervorst 2012: 228-9). The first representations of such a rudder appear in the iconography of the region at around 1130 (Agius 2008: 205), here, however, in combination

- with additional lateral rudders. As an 'opportunity to test both systems', Jewel of Muscat, the tentative reconstruction of the Belitung wreck, was fitted with such a combination - and It turned out to be a wise decision as the two systems sometimes needed to be used in tandem' (Vosmer 2011:134).
46. The square stems and high poops of a number of historic types of vessels of the area are argued to "copy the characteristics of Portuguese vessels when they arrived in the Indian Ocean at the beginning of the 16th century' (Green 2001: 68). There exists a number of known transom-straced boat models from archaeological finds from the third to last millennia BCE (see Agius 2008:156), most of which, however, seem to be rather small craft (cf Carter 2012).
 47. Cf. Blue 2009: 5b Ray 2003: 55ft.
 48. For published representations see Manguin (1980: 274 fn. 34) and Deloche (1996: 204); a reconstructional drawing is found at <http://ira.sun.acza/handle/i/0019.2/649> (last accessed 2012-11-28).
 49. Vosmer 2007: 227.
 50. See, e.g., Green 1996: 8gf; Prins 1965:121.
 51. Flecker 200: 207.
 52. As frequently argued, 'apparently a corruption' (Hoogervorst 2012:192) of a possible root kolandia. For a discussion of the various scholarly interpretations of the word see Christie 1957:345-6.
 53. Section 60, Schoffs translation (1912: 48). Huntingford (1980: 54) translates, 'those that cross over to Khruse [...] are called Kolandiophonta and are the largest of the various types of vessels listed in paragraph 60 of the Periplus. Miksic (1990:19) sees the Greek merchants Impressed by [these] large non-Indian ships¹ and has 'no doubt that their sailors 'were Indonesians sailing from ports in Java and Sumatra'. The Greek source, however, mentions that the kolandiophonta also sail to the Ganges.
 54. For a discussion of the possible date of this Periplus see, e.g., Dihle 1965: gff; Huntingford 1980: 8-12.
 55. See Section 3.3, pg.2y4f,
 56. See, e.g., Doran 1981; Friederici 1912; Haddon and Hornell 1935; Hornell 1920,1943; Neyret 1976.
 57. See pgs.232ff below.
 58. Booth 1984: 203; cf. Manguin 1985: 333.
 59. Here, a broad plank in the bottom of a hull that 'differ[s] from a keel in that it does not project below the hull' (Flecker 2002:127). For a discussion and detailed



- definition of the term see Gibson-Hill 2009 [1952b]: 144, fn.2; cf Clark et al. 1993: passim.; the graphics in Horridge 1978: 22, 27, 40-1; or Manguin 1985: 328.
60. See Manguin 1989: xozff; 1996a: 185c
 61. For other sites see Budi Wiyana 2010; Sugeng 2010: 7-8; and Manguin forthcoming.
 62. #9 in table 2 in Manguin forthcoming; Manguin 2009c: Slide 66.
 63. See, e.g., Clark et al 1993; Green 1995:1826 Stead and Dizon 2011.
 64. Manguin 1989a: 205f.
 65. See pg.25if.
 66. Manguin 2010: 338. On the example of South Sulawcsian boatbuilding traditions I have assumed that, just as the transformation from sewn to nailed ships in the Western Indian Ocean, some of these changes were influenced and possibly forced by the arrival of Western maritime powers (Liebner 1992:120b 1993: 29-30; cf. Manguin 1993d, 2012b). Self-evidently, this development made carved lugs on planks superfluous: cf. Horridge 1978: 24ff, and here, especially, his Fig22.
 67. For examples for this and the following see the sources on outrigger craft noted in fn.56; cf., too, Green et al. 1995:1796, Horridge 1987. For the contemporary sandeq outrigger craft the choice of a V-shaped wings or single planks for starboard and port today often depends on the availability of fitting timbers (Liebner 1996: 7); hence the notion of the seven- against five-parted canoe (cf. Bumingham 1993).
 68. Eg., Bumingham 1990. As none of the presently available archaeological finds of lashed-lug vessels produced timbers that could have constituted stem- or stern-posts, we have to assume that these were intro-duced at a comparatively late date, and possibly are related to the shift to completely dowelled vessels and/or the South China Sea Tradition mentioned above.
 69. <http://indigenousboats.blogspot.com/2011/07/bancas-iii.html>, on the Philippine bangka.
 70. See Fig.3.2-13 and pg.247 below. Re the practicability of such structures comp, the arrangements on the eleven-century Skuldelev wrecks (Crumlin-Pederson 2004: 50-1; Roberts 1994:14Q).
 71. For the former, Alimuddin 2009: 31ft; Liebner 1996; Quatrefages 1994-5; for the latter, e.g., Neyret 1976, II: 20if, Scott 1981: 641F, Valentijn 1724: II, 184, Plates XLII-III.
 72. Eg., Neyret 1976,1:143ft; H; 7*f 85b Haddon and Hornell 1935: passim.; Hornell 1920.
 73. See Horridge 1979: 49b Liebner 1992:117b 1993: 29; Nooteboom op.cit
 74. See Nooteboom 1932: 69. Both the Kamus Dewan EdIV and the Kamus BesarBahasa Indonesia note the word now under tembuku, translated (as happens to most of the

classic maritime vocabulary of Malay) wrongly as 'archaic: a knob or button on the mast of a ship'. The online Malay-English dictionary at <http://kamus.laman mini.com> translates 'knob, a hard projection'.

75. The dichotomy between "shell-first" and "frame-first" construction is a topic of debate for, especially, medieval shipbuilding in Europe; for overviews see Beltrame and Bondioli 2006; Hocker 2004a: 5ft 2004b: 65-6; Pomey 2004 and 2011: 2&f; and the sources there mentioned. McGrail (2010:101) though notes: All excavated planked boats dated 'before the second century AD (and many, but not all, built after that time) were built in the "planking-first" sequence: framing was fastened into a hull already defined by the fastened-together planking. It seems likely, therefore, that the earliest planked boats were also built planking-first
76. See, e.g., the planking patterns of South Sulawesi pajala or palari. as noted by Collins (1992 [1937]: 211), to achieve the geometry of bow and stem The planks forming the lower part of a palari's hull are short, for they are cut and not bent to shape'.
77. Eg., Horridge 1979: 49b Liebner 1992: 66ff, 1993: zzf, 2004, 2005b: 87^ Felly 1975: 8sf, 1977: 95b; Saenong 2013: 97ft (South Sulawesi); Barnes 1996: 208ft (Lamalera); Liebner 1990 and Vermonden 2006: 238-9 (Buton); Bhattacharyya 2006: 246-8 (southern Bengal); Ahmad Sheikh Nabhany 1979: nff (Lamu, East Africa). It is of note that in absence of design drawings these "building plans" rely heavily on a specialised terminology for, first-of-all, the "different names for the special position of each strake' (Bhattacharyya 2006: 248) and the planks they contain (cf. Fig.3.1-16).
78. For tie latter see, eg., the "compression" lashings on the Punjulharjo ship noted above.
79. Cf. Flecker 200z 139b and the description of the Punjulharjo wreck, pg.228f above.
80. Numbering of the panels follows the notation system used by van Erp (1923) and Miksic (1990).
81. None of the considerable number of proposedly early rock-carvings of boats have as yet been adequately dated; see Ballard 1988; O'Connor 2003; Lape, O'Connor and Burningham 2007.
82. Eg., Miksic 1990a: 25-6; Sundberg 2006a
83. Panels 1.23OW), Bi-54(up) and Bi.i93(up).
84. Panels 1.53,1.86, 1.88,1.108, and 2.41. For the reader's convenience, I from here onwards omit the row labels.
85. See the line drawings of these vessels in Heide 1928.
86. For a photograph see Miksic 1990a: 88; and for Maitrakanyaka's tale, van Erp 1923: 25.
87. Cf. Petersen 2006: 52.



88. The tale rendered in the panels surrounding 1.88 relates 'the sequel and also the end of the story of Rudrayana. [Here,] the second "decent minister", by the name of Bhiru, sails out and founds the city of Bhiruka, or Bhirukaccha' (van Erp 1923: 23).
89. Cf. Burningham 2003, 2005.
90. Additional reprints of historic sources and drawings of models with comparable upperworks are found in Horridge 1978, 1981, 1982.
91. See pg. 226 above.
92. The stories of the vessels are detailed in van Erp 1923 passim.; cf. Miksic 1990a: 88f, 129f.
93. Based on the assumption that 'the vessel should be capable of transporting some 25-30 persons, all necessary provisions, stores and a cargo of a few cubic metres volume' (Burningham 2003), the initial design 'was for a hull 17m in length, but [the boatbuilder] preferred 19m' (Burningham 2005: 11).
94. Burningham reports of a full-sized Japanese replica, presumably built around such ratios, that 'capsized on launching' (2005:12).
95. <http://www.guaduabamboo.com/dendrocalamus-giganteus.html>, last accessed 2013-01-07.
96. Cf. Fig.9 In van Erp 1923: 26.
97. See Figs.3.1-20 and 3.2-61.
98. The ship on B1.193 clearly has such a sail, and it would seem that some of the details of her rigging are borrowed from the outriggered ships on panels 1.53 and 1.86, not too far away from the former relief. The other two panels are damaged, so that only 'the allusion of strongly swelling four cornered sail[s]' (van Erp 1923:16) remain.
99. See van Erp 1923: 16f; Miksic 1990a: 73. The tale related in panels 21 to 30 has as yet not been identified.
100. See pg. 225, and the sources quoted in fns.48 to 51 in this section.
101. Eg., Blake 1929: 89; Hawkins 1982: 63ft Stenross 2007: 86 Photo 6; Wangania 1980/81: 10if.
102. "Weatherdeck" here not necessarily should mean a rigid cover of the hull. As N. Burningham informs me: Right up until the end of Arabian dhow building there were no true water-tight decks. The big bourns, ghanjas and baghlas had planked decks, but they had no scuppers and the inwales were not planked. Water that got on deck went down into the hold. Most smaller dhows, which had through beams, had no decks other than a fore deck and an aft deck or aft gallery. Indian kotias did have decks and scuppers, but the big pattimars were undecked, even when they were

motorised (pers. comm., March 2013) Cf Correia's observations (ca. 1500) of ships at Cannanor with 'roofs [...] with plaited palm-leaf thatch [... where] the water would flow down their sides, then along the hull and gather at the bottom of the hold' (as quoted in Pearson 2008 [2003]: 65).

103. See Fig.3.3-44 and the related discussions on pg 28yf below,

104. Cf. e.g, Horridge 1979: 26f; Roberts 1994: 25.

105. "Flexibility" here does not imply pronounced movement of a hull's structural members, but notes the potential of (in most cases) rather slight but mostly discordant movements of the various lashed timbers.

106. P.-Y. Manguin, pers. comm., November 2012, referring to Marco Polo's description of the vessels of Hor-muz (cf., e.g., Pearson 2008 [2003]: 64).

107. See <http://expositions.bnf.fr/marine/albums/miller/index.htm>: 6, last accessed 2013-10-21.

108. Eg. Hawkins 1982: 34ff, Horridge 1981:17-25.

109. ... Le., not a term initially describing Chinese ships (cf. Hoogervorst 2012:199^ Manguin 1993b: 266 fn.25).

110. Cf. Manguin 2012b: i5off.

111. Manguin 1980: 267, quoting Correa 1858,1. Manguin adds that 'these events are confirmed, in less detail, by other 1b^-century chroniclers' (*ibid*, fn.6).

112. A letter by the commander of the fleet relieving Malacca, as quoted in Pires (1515) 1944:151-2, fn.3.

113. Horridge 1982, Scott 1981: 7iff.

114. The Southeast Asian vessels on both the Miller Atlas and the map of Jambi show lines holding their yards / furled sails that are more fitting for European square canvas than for tilted rectangular sails, today invariably set on a single halyard; as they would interfere with the yards of the sail, no fore- and topstays are employed on *tanja*-rigged vessels.

115. See Gibson-Hill 2009 [1949]: Warrington-Smyth 1902.

116. Cf. Bumingham 2000:118; and the replica now at display at the Maritime Experiential Museum, Singapore.

117. Liebner 2009b: Slides 50, 54.

118. See fn.66 in this section.

119. See, e.g., Knaap 1996,1999; Knaap and Sutherland 2004; Manguin 2012a.

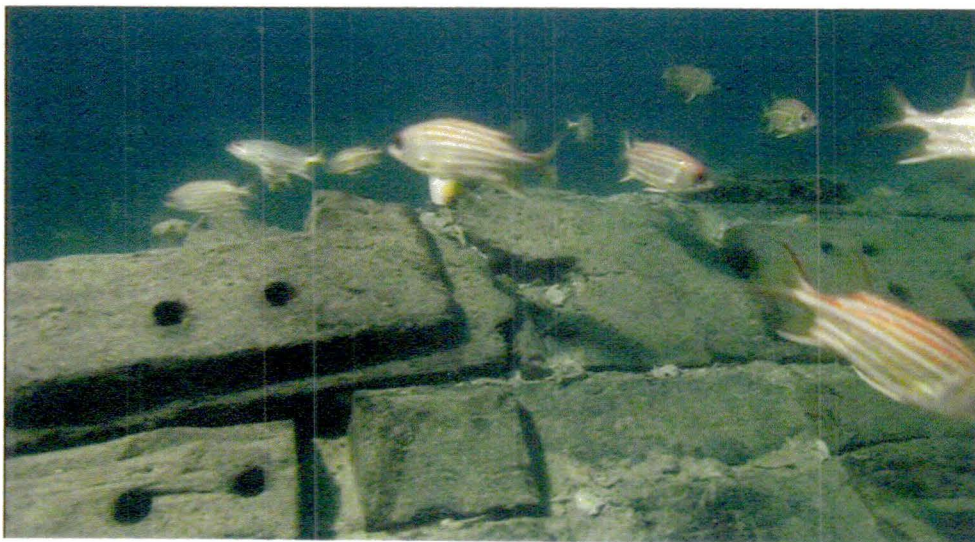
120. See pg.225 above.

121. See fh.6 in this section.



3-2 The Vessel's Remains

'Re-modelling' the remnants of the Nanhan/Cirebon ship in a computer proved more trying than anticipated: the available information -a set of drawings, video recordings and still captures appreciatively supplied by the salvage company, plus a number of timber samples- could not clarify all open questions. Indeed, as demonstrated by Mark's discussion of Khufu's ceremonial vessel (2011), unearthed in 1954 and probably one of the best documented discoveries of a ship in an archaeological context,¹ even for many better accessible finds such records cannot provide exhaustive explanations of all features met.² Accordingly, 'research and reconstruction are practically synonymous in the interpretation of shipwrecks], ... and] it is often difficult to determine where research ends and reconstruction begins' (Steffy 1994: 214).



Video capture courtesy Yves Gladu, 2004

Pomey (2011: 26) observes that a ship constitutes a homogenous assemblage, of which all the elements, from the largest to the most minute, are very closely linked and yet only express their true role in their relation to the whole'. In consequence, a vessel is not only outcome of its components³ and their assembly,⁴ but the realisation of a 'fundamental conceptual approach underlying [its] design and construction' (Hocker 2004:1). The following will, loosely and somewhat circularly, strive to unveil these 'conceptions' and their 'realisation',⁵ as exercised in the construction of the Nanhan/Cirebon



Fig.3.2-5: Attempt at overall photography of hull's remains, October 2005; starboard, looking aft.

ship. This section begins with general observations of the wreck and the available documentary, followed by comments on the keel and the overall layout of the plank shell. An examination of a number of plank samples then will attempt to establish patterns and tools used in the joinery work of the strakes; next, an assessment of the positioning of the vessel's frames probes possible explanations for a general blueprint of the hull. Finally, I will discuss the few indications available for the arrangements of the internal framework of beams, stanchions and trusses and the vessel's superstructure.

The directives for this study exact its admissible length, and thus preclude presentation of the detailing examinations that reason a number of arguments here proposed. Where feasible, such examinations are annexed in the appendices on the DVD-ROM attached to this thesis. To observe one of the 'main points of principle' for any regeneration of a naval construction proposed by Coates et al. (1995; here: 300, 301), i.e., enabling its repetition independently', App-3-2-i describes my approaches to the preliminary set of drawings provided by the salvage company. App-3-2-ii and -iii cover analysis of plank fragments S573 and S581/583; App.3.2-iv covers unpublished reports and documentary of a number of further samples of constructional elements of the ship.

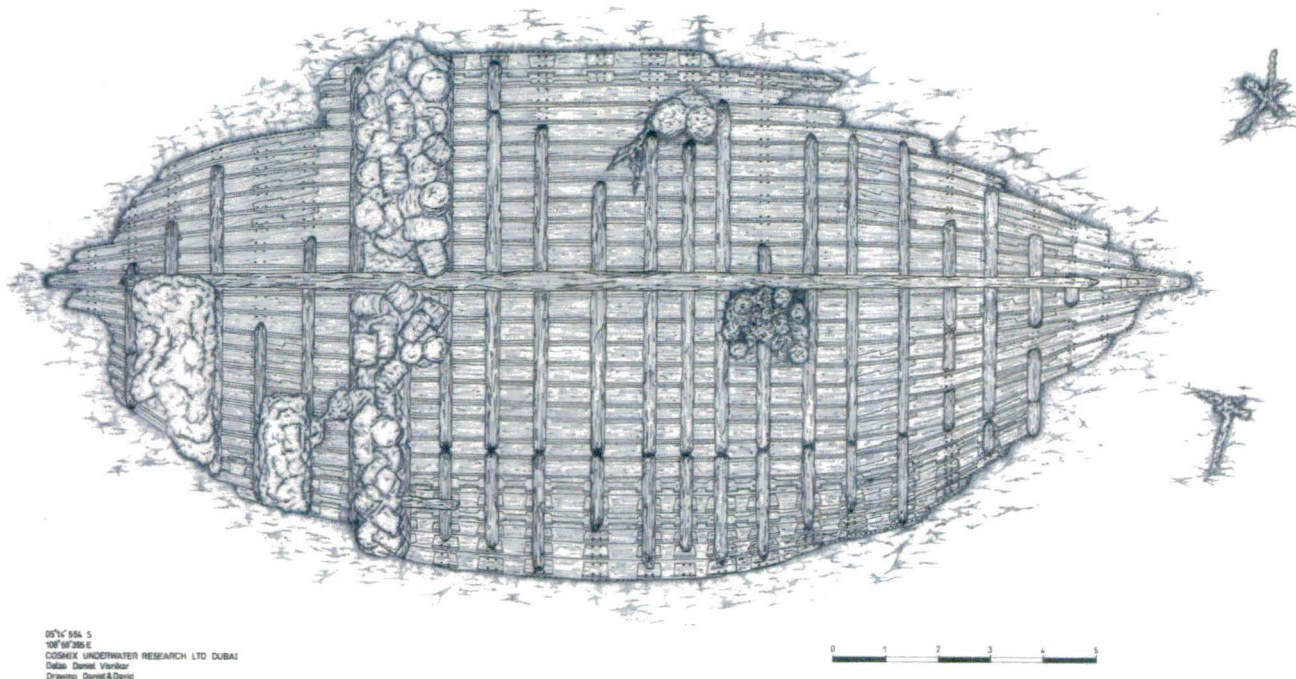


Fig. 3.2-7: D. Viskar's overall drawing of the hull's remains; courtesy Cosmix Underwater Research Ltd.

The Hull's Remains: General Observations and Virtual Reconstruction

Divers reported 'the first big piece of wood which might be a part of the hull'⁶ on 040702 at grid [V22]; the first composite remains of the vessel became visible after removal of the piles of ceramics and debris over grids [L-022:M-N24] throughout mid-end July 2004. Remains of three iron anchors recorded around grids [L18:K21] allow the assumption that this had been the bow of the vessel. The whole structure eventually uncovered comprised fifteen conjoined plank strakes on starboard and eleven on port (Fig.3.2-1). These planks were edge-fastened by dowels and reinforced by frames tied to lugs on their inner surfaces, evident characteristics of Western Austronesian shipbuilding.

The ship had settled on the seabed at an incline of about 5-10° to starboard. This angle would recall the initial deadrise of the hull: it has to be assumed that at some stage at or after contact with the seafloor the ship, drawn by the load in her cargo hold, had "rolled over" and eventually rested in an inclination that followed the slant of her bottom planking.⁷ Analysis

of the distribution of the ceramic cargo in Section 2.2 noted conspicuous concentrations of artefacts and shards registered off the (fore-) starboard part of the hull.⁸ This scatter of ceramics and debris indicates a substantial shift of cargo into that direction; it however remains unexplained whether this shift had taken place during sinking, at the moment of touching ground, or in course of the disintegration of the vessel. The most convincing scenario would be that the sinking ship's first impact onto the seabed was on her starboard bows, thus effecting a displacement of her load that prompted both the hull's list to starboard and the observed dispersal of cargo items into GridNNW.⁹ This assumption is to some extent supported by the condition of the remains of the vessel.¹⁰

The vessel's most extensive remains were found under the highest parts of the tumulus, where increasingly lower concentrations of oxygen and nutrients apparently had protected ever more of the ship's timbers from marine fauna and microorganisms feeding on wood; more severe disintegration had occurred around aft and port of the hull, where cargo had spread out more thinly and widely (Fig.3.2-2). Around the bows were found a number of timber fragments that apparently had broken off the vessel's fore sections during the wrecking process (Fig.3.2-3). The only effort at identifying the hull's timber was attempted on one of these fragments, reportedly belonging to a loose plank found off starboard bows. The provisional results pointed on four possible species¹¹ of which *Koompassia Malaccensis*, *Dalbergia sissooides* Grah. and *Albizia Procera*, all indigenous to Southeast Asia¹² are still today recommended for shipbuilding.¹³ No results of eventual analyses of the various timber samples delivered to the Musée royal de Mariemont, Morlanwelz, and the Laboratory for Wood Biology at the Musée royal de l'Afrique Centrale, Tervuren, Belgium, in June 2007 have been made available. Neither the salvage company nor PanNas BMKT responded to requests for further examinations.

Depth and poor visibility severely hindered a visual documentation of the site. Nearly all attempts at photographic and video recording were frustrated by darkness and floating sediment, and eventually resulted in only a dozen useable pictures of details of the hull (Fig.3.2-4, -5). Neither overall photographs nor a mosaic recording were possible in the given time and with the equipment available.¹⁴



Due to his extensive experience in plotting underwater remains¹⁵ Daniel Visnikar, second chief diver for the salvage company, was tasked with taking measurements of the ship's remains. Since her foundering the remains of the vessel had settled in a bed of sand and debris that reached to strake XIV on starboard and covered all remaining strakes on portside. Anticipating an eventual salvage of the structure, at the outset this sandbed was removed only around the bow and the largely deteriorated aft sections (Fig.3.2-6). When the plans for raising of the hull's remains were abandoned due to financial restrictions and the intricacies of preservation and storage, in the last three weeks of the field campaign the sand along midship's hull was removed to up to 150 cm under the remaining planking (see Figs.2.1-12, -23, -24). Accordingly, except along these cleaned areas no measurements of the outer surfaces of hull and keel could be taken.¹⁶

The hull was measured along cross sections following the frame stations; the resulting section drawings then were to be combined into an overall site drawing. Inside the structure, the keelson and various concretions obstructed detailed recording of the keel's top surfaces and frame sections C16-18, C19-20 (starboard) and C21-23¹⁷ (see Fig.3.2-1 and below). Here, a number of measurements had to be based on educated guesses following dimensions noted at better accessible parts of the hull. Starting at the vessel's bow, Visnikar produced a set of frame section drawings on paper, and concomitantly compiled a (to some extent imaginative) overall hand drawing with a scale of 1:20 (Fig.3.2-7). He then transferred these drawings into two-dimensional (2D) plots in a professional drafting program, which were used as basis for the three-dimensional (3D) models by the present author. He assumed that the midship floor planking was lying flat on the seabed and plotted accordingly; I followed this assumption for the "inside" measurements of the hull.

Still new to the drafting program, Visnikar did not necessarily apply the full repertoire of functions and layout consistency that the program allowed, thus necessitating various, though generally minor corrections of and amendments to the original plots. While the salvage was still under way, he found little time and opportunity to crosscheck and match the individual 2D plots, and a number of incongruities between the individual plots went unnoticed. A cross-examination scheduled for the months after the end of the field campaign was prevented by the legal actions in course of the

"Cirebon case".¹⁸

Details of my revisions to the original drawings are discussed in App.3.2.i. As there described, for the 3D site models none of the above shortcomings necessitated corrections of more than a couple of cm in "real" measurements. Indeed, despite the excessive depth and unfavourable conditions, Daniel Visnikar's efforts in measuring the ship's remains resulted in a remarkably consistent and stringent set of data, an accomplishment not matched for many a better accessible site.

Keel

As the hull was not accessible from underneath, the actual profile of the keel remains open to conjecture. Visnikar had drawn the keel profile sections as rectangles, and, based on his observations on the bow piece, on starboard and portside added protruding lugs at around the centre of the keel's height. The amidships rather large sided dimensions of the keel, however, recall a 'keel-piece' or '-plank', such as reported for a variety of archaeological finds and recent observations of ships in Southeast Asia,¹⁹ rather than the square keel beam common in European or West Asian naval constructions.

While the positive effects of a protruding keel in reducing lee-drift and stabilising the rolling moment of the ship very probably would have been known to her builders, they would also have been aware of the difficulties faced when beaching a keeled vessel, a possibly essential requirement for any vessel operating in a time and area where tide-free harbours and docking facilities were scarce.²⁰ While (hull) planks, however, could be carved from a tree trunk split into two to provide corresponding planks for starboard and portside,²¹ thinning a log of at least 60 cm diameter into a plank-shaped keel would have been a singular and wasteful undertaking on a major piece of timber. The ship's builders here would have carefully considered the possible benefits of any additional and doubtlessly labour-intensive endeavours, particularly if such toils could potentially reduce strength and endurance and decrease seaworthiness and performance of the vessel.

The hypothetical solution adopted here assumes that the initially square profile and the laterally protruding "cheeks" on the keel's bow noticed on pictures (Fig.3.2-8) and video recordings would gradually broaden into the shape of a keel-plank. Comparable patterns are reported for bow/



keel-pieces found at Paya Pasir (Manguin 2009c: Slides 38, 39) and for the Butuan 2 boat (Fig.3.2-9). These "cheeks" (as presently, essentially part of the vessel's bow-wing) then should shape into the keel-plank's bevelled edge accommo-dating the garboard strake (Fig.3.2-10). Following a number of representations and reconstructions of keel-planked ships from extant examples and archaeological contexts,²² I opted for an about semi-circular profile, with its central circle segment bound by a chord at an angle of about 10°, ²³ raised off the lower "comer" of the garboard bevel (Fig.3.2-11).

Contemporary traditional master shipwrights (and other carpenters) of South Sulawesi maintain that, where possible and detec tibie, any timbers used in the construction of (not only) a ship should preferably be aligned with its "head", i.e., the section closest to the crown of the tree it was cut from, pointing to the hull's bows (or the fore/upper part of a construction).²⁴ I accordingly assume that the keel's fore sections would be somewhat less wide than those aft: the latter could have been cut out of the fuller lower trunk. The resulting dimensions and a number of necessary adjustments to Visnikar's original measurements are described in App.3.2.i (Figs.3-2.i-4,-5).

Towards the bows, the keel terminated in a bow-wing, or winged stem, comparable to a number of documented Southeast Asian hull structures.²⁵ The a vailable records of the extant structure -a set of the 2D drawings and a small number of photographs and video recordings- necessitated a number of conjectures as to its actual shape (see App.3.2.1, Figs-3.2.i-6-9). According to Visnikar's drawings, information by other divers and the available photographs and video recordings, the remaining bow-wing was not the composite assembly observed on the bow sections of the Punjulharjo vessel (Fig.3.2-12), reported for the remains of the Paya Pasir wrecks (Fig.3.2-13²⁶), or hypothesised for the Butuan 2 and 5 boats (Fig.3.2-9²⁷), but a single and solid timber.

The wing's overall height and the number of possible "steps" for accommodating hood ends remain a matter of speculation: its upper foreward portion was lost. The model proposed in Fig.3.2-14 assumes that the wing's protruding "cheeks" would allow to close the first two strakes to the ship's bows. Resulting in an elevation of at least 1.1 m, the structure would have to be carved out of a trunk of about 1.3-1.5 m diameter,²⁸ thus a tree of an overall height of 50-60 m.²⁹ I imagine that a trunk of such size could

have been sufficient to fashion the estimated overall length of about 24 m for keel, bow- and aft-wings out of one single log. The bow-pieces recorded on the Butuan 2 and 5 boats or the Paya Pasir and Punjulharjo remains, on the other hand, apparently were additions worked on- or into the keel-plank. On the present wreck, a separate bow-wing could have been connected to the keel-plank by an elongated and shallow scarf that would be reinforced by the overlapping wings; such an arrangement could explain the obviously complete disintegration of the stern-wing. As the keel for most of its length was buried in sand and superimposed by floor timbers and the keelson, the available documentation can substantiate neither of these suppositions.

It is also uncertain whether the hull's extremities in the upper sections were closed by stern- and sternposts or by further "wings". One would assume that remains of stem/ sternposts and associated timbers, for a vessel of the given size necessarily rather sturdy affairs, would have been preserved; on the other hand, the same could be supposed for any given bow/stem-wing section that should have terminated in the large, heavy piece[s] of timber' (Clark et al. 1993:150 on the Butuan 2 wing-stem³⁰) which only could have furnished the necessary constructional strength.³¹ Stem/sternposts may have been introduced into Southeast Asia shipbuilding at a comparatively late date: to the best of my knowledge, no finds dated into the first millennium have yielded remains of such posts, and despite their otherwise detailed and informed nature none of the ships on the Borobudur reliefs expressly note such arrangements.³²

Visnikar reported an overall length of the keel's remains of 21.80 m; this measurement includes the bow-piece, stretching about 1.60 m to the first recognisable frame station, Ci, but not its counterpart on the deteriorated stern of the hull. The remains as such do not allow further conclusions on the actual size of the vessel: the original length of the missing aftship and an eventual overhang, rake and profile of bow and stern³³ can only be approximated through a hypothetical model of the complete hull via a conjectural reconstruction of her lines, the topic of the following section.

Plank Shell: Overall Arrangements

Overview drawings and a number of measurements of the 3D model of the remaining plank shell of the Nanhan/Cirebon wreck are found in Figs.3.2-



15, -16 and -17. A "shell- first'-built hull should follow a pattern that outlines numbers, sizes and position of the individual planks in the construction³⁴: Figs.3.2-18 and -19 illustrate the arrangements of the surviving planking of this vessel. Visnikar reported identical patterns for lar- and starboard. The overall pattern apparently was mirror-imaged to bow and stem over frame station C13.

The arrangements confirm to the customary pattern of a hull built "shell-first": after laying a first plank along midships, the majority of the successive planks to fore and aft could be placed "atop" the angled and hooked scarf joints in the extremities of the previously laid boards (Fig.3.2-20). Exceptions are the butts of the drop strakes, apparently fitted onto the hood planking, and the lower central part of the extensions of the garboard strakes which had to be trimmed into the "slot" between the extremity of the garboard itself and the "cheeks" of the bow-wing (Fig.3.2-21).

Hood planks "inserted¹¹ between the garboard strakes and the bow-wing probably were required to bridge a considerable change in the geometry arising between the initial midships deadrise and the fine shape of the bow's lower entry that could not be accommodated by the run of the garboard stake alone³⁵ The position of the garboard hoods' bow-side scarfs indicates that the bow-wing was fabricated independently from the garboard planking; I accordingly assume that the vessel's sharp lower bows reflect the intention of her builders to produce a swift and seaworthy ship.³⁶

It is somewhat startling to find the plank joints placed atop one another and not alternately staggered or "stepped" as reported for contemporary traditional boat-building practice in the area.³⁷ Comparable features on the thirteenth-century Butuan 2 boat are commented by Clark et al. (1993:149-50):

The large number of scarf joints in this area was unusual, suggesting a rapid change in the shape of the vessel, a change that would not have been possible by continuing the normal lines of the planks. Therefore more radically curved strakes were needed; hence the presence of the scarfs where these planks were fitted. [...] While the introduction of joints would appear to weaken rather than strengthen the structure, the type of joint -hooked scarf with dowel edge-fastening— might actually be stronger and stiffer than the normal run of planking, as in the mortise-and-tenon fastened vessels of the ancient Mediterranean. The fact that

so many scarfs occur in one place indicates that the builders did not view them as detrimental to the structural integrity of the hull.

In the Nanhan/Cirebon ship's plank pattern, the scarf joints mark the introduction of drop strakes. It appears that her builders here anticipated not only lateral changes in the geometry of the following sections, but also forestalled a decreasing girth of the hull to bow and stem that could not be fashioned by further tapering the hitherto employed planking alone³⁸.

Clark et al.'s assumption that the joints inhibit a considerable constructional strength is not supported by the present wreck. Photographic and video recordings show two plank-shaped braces vertically covering the weatherside surface of the bow planks' scarf joints at C6 and C7 (Figs.3.2-6, -22), and a number of plank samples (e.g., S35, S36³⁹) retained traces and/or fragments of these braces. In contrast to the planking, the braces were not dowelled but nailed onto the hull, and their surfaces and fitting display considerably less wood-working skill than applied to the planking. I suspect that these braces were a later addition that anticipated a destabilisation of the hull along the scarf joints: fragments of the corresponding joint at C19/20 presented a rather tangled dowel placement that unquestionably had weakened the joints.⁴⁰ A gradual destabilisation of the hull's integrity around these scarfs and, consequently, increasing leakage during the ship's active service would have contributed significantly to her foundering.

The lower hull's lines around C1-7, the foreship sections containing the scarf joints, clearly are not as fair as expected: C3 and C5 deviate noticeably from the ideal lines between the bow-piece and the frames further aft. While there is some possibility that the (by virtual generation rather amplified) contour in Fig.3.2-23 is partly due to measuring mistakes,⁴¹ it nonetheless shows a distinct distortion of the hull's lines along C2-4 that can only be explained as result of a breakup of the planking along the fore ward "stacked" plank-joints. Under the weight of her cargo (here notably the concretions covering C21-23 on starboard), more severe deformation (and disintegration) of the hull had taken place along C22-23, the corresponding sections aftships (Fig.3.2-24).

Visnikar's frame section plots record at C 5, strakes VIII-X, a distinct bend off the fair run of the planking between the preceding and following sections



(Fig.3.2-25), and the reconstructed model of the hull's remains suggests that the remaining planks of starboard bow sections C2-5 had "flattened" considerably more than could be expected (Fig.3.2-26; cf. Fig.3.3-11). These deformations may have been caused by the kinetic energy produced by the cargo at the moment the sinking ship touched the seabed; it is here where the most forceful initial impact of the ship's load against the hull's sides would have occurred if, as indicated by the heel of the hull on the seabed and the distribution of her freight, the vessel had grounded with starboard bows first.⁴²

Horizontally, the remaining strakes were composed of three types (Fig.3.2-27): (i) the floor planking (strakes i-ix) consists of massive blocks with rabbeted longitudinal edges into which the holes for lashing lines were drilled (Fig.3.2-28); (ii) planks in strakes X and XII carry lugs connected with ridges (Fig.3.2-29); (iii) the remaining strakes display the "standard" *tambuku* (see below). On a number of surfaced fragments of type (ii) planks (Fig.3.2-30) were found holes traversing the ridges close to the lugs; as described in the discussion of the internal strengthenings of the hull below, these were possibly related to the placement of stringers. Planks with (central) ridges have been reported for plank #7 of the Butuan 5 boat⁴³ and find #52 from the Kolam Pinisi site.⁴⁴ I am not aware of examples for type (i) planks in the archaeological and ethnographic record, but note the carinate or ridged keel of the Butuan 5 boat with its 'raised lug running along its full length' (Green et al. 1995:185). Applied to the floor planking of the present wreck, the latter arrangement evidently would 'increase the stiffness [...] and decrease any tendency of the vessel to hog' (*ibid.*: 186).

Plank Fragments: Dowel Placement Patterns

On none of the surfaced plank samples were found the holes and cord that in the "Stitched and Lashed-Lug Tradition" join plank seams; instead, the strakes were fastened to one another by dovetailing alone. It has been seen that on various remains of "stitched- and lashed lug" vessels the stitchings flank the *tambuku* lugs;⁴⁵ on a number of plank fragments of this wreck this position is marked by dowels secured with locking pegs (for this and the following, Figs.3.2-31, -32 and -33). On those plank fragments that were not part of scarf joints, dowels were not set in the inter-changing pattern found

on contemporary traditional vessels but placed at approximately the same points on the upper and lower edges of the plank.⁴⁶ These arrangements suggest that positioning of dowels on both edges of the planks followed the same pattern.

The complex construction of the hull must have required a considerable degree of planning; hence one would expect to find marks and signs related to the shipwrights' pre-meditations. Several of the surfaced plank samples⁴⁷ had retained scratch marks that in all probability were related to the placement of dowels: single marks on, for example, samples S34, S35, S36, S218 or S584 are parallel to the positions of single dowels (Fig.3.2-34); S36 displays a sign | X | placed in vicinity to a square dowel (Fig.3.2-35); on S581 /583 were found double scratches which seem to be related to "doubled" dowels (Fig.3.2-36). Such marks are known from contemporary insular Southeast Asian boat-building techniques, where they constitute a first and crucial step in "shell-first" hull construction.⁴⁸

In contemporary traditional boat-building such patterns do not employ fixed measurements, but are related and relational to features of the construction. As they have to hold frames that throughout the entire hull necessarily run about perpendicular to the keel, the *tambuku*-lugs on any given plank are in predefined and rather unchangeable positions, and accordingly could have served as a first reference for the placement of dowels inter-connecting plank-strakes. Discussing the dowel arrangements on the Butuan 2 boat, Clark et al. (1993:158) hence assume 'some form of correlation' between *tambuku* and dowel positions.

An analysis of the only fragment retaining more than two *tambuku*-lugs, S573, appears to support this assumption. The detailed examination of the measurements obtained from the 3D model of the plank in App.3.2-ii⁴⁹ infers the following sequence for the positioning of its dowels: (i) the first pairs of dowel holes were placed parallel to the holes for the lashing rope in the *tambuku*-lugs (step [1] in Fig.3.2-37); (ii) to the "left" and "right" of these holes, further holes were drilled at about two-thirds of the distance between the lashing rope holes and the respectively closest corners of the lugs (step [2]); (iii) doubled over the corner, the "last third" and/ or the distance between the corner and the holes made in step [2] then would define the position of the first dowels on the edge sections "between" the *tambuku* (step [3]); (iv)



dividing the distance between the latter holes into three roughly equal parts could establish the positions of the last two holes (step [4]). As proposed in App.3-2.ii, divisions by three could have been obtained by trisecting a, e.g., piece of rope (see Fig.3.2.ii-7). For step [4], the shipwrights then had to gauge only the first two distances [4.1, .2], and could leave the last one, [4.3], "open".

Other samples of unbroken runs of planking seem to confirm this pattern;⁵⁰ plank fragments that had been part of the scarf joints,⁵¹ however, display different arrangements. A notable distinction are dowel holes that pass through the whole width of the planks (Fig.3.2-38). In S581/3, part of the aft scarf joint of strake VII at C19/20, portside, at places up to three of such dowel holes had been drilled into virtually the same positions (Fig.3.2-39). While the dowels in the "normal" run of the planking connected to either the preceding or the following strake, here planks seemingly were joined with dowels that traversed (at least) three strakes. Double scratch marks indicate the positions of these "doubled" dowels (see Fig.3.2-36): the shipwrights apparently were aware of this feature.

The clusters of dowels are found under the forward lashing rope holes that here substitute for the *tambuku*-lugs (Fig.3.2-40). A detailed analysis of the two plank fragments⁵² implies that such clusters would appear if dowels placed "under" the lashing rope holes of the plank placed atop S583 were extended throughout the latter and S581. Due to the changing geometry of the hull, the "columns" of lashings, necessarily perpendicular to the keel, in bow and aft would not be right-angled to the planks' seams; dowels drilled in approximately right angles to the increasingly tapered run of planks then would "slant" to midships, possibly breaking into dowels in the preceding strakes (Fig.3.2-41). It has been seen above that the lashing rope holes would provide the first alignment for the positioning of dowels, and at least those dowels connecting S581 to the previous strake (marked blue in Fig.3.2-41) about follow the "standard" arrangement of dowel placement observed on S573. In positioning of the dowels connecting S583 to S581 (green), the shipwrights apparently had tried to avoid overlaps by alternating their angles - when later adding the next strake, however, they seemingly had returned to the "standard" pattern of dowel placement (red).

Fig.3.2-42 tests the applicability of this pattern on the corresponding scarf joints in strakes VIII and IX on starboard side of the 3D model. Compared to the

"standard" dowel pattern shown in the sections fore and aft off the scarf joint, the dense profusion of dowels employed is striking. It proved impossible to employ a consistent overall pattern in placing the various holes throughout all five tiers of dowel holes in this (proportionately scaled) reconstruction: just as the shipwrights had probably done when attempting to prevent dowels from breaking into already existing holes, it was in many a case unavoidable to individually shift and slightly pivot dowel positions. Especially along the "columns" of lashing rope holes this arrangement prompts clustering of dowels under the fore lashings holes covered by the scarf in both strakes VII and IX (marked in transparent red). If this pattern is reiterated, such clusters would occur in every second strake and thus undoubtedly compromise the constructional integrity of the joint.

It is notable that attempts at employing this necessarily rather "flexible dowel pattern" in the model produce a feature not observed on the "regular" plank samples: in between the holes "under" lashing rope holes terminate "additional" dowel ends, marked in transparent green in Fig.3-2.i-42. Such dowels were observed on fragments S33, S35 and S36,⁵³ all presumably belonging to the starboard foreship scarf joints sections at C6/7 that were covered by braces placed over the outer sides of the hull (see Fig.3.2-22): I assume that along scarf joints this "dense" arrangement of dowels would have been repeated throughout all horizontal plank connections in the hull. Extensive and prolonged stresses the foreship was exposed to when, e.g., pounding through waves or anchoring in adverse weather could have increasingly threatened the evidently frail scarfs.⁵⁴ The resulting damage would be especially obvious along the "clusters" of dowels close to the lashing rope holes, right where the braces were applied (Fig.3.2-43).

Miscellaneous Dowels and Tools

All of the examined (round) dowel and lashing rope holes were of about the same size. Plank (?⁵⁵) fragment S217 preserved considerably sharp-edged holes of uniformly 27 mm diameter (Fig.3.2-44), matching reasonably well the majority of holes inspected on other plank fragments. Intriguingly, holes of the same diameter are reported for the thirteenth-century Java Sea Wreck.⁵⁶

The various angles and distances between the turns of the "thread-spurs" indicate that the builders did not use a threaded drill with a lengthy



fighting but some variety of a spade- or (less plausibly) spoon-bit. Bearing upon contemporary traditional boat-building practice; such a bit would have been fitted onto a cross-handled auger. The bit-spurs preserved on S217 (Fig.3.2-45) imply that this auger was turned counter-clockwise.⁵⁷ It is unrealistic to assume that only one drill was used in the construction of such a large vessel: to warrant workflow, a contemporary traditional Sulawesi shipyard would employ at least four two-membered teams, where each master carpenter keeps and uses an own set of drills and augers, for reasons of interchangeability in this case of mainly Imperial diameters. The uniformity of the holes on the Nanhan/Cirebon shipwreck hence indicates a surprising degree of consistency, if not standardisation, of the tools used.

Besides round dowels, a number of samples (836, S584) and underwater photographs (Fig.3.2-46) demonstrate a probably rather restricted employment of square dowels. All recorded square dowels are found on plank sections close to scarf joints. The square dowels on the type (ii) planks S584 (Fig.3.2.i-32) and the now lost fragment in Fig.3.2-3 were positioned in proximity to the holes in their ridges that are proposed to be related to the placement of stringers; although not displaying such ridges, on fragment S36 a square dowel was placed "under" an extension of the *tambuku*-lug sideways off the lashing rope holes (see Figs.3.2-35 and -38). On, e.g., S537 or S582 this position was secured by (double) locking pegs. S584 preserved such a locking peg holding the square dowel. Locking-pegged square dowels are pictured for plank fragments found at Sambirejo and Suak Bujang, Palembang.⁵⁸

Internal Strengthenings: Frames

None of the available photographs and video recordings of the site reveal more than glimpses of the hull's framings; and while a number of (parts of) floors and frames were surfaced,⁵⁹ none survived closure of the warehouse throughout 2006, when one of the main storage pools partially dried. A concluding attempt at filming the hull's remains in October 2005 indicated that by then nearly all of the frames had been dislodged in course of the salvage operations (see Fig.3.2-4). A reconstruction of the ship's framing thus has to rely on D. Visnikar's drawings and a number of informed guesses.

When in contemporary "shell-first" boat-building the planks are raised to the turn from bottom to side planking, floor timbers are laid into the hull; these

floor beams are extended with futtocks when the hull's sides have reached sufficient height. As neither floors nor futtocks would have to produce the full change of inclination occurring around the turn of the bilges, partitioning the frames at this point is an undemanding way to form a smooth curve following the "veer" from bottom to side planking. For the present wreck's remaining frames, D. Visnikar noted partitioning into floors and futtocks by hooked scarf joints over strake IX (Fig.3.2-47). His measurements though seem undersized if compared to the singular underwater photograph showing a broken scarf belonging to an unidentified floor beam (Fig.3.2-48): one would imagine that a complete hooked scarf covered up to two strakes. The extremities of the scarf joints then could, speculatively, have been secured under a stringer passing along strake X, the lowest tier of type (ii) planks that supposedly formed the first strake of the bend planking. In lieu of an alternative, however, the 3D model of the wreck follows Visnikar's measurements.

In contrast to the squared ribs common in the contemporary traditional boat-building of the area, here only the surface joining the frames onto the plank shell was flattened and, where necessary, notched to allow tight placement over the *tambuku*-higs (Fig.3.2-49).

The remainder of the frames was left rounded, probably retaining the original shape of the timbers. As described below, the various stringers and beams follow this practice. The framing was not divided into the 'alternating ribs and floors' (Horridge 1979b: 23) found in most "contemporary traditional" ships of insular Southeast Asia, but throughout the whole length of the vessel employs floor timbers extended by futtocks (Fig.3.2-50).

The frames undoubtedly were lashed onto the planking through the holes in the *tam- buku* (Fig.3.2-51); as no samples could be examined, it however is impossible to ascertain the applied procedures. The lashings would have been similar to any of the various bonds found on, for instance, the Punjulharjo wreck (Figs.3.2-52, -53; see also Fig.3.1-9), here probably also utilising various holes found in the frames, some of which are visible in the available video sequences and pictures. Visnikar reported holes for lashing ropes along all frame positions for all planks except at strakes HX at C13, the approximate lower midsection of the structure (Fig.3.2-54). It is here, in the bottom area in the midships region, where the 'tensile [...] and compression stress[es]'⁶⁰ caused by sagging and hogging of the hull concentrate.



To avoid excessive bending, in contemporary shipbuilding midship sections are reinforced with additional girders and beams; the arrangement chosen for this ship would, conversely, seem to accentuate these basic structural strains affecting a hull. Two complementary explanations can be offered: (i) the shipwrights did not provide for fastenings along lower midships as they may have experienced that the stresses mentioned above would cause lashings between floor planking and a midsection frame to snap easily; (ii) allowing the hull a more ductile response to the strains here converging could furnish an effective way of avoiding stress concentration (Horridge 1978: 41) that might compromise the construction. The latter assumption would imply that the builders of this vessel had intended to produce a structure that, as argued in the previous section for lashed-lug hulls in general, was engineered to be (essentially and comparatively) light and flexible.⁶¹

Frame Stations and Overall Layout of the Hull

Plank joints and dowel placement could have been fashioned following features found on the planks themselves; for the hull's overall layout, however, the builders must have employed a general blueprint that should have been arranged when the keel was laid.⁶² As they evidently define sizes and positions of the hull's planks, it would be the arrangement of the hull's frame stations, i.e., the positions of the *tambuku* (or, perhaps better, the lashing rope holes therein) and the frames they hold that outline this blueprint.

In both contemporary traditional insular Southeast Asian and classic and historic Western shipbuilding techniques the shape of a vessel is developed around a "centre point" that serves as reference for the hull's geometry.⁶³ The arrangement of the planking pattern of the present ship⁶⁴ implies that here frame C13 constituted such a centre point. Starting at this midpoint to foreship, the builders on the keel had provided twelve "columns" of lashing rope holes; due to the deterioration of the hull's stern, to aft only eleven such "columns" remained. C13 is not the exact geometric centre of the hull: gauged over C2 and C24, the extant "pair" of frames farthest apart, the hull's aft section is about 8% longer than her fore part (Fig.3.2-55, second measurement from above), a tendency that is also visible in a number of other measurements. The planks "inserted" between the midship planking

and the hoods commencing in strakes III/IV as well as distances between the frames covering the two aftship scarf joints (C19-20, C22-23) are, conversely, markedly shorter than the corresponding measurements recorded in the foreship (see Fig.3.2-16). Evidently, these arrangements would shape the more radical geometrical changes of a, compared to the vessel's bows, more deeply rounded aftship.⁶⁵

One would expect the design to employ some "standard" unit of measurement, 'a tool which would enable [the builders] to transfer the planned dimensions whenever they needed to do so and check permanently the measurements of the work already completed' (Lordereau 2007: 227). The table inserted into Fig.3.2-55 tests the reported distances between the frames against the cubit (in the following, cub) of 34.83 cm, proposed by Lordereau (2007: 249, 251) as a 'rather stable' unit of measurement employed in temple constructions on Java and Sumatra throughout the eighth to thirteenth centuries. None of these distances differs more than ± 1.5 cm from fractions of up to $\frac{1}{8}$ cub (4.35 cm), and a number of values (e.g., all distances between C_i and C₅; if counted from C₁₃, distance] 12fore[ship]-d9fore) vary only mm from values expressible in thirds, fourths, fifths and sixths of cub. Compared to the measurements recorded throughout the foreship, most of the distances between frame stations C₁₄-C₂₄ (dl-llaft) are rather rounded numbers: I suppose that Visnikar here had struggled with both waning time at the end of the salvage enterprise and the obstructions by concretions covering better part of these frames.⁶⁶ It is mainly these figures that have to be expressed in eights of cub - and it is largely the measurements of eights of cub that display the highest differences between fractions of cub and their cm values. However, the only measurement mirror-inverted in both fore- and aftship, the 86 cm of d8fore/aft, differs more than 1 cm from its proposed conversion into $2\frac{1}{2}$ cub. If such cubit were used as a unit of measurement, they in all probability were not the only dimension employed.⁶⁷

Fig.3.2-56 attempts to evaluate the arrangements in the bow-ward half of the hull. Evidently, all frame positions except C₁₁ approximately align with various common fractions of the distance C₁-C₁₃ (blue, above) and that between the bow and C₁₃ (red, below). A number of observable (and generally small) variances exhibit a regularity that seems to be either result of consistent recording mistakes or intention. Additionally, several of the



distances between the frame stations are readily expressible as single-digit fractions of these two lengths; most others can be rounded into such by adding or subtracting <2(3) cm to/off their reported lengths (cVN in the table in Fig.3.2-57). Unquestionably; the builders of this vessel had employed divisions of the two lengths C1-C13 and bow to C13 to generate both the positions of the frame stations and the distances in between these.

The span between Ci and C13 apparently played a central role in the pattern: various simple fractions of this distance could define at least six of the eleven frame stations and nine of the twelve distances between the frames1 centrelines it encompasses. It may also be no coincidence that the *tambuku* on S573 measure approximately $\frac{1}{20}$ of this distance. I suspect that a preference for a partition into twelve, the number of distances between the extant lashing rope columns / frame stations to bow and stem if mirrored over C13, was based on the number 12's characteristic of being both highly composite⁶⁸ and 'practical' ('panarithmic'),⁶⁹ thus allowing for a wide range of "simple" divisions - hence, perhaps, can we express the positions of nine of the fourteen recorded frame stations in the foreship in twelfths of the two "overall" measurements of Ci3-bow and C13-1.⁷⁰

A plain and practical aid in generating such fractions would be the 'Egyptian surveyor cord' or '*harpedonaptai* "arithmetic" rope'⁷¹ with its twelve spaces and thirteen knots, since at least the second century BCE widely used for construction purposes. By its various possible "foldings" such a device could produce not only right angled "Pythagorean" triangles for, e.g., the right angles of frames against the keel, but also most of the factors needed to generate the observed fractions, bordereau (2007: 250) notes that multiplications or 'simple fractions (halves, thirds, fourths)' of his "Javanese cubit" can be traced on a number of monuments of the ninth to thirteenth centuries in Java and Sumatra: at least for architectural purposes 'simple' multiplications and fractions of a given length were used in the area and time here under discussion.⁷²

For the divisions apparent in the positioning of the frame stations of this ship, however, her builders had not only employed divisors and simple fractions of twelve alone - C2 and C6 can be constructed by multiplying fifths of the two basic lengths involved, and at least the distances dl, d3, d10, d11, d12 and d13fore could be expressed as tenths, fifteenths and twentieths of these

measurements (see Figs.3.2-56, -57). Dividing a length of rope into five equal parts can be done by adding a further turn to a trisected line (for the latter see Fig.3.2.ii-7). If the shipwrights for the layout of the hull had used a rope as measuring device, it evidently had allowed for more divisions than those provided by a 13-knot cord.

The sequence in which these "relational" measurements and divisions were applied yet eludes me. It would seem pragmatic to propose that the builders had started with divisions of higher orders: we thus could sequentially construct the positions of C7, C9, C10 and C6 by, respectively, halves, thirds, fourths and fifths, and C12 and C8 by tenth and twelfths of the distance C1-C13; adding $\frac{1}{6}$ of this measurement to fore arrives at the end of the bow piece, and divisions into thirds, fourths and fifths of the overall length bow-Ci3 could subsequently furnish C4, C3, C2 and C5. C11, the only "undefined" frame station, could be positioned by repeating the measurement d12fore from C10 to aft. Alternatively, by repeated divisions of these two "overall" lengths the shipwrights could have arrived at enough frame stations and/or measurements for dN to reiterate patterns of distances that they assumed suitable for the various features of the hull. These could include the measurements between the frames covering and placed aft of the scarf joints (here: d!0-8fore and d7-5fore, shaded blue-yellow-green in Figs.3.2-55-7), or frame stations C1-2 and C11-12, which, as discussed in the following section, appear to be associated with the placement of masts. The builders then could have "left open" the measurements d11fore, d8fore, d5fore and d2fore, all of which are not readily expressed as simple fractions of the distances Ci- C13 and/or bow-Ci.3. If so, the three fractions of tens, twelfth and fifteenth of C1-C13 would suffice to construct all frame stations. The numerous relations between the various measurements shown in Figs.3.2-56 and -57, however, imply a number of further possibilities.

One of these is inferred by the hypothetical reconstruction of the positions of the vessel's crossbeams.⁷³ Frame stations C2, C5, C8 and C11 coincide with the centres of "groups" of each three frames bound by thwarts that in all possibility were placed equidistant in between frames C3-4, C6-7, C9-10 and C12-13 (see Fig.3.3-27). C3-4 and C6-7, the pairs of frames covering the plank scarfs, are critical to the hull's plank pattern, and should have been fixed at the moment the keel was laid; C9-10 are placed at, respectively, $\frac{1}{3}$ and $\frac{1}{4}$ of



the length between C13-1, and hence possibly were among the first frame stations established. While crossbeams would have been fitted at a very late stage of the construction, employing their “anticipated positions” midway in between the mentioned frames in the tally defining further frame stations apparently could avoid usage of more complex fractions and/or define positions that otherwise remain unexplained.

It proved more difficult to construe a pattern for the aft part of the hull: here missing are at least one frame station and the stern extremity of the keel with its (assumedly) associated stern-wing. As seen in Fig.3.2-58, the distance between C13 and C19 (the counterpart to aft of C7 that marks $\frac{1}{2}$ of the expanse between C1 and C13) equals $\frac{1}{2}$ of the 1120 cm span between prow of the bow-wing and C13; the fractions used to position frame stations C8-10 approximate those marking C16-18, the corresponding frames in the aft part of the hull. Compared to the foreship, this arrangement lengthens the extent of the central planks to aft by about 16%. However, applying the scheme observed in the forward part of the hull, i.e., doubling the measurement C13-17 to stem to construct the missing last frame station, one arrives at a point too far aft for a proposed frame C25; adding $\frac{1}{6}$ of the resulting overall dimension C13-C25 to mark a possible aft extremity of the keel results in a position outside the suggested overall length of the vessel⁷⁴ (all marked in broken red/magenta lines in the figure). C13-C19 plus a value of 480 cm, the length C13- C7 / C7-C1, reaches at a point that would seem more appropriate for C25 - however, $\frac{7}{6}$ of the resulting overall length arrives, again, without the suggested dimensions of the hull (broken blue lines). Broken green lines in Fig.3.2-58 show attempts at allocating the aft extremity of the keel by the relational measurements found in the foreship. The resulting measurements yet again exceed the keel (and, in a number of cases, hull) length proposed by the reconstruction of the overall dimensions of the vessel.

It has been noted that the central planks from strake III upwards were longer to aft of C13 than to fore. The run of these central planks would not allow for drastic changes in the geometry of the hull's lines; consequently, the ship's waists would stretch further abaft than to her bows. The plank pattern of the hull indicates that, just as in the foreship, the shipwrights next had employed two shorter planks to accommodate the turn of the planking to the stern, and that the planks inserted between the central one and the hoods

in the aft of the ship are notably shorter than those in the bows (see Fig.3.2-16, -18). Judged by the extant remains and the supposed overall length of the vessel⁷⁵, to produce a fair and rounded stern section the shipwrights then would have had to employ even shorter hood planks (aligned yellow measurements in Fig.3.2-58).

This combination of a central plank "lengthened" to aft and, compared to the bows, shorter inserted and hood planking would by itself form a longer waist abaft and a more rounded aftship.⁷⁵ Such waterlines are observed on the Punjulhaijo wreck and the Butuan 2 boat⁷⁶ or on a number of (early) medieval ship finds in Europe⁷⁷ The measurements available for the Nanhan/Cirebon ship, however, do not enable us to determine the relational formula (s?) applied to define the lengths of these aftship planks and the distances between the frame stations that determine their positions. In any case, all of the above provisions had to be arranged in, to borrow Pomey's (2011: 281) term, 'the "conceptual" phase' of the vessel, i.e., at the latest when the keel was laid and the holes for the lashings ropes were to be drilled. The patterns here observed thus are result of conscious and conscientious decisions defining the shape of the hull that were taken at the very beginning of the construction of the vessel.

It will be observed in Fig.3.2-58 that the midpoints of the distances C4-C22, C3-C23 and C2-C24 are somewhat aft off C13, our assumed "constructional centrepoin" as are the actual frame stations C16 and C17 if compared to their proposed "relational" positions. As observed for the relational measurements in the fore part of hull, the consistencies of such deviations could be caused by both coherent measuring mistakes during the recording of the hulls remains⁷⁸ or intention on part of her builders. Regarding the latter possibility, N. Biiriingham (pers, comm., January 2013) remarks:

Regularity is a form of perfection, and a vessel which has that form of perfection will not want to go out into the world to find that which improves it. It will just bask contentedly on the beach. You need a vessel aware of its imperfection and incompleteness because that is a vessel which will go to search for fish, or cargoes, or clients, or new lands it will have *semangat* ['spirit']. We can't know that a similar philosophy prevailed a thousand years ago, but it would be rash to dismiss the idea, especially when the shipwreck's measurements seem to display complex *ganjil* ['irregularities'⁷⁹].



Internal Strengthenings: Keelson, Stringers, Beams and Stanchions

As shown in Fig.3.2.i-66, the floor timbers were topped by a massive keelson, probably a complete tree trunk.⁸⁰ This timber, however, was displaced in course of the salvage of the ship's cargo (Fig.3.2-59, -6). Of a number of other apparently longitudinally placed timbers recorded on film in August 2004 only a short fragment of a stringer embedded in a starboard concretion remained when salvage operations over the hull were finished. Placed "above" strake XII, this fragment could confirm that stringers were related to the "ridged" type (ii) planks, and in all probability were tied to the holes in their ridges. As mentioned above, the "ridged" strakes X and XII proposedly formed part of the planking along the turn of the bilge of the hull. Placement of stringers here (Fig.3.2-6o) indeed makes structural sense⁸¹ - and is, almost certainly, shown on the ship on panel 1.53 at the Borobudur (Fig.3.2-61). Visible on the 2004 video recordings are at least two further stringers, seemingly placed at about strakes IV and VII; such longitudinal timbers could have been attached to holes correspondent to the "v"-shaped hole in the centre of plank fragment S583, evidently part of strake vii (see Figs.3.2-40, 3.2.iii-1 and -.2).

With the cargo were surfaced various short fragments of "medium-sized"⁸² beams of at least two species of a timber considerably softer than the wood employed for planking and frames.⁸³ Nearly two dozen of the more than 40 registered fragments of these beams retained (impressions of) lashing rope (Fig.3.2-62). At least five⁸⁴ of these fragments displayed variously placed holes that in all probability were related to the lashings (Fig.3.2- 63). Due to their delicate nature the timbers easily fragmented when the ceramics they had been embedded in were retrieved; hence no fragment of more than about 40 cm length could be recorded. No details of their arrangements were logged by the divers, and the few available video recordings vaguely depicting beams embedded in the dense tumulus of cargo items do not allow for a precise locating of any of these timbers.

As most of the ceramic cargo was placed in tightly stacked rows parallel to the frames, the angles of impressions by rims of ceramics indented into the soft wood of about a dozen of these fragments seem to imply that these timbers were placed horizontally, longitudinal and athwart, as well as upright throughout the hull (Figs.3.2-64, -65). A possible arrangement is illustrated

by 8179, two supposedly connected fragments of such timbers: judged by the location of their unearthing, off portside aft, and the angle they display, these timbers could have been part of a pair of cross- and lengthwise beams in the upper aftship (Fig.3.2-66). In the previous section were quoted recent ethnographic examples of arrangements of such frameworks (see Fig.3.1-17), and the only find of a Southeast Asian vessel of the first millennium still retaining parts of her inner strengthenings known to me, the Punjulharjo wreck, exhibits a number of variously placed lateral as well as vertical timbers (Fig.3.2-67). In the latter wreck also are observed a number of "forked" stanchions placed vertically upon stringers that in all possibility were connected to crossbeams higher up in the hull, indicating a possible use of the crotched timber fragments S101, S152 or S164.

On two samples, S233 and S306, were clearly visible remains of the timber's bark (Fig.3.2-68); hence of an ostensibly rather provisional nature,⁸⁵ one could imagine that these timbers were a somewhat recent addition into the hull's inner frameworks. Lashed, and thus detached and reassembled with comparative ease, it is conceivable that at least some of the various thwarts and longitudinals were "adjustable" to changing requirements transpiring during, e.g., loading. It is hardly imaginable that these timbers could have contributed much to the structural rigidity of a hull; their main function probably lay in distributing stresses throughout the whole framework of ribs, stringers, crossbeams and longitudinals.⁸⁶ Except for the topmost crossbeams that had to counterbalance the considerable 'strains which tried to spread out the hull' when, e.g, heavily laden or 'momentarily supported by its ends on two waves' (Roberts 1994: 25), their respective positions and number thus were not necessarily imperative for the hull's integrity. In any case, these beams in all probability outlined a grid-like framework inside the hull that could easily have shaped various "compartments", akin to the *petak* of the maritime law codices of the area.⁸⁷

Decks and Upper Works

None of the available underwater video sequences and photographs recorded structures that could be linked unequivocally with the ship's upper works: it has to be supposed that any superstructure disintegrated with the collapse of the hull and was successively buried in the upper layers of the



cargo spilling over the site, where the timbers were exposed to escalating oxidation and activities of marine borers. On the gridSE fringe of the tumulus, however, were recorded a few fragments of planking⁸⁸ and a considerable number⁸⁹ of remains of beams that could have been related to weatherdeck planks and/or the hull's upper works (Fig.3.2-69⁹⁰). At least one of the plank fragments, S119, displayed dowel holes, and thus was part of a more permanent construction.

The only deck-like structure recorded with some certainty are the remains of a number of planks and beams found in the vicinity of C8-13. Due to divergent reports by divers working in the area and the prompt disintegration of its timbers in course of the reclamation of the cargo,⁹¹ the overall layout of this structure must remain tentative. First noted were remains of a number of sizeable beams around C8-C13 and an unrecorded number of planks reportedly resting upright at 'a rather steep angle' (the interviewed divers) to the hull's bottom; later eight longitudinal planks that were positioned horizontally at ca. 100 cm above the extant floor planking were observed. A brief examination of the structure was possible only on 2005-05-29, a "dive-free" day; by then the beam and planks first observed had fragmented. Under the fifth plank from starboard was found a strut dowelled onto a (then unidentified) frame that supported a longitudinal half-beam, and it was assumed that both timbers had some function in upholding the planks (Fig.3.2- 70). It, however, is hardly imaginable that these timbers could have carried the transverse extension of the lengthwise planks: here, cogently, crossbeams must have taken the main burden. As the strut reportedly was dowelled onto a frame, in all probability it was part of a more permanent construction and could have supported a framework reinforcing transverse timbers that might have been related to the placement of the vessel's masts.⁹²

Commencing 9.5 m from the bow, the recorded planks apparently formed a 'tween-deck-like structure stretching from frame C11 to C13 that, as demonstrated by its measurements in the site model (Figs.3.2-71, 3.3-27), could have been supported by crossbeams placed atop a proposed stringer passing over strake XII. The original position of the timbers found over C8-10, however, is up to speculation: the divers first encountering the structure considered it to be a broken down part of the 'tween-deck; the diver inspecting the remaining structure above C11-13 maintained that it was

a bulwark that closed the tween-deck to the bows. Both these alternatives are coloured transparently in Fig.3.2-71.

The tween-deck's function remains open to speculation. Such a deck would have allowed convenient access to the ship's bilge for bailing or inspections, and could have provided shelter for both passengers and freight consignments of a more delicate nature.⁹³ It should be noted that many of these objects not necessarily were Chinese products: the deck and its direct vicinity apparently were used to stow cargo that, conceivably, was loaded after the main cargo of ceramics and ironwares had been taken on board. Among the items retrieved during the days the divers were working in the vicinity of the structure also were a number of Hindu-Buddhist paraphernalia, proposedly the belongings of a travelling monk or priest, and a quantity of objects that probably were related to gaming⁹⁴ it is likely that the 'tween-deck (and a possible hut above it) during at least the last weary hours before the foundering of the vessel had provided a retreat for both worldly and spiritual pursuits.

Divers reported of a considerable number of, proposedly, tin and lead ingots piled both under and atop the 'tween-deck.⁹⁵ Due to the high specific gravity of the ingots such stacks represent a considerable weight that must have contributed to the ballasting of the vessel. Prudent seamanship would have called for such heft to be spread along the whole length of the vessel's bilges;⁹⁶ that this here was not done indicates that fore and aft of the lower hold were already occupied by other cargo when the ingots were loaded. It is possible that the timbers supporting the deck were part of a construction designed for carrying such a heavy load.

Three timber samples⁹⁷ exhibited square indentations that could have been foundations for stanchions attached to superstructures like huts or bulwarks.⁹⁸ On none of the three timbers were found dowel holes - if attached at all, these timbers could only have been fastened to the hull by lashings. However, no clear-cut remains of lashing rope are visible on the available photography. Compared to the generally fine workmanship of the planks, the surfaces of and indentations in all three timbers were finished rather coarsely (Fig.3.2-72), raising the possibility that they were prepared independently of the main structures of the hull. At least the two smaller timbers thus could have belonged to comparatively impermanent and "adjustable" structures.



S308 (Fig.3.2-73) leaves the impression that "adjustment works" were also carried out on more permanent assemblies. With a thickness of 3.5 cm, the fragment in all probability was not part of the hull's planking; displaying dowel holes and locking dowels on its lengthwise edges, it appears to have been part of a permanent structure, and its smooth surfaces mark it as a product of mindful workmanship. Reportedly found loose over the centre of the aftship (see Fig.3.2-69), it could have been part of a bulwark, a coaming or the sides of a hut. Its stepped end resembling a "thin" *tambuku*-lug with holes drilled perpendicular into the main surface reminds of a corner piece that could have connected to further segment(s) placed at a right angle to S308. Into the fragment, however, were chiselled three roughly square holes which, compared to the fine craftsmanship of its various other features, were executed rather coarsely (Fig.3.2-74), suggesting not the skilled hand of the original carpenter but someone much less proficient in woodworking. These holes could have accommodated horizontal beams supporting, e.g., a hatch cover, a light deck or the roof of a hut that were completed at some time after the original construction was set up.

Due to the greatly restricted data, the last of the above assumptions on the hull's inner framings and superstructure have to remain as such - and, thus, will curtail attempts at a reconstruction of the vessel, the topic of the next section. Where sufficient information is available, however, it is evident that the ship's builders in fabricating both the elements and the overall structure of the ship employed, consciously and consistently, premeditated procedures and patterns. Just as described for contemporary traditional shipbuilding of insular Southeast Asia, these routines were deeply inter-related: the vessel's waterlines were produced by specific arrangements of the frame stations that in turn determined length and positions of the hull's planks; positioning of the frames followed a layout based on fractions of a couple of overall lengths and their repetitions; placement of the dowels joining the plank shell, the very first step in the assembly of the hull, started at the holes later on used to lash the frames onto the planks. The builders of this vessel evidently had at their disposal the sophisticated skills, knowledge and techniques necessary to build advanced naval constructions, and, as their confreres in medieval Europe, 'must have been working from a mental template that is a pre-conceived concept in [their] mind[s] that defined not only the size

and structure but also the details of lines and shapes of the vessel-to-be' (Rieth 2009:121, quoting Crumlin-Pederson 2002: 231). As implied by the size of the ship and the indications of attempts at standardising their tools, they, perhaps most importantly, had an adequate command over 'sufficient financial means, manpower and organizational capacities' (Manguin 1996a: 190) to successfully complete such a task.

(Endnotes)

1. For an overview see Mark 2009; Ward 2004.
2. Cf. e.g., Castro et al. 2011; McGrail 2007; Roberts 2006.
3. I.e., 'groups of characteristics expressed in a physical form. They are the pieces used to build a vessel [...] expressing] dimensions, patterns or any relevant feature in a component' (Fraga 2004: 588).
4. The manner by which components are placed together. This includes the order and manner of placement' (Fraga 2004: 588).
5. For a recent discussion of these processes see, eg., Pomey 2011: 28f.
6. ER 2004-06-06/2004-07-03, Dobberphul.
7. Cf. the description of wrecking processes on pgs.86f above.
8. Cf., e.g., Figs.2.2-91, 207, 210.
9. My assumption that that the vessel foundered due to an unlucky combination of overburdening and extensive leakage will be discussed in Section 4. The ship's and her cargo's deadweight then would suggest a fairly high 'terminal velocity. of the sinking vessel, hence enough kinetic energy to cause such a shift (cf. Wachsmann 2011: 206).
10. See pgs. 250, 272 and Fig.3.3-11 below.
11. The unpublished report (2005) on the sample analysed at the Faculty of Forestry, Gajah Madah University, Yogyakarta, asserted *Koompassia Malaccensis*, *Dalbergia Nigra*, *Albizia Procera* and *Acacia Catechu* as possible identifications. "Dalbergia Nigra, known as Brazilian rosewood, is an endangered tree species restricted to the Brazilian Atlantic Forest' (Ribeiro et al. 2011: 46). 'Kayu Sono', the reported Indonesian name of the species in question, though, is mentioned as *Dalbergia sissooides* Grah. and *Dalbergia parviflora* Roxb. (both under 'Sono Keling') in a List of Indonesian Commercial Timber Species found at <http://www2.bonetco.id/dephut> (last accessed 2005-11-27). *Dalbergia parviflora* is a 'shrub, which often becomes a climber with support, found in freshwater and brackish swamp forests' (<http://threatenedplants>.



- myspecies.info/sites/threatenedplants.myspecies.info/files/Dalbergia%20parviflora.pdf, last accessed 2013- 09-15); its heartwood and roots are the lakawood historically exported to China (e.g., Soon 2001:135). "Acacia Catechu is a small-sized tree, from 15 to 20 feet high' (Felter and Lloyd 1905: 466), of considerably smaller size thus than most of the planks and framing of the Nanhan/Cirebon ship. Cf. Flecker 2008.
12. See, e.g., [http://www.africamuseum.be/collections/browsecollections/naturalsciences/earth/xylarium/ species_result?familia=Fabaceae](http://www.africamuseum.be/collections/browsecollections/naturalsciences/earth/xylarium/species_result?familia=Fabaceae) (last accessed 2012-11-12).
 13. For *Dalbergia sissooides* Grah. see <http://trees.kau.edu/index.php?a=view&recid=i07>; for *Koompassia Malaccensis* and *Alhizia Procera* <http://www.thewoodexplorer.com/woodsearch.php> (both last accessed 2011-10-15).
 14. For the necessary preparations and equipment and possible procedures for photomosaic recordings see Section 6.III in Green 2004 (1990).
 15. Daniel Visnikar was one of the two divers mapping the sunken Royal Quarters of classic Alexandria (cf. Goddio (eel) 1998) and was involved in recording the remains of the French ships destroyed in the Battle of the Nile (<http://www.firaeckgoddio.org/projects/otliers/napoleon-bonapartes-fleet.html>, last accessed 2013- 09-22) and the foundered Manila Galleon San Diego (Desroches et al. 1996).
 16. A rather typical situation: Cf. Steffy 1994: lgiff, and especially 194.
 17. Numbering of frames stations follows the nomenclature applied by D. Visnikar. Depending on context, in the following these numbers will refer to both actual frames and measured sections.
 18. See Section 1.2.
 19. See Section 3.1, pgs.22yf and 229; and fh.22, this section, below.
 20. Cf, e.g., Gould 2000: 70.
 21. See pg.231 and Fig.3.1-15.
 22. Here especially the Butuan boats (e.g, Clark et al 1993, Lacsina 2011, Ronquillo 1989); the Paya Pasir finds (Manguin 1989a, 2009c); and the Punjulharjo wreck (Manguin 2009b; and a number of photographs (2008] supplied by Imam Fauzi and Jaenab Tahir, PANAS BMKT).
 23. As detailed in the following section, the proposed maximum deadrise of the vessel: the reconstructed surfaces of a virtual hull with less deadrise can easily and without interruption of both the curves of the surfaces and the keel be superimposed onto the resulting circle segments; the reverse -placing a hull surface with a deeper deadrise onto a shallow keel cross section- proved operose.

24. Various interviews with master boat-builders and carpenters, Tana Bern, Mandar, Makassar, 1987-2011.
25. Additional to the ship structures mentioned in fn.22 in this section, see Burningham 1993; Horridge 1981: 55-7; and pg.22gf and Fig.3.1-12 above.
26. Cf. Manguin 1993: 264; 2009b: 5.
27. For the latter, see Green et al. 1995:183, Fig.g.
28. Here assuming 10-20 cm of sapwood, in all possibility not to be retained on a major component of the hull.
29. Feldpausch et al. 2011: 1093, Fig.5.
30. See, too, the Butuan 1 boat (Lacsina 2011: Fig.i).
31. A video recording dated 2004-08-12 vaguely shows a number of bulkier timber fragments lying off the bows. However, none of these can undoubtedly be associated with an eventual stem or bow-wings.
32. See pg.22gf. (here especially fh.68) and pg.236 in the preceding section.
33. The 'slight' angle of the bow-wing's prow adopted in the drawings is based on reports by F. Dobberphul (pers. comm., July 2012), one of the divers recording the structure. A possible initial rake of the bow-wing was not measured, and could not be extrapolated from the available photographic recordings.
34. See Section 3.1, pg.23if, and the sources mentioned in fn.77 in that section.
35. "Shell-first" construction generally calls for the use of planks shaped, i.e, not bent, into the necessary forms (pg.231 above). Any major changes in the geometry of a hull that cannot be covered by a single log hence must be realised by arranging sequences of planks of the necessary shapes.
36. Cf. Section 3.3, pg.27of.
37. See pg.23if, and, for an array of examples, fn.yy in the previous section.
38. Cf. Fig.3.2-17.
39. See ER 2007-02-23, Liebner, on the accompanying DVD-ROM.
40. See pg.252f below.
41. As described in App.3-2.i, it proved necessary to apply a number of adjustments of the measurements reported by D. Visnikar. Figs.3-2.i-11, -12 and 3.2-24 illustrate that Visnikar at C4-6 recorded measurements that are considerably more incongruent than those adopted for the 3D reconstruction of the hull's remains.
42. Cf. pg.272 below; and Wachsmann (2011: 206): 'The force of a vessel's impact on the seabed may result in weakening, or even cracking the hull open. At very least it is an additional opportunity for items to shift, particularly if the vessel hits the seabed



bow or stem first'

43. Green et al. 1995:185,186 Fig.16.
44. Manguin 2009c: Slide 13. Here the ridges are not continued until connecting the lugs, but at about half-way between the *tambuku* broken for some cm,
45. For the Pontian wreck, pg.227 above; for the Sambirejo and Kolam Pinisi finds, Figs.3.1-4, -5; for the Pun- julharjo wreck, pg.228 and Fig.3.1-8.
46. Cf. plank fragment #52 from the Kolam Pinisi site (Manguin 2009c: Slide 13,14; Fig.3.1-5).
47. For an overview see App-3-2-iv on the annexed DVD-ROM.
48. See pg.23if above; and, additional to the sources mentioned in fn.77 in the previous chapter, Liebner 1992: 38f, 46.
49. Cf. ER S573, 2007, Liebner; and Liebner 2012: Slides 58-63.
50. See Fig.3.2-32.
51. Besides S581/3, to be discussed presently, S33, S35 and S36 (see App.3.2-iv).
52. See App.3-2.iii; cf. Liebner 2012: Slides 65-72.
53. Surfaced in May 2005, the samples were not allowed to be landed and hence stored in tanks on board the salvage vessel. The planks were allowed to dry and could be recorded only provisionally in May and August 2005.
54. Both conditions produce 'severe effects in the region between 5% and 25% of the ship's length from stem' (<http://www.shipssupplier.com/categories-of-ship-stresses.html>, last accessed 2012-02-21).
55. S217 displays only one of the flat surfaces one would expect to be associated with planks; I provisionally labelled it 'possibly an codpiece of a how plank' in the samples database. No information re its position on the site is available the fragment was found already surfaced on the salvage vessel in August 2005.
56. Flecker 1997: 70; Flecker 2002:139.
57. ... and, hence, possibly operated by a right-handed person: as a human arm's pushing strength at elbow height exceeds pulling strength (Badi and Boushaala 2008), right-handed persons would tend to start the turning movement of the handle of a proposed T-shaped auger into that direction.
58. Manguin 2009c: Slides 17, 20; for the Sambirejo find see Fig.3.1-4.
59. S162, S299, S300, S301 and an unregistered fragment of a frame, surfaced on 05-10-07.
60. <http://www.shipssupplier.com/categories-of-ship-stresses.html> accessed 2012-02-21; cf. Coates 1985.

61. Interestingly, 'in the midship part of the [Butuan 5] boat there is a large space between the lugs' (Green 1996: 97; cf. Ronquillo 1989: 68), and thus no frames. Barnes (1996: 218) reports that in the lashed-lug vessels of Lamalera the lowest stringer is interrupted over the central section of the hull, and argues that these provisions are taken 'so as not to interfere with bailing'. It would be here, however, where sagging and hogging stresses concentrate, thus easily compromising any structures that, like this stringer, would 'distribute the forcefs affecting [...] the hull throughout the length of the boat' (*ibid*).
62. Cf. pg.242 (general approach); pg.23if (examples for insular Southeast Asian practice); and Green, Burn- ingham and Museum ... 1998: 287.
63. For Southeast Asia see, eg., Liebner 1992:661?, 1993: 24f, 2004: Slides 24, 39, 40, 43; for Western ships, Bonino 2012, Dotson 1994, Harpster 2006, Pomey 2004, or Rieth 2011.
64. See Figs.3.2-16 and -18.
65. Cf. pg.260 below.
66. See pg.245. It will be noted below that at least frame station C21 about marks the centre between a proposed "block" of frames encompassed by crossbeams at C19/20 and C22/23, thus indicating that Visnikar's measurements for these frames cannot to be too far off a pattern observed at other frame stations.
67. Cf. Lorderau's arguments that the cub was only 'one of the elements of the "normalized scale" which the builder [of, here, a religious edifice] had at his proposal', a scale that for 'no reason [would] compare with the same progression as our metric scale, nor must have any point in common with it' (2007: 241).
68. 'A number whose number of divisors exceeds that of all its predecessors' (Ramanujan 1915: 350).
69. 'A number N[...] with] a very remarkable property which ought to have been perceived by the ancients [...] where] every number less than N, other than a factor of N} admits of partition into unequal parts all of which are factors of N Thus the numbers less than 12, which are not factors of 12, are 5 (=1+4=2+3), 7(=1+6=3+3), 8(=2+6), 9(=3+6), 10(=4+6), and 11 (=1+4+6), where 1, 2, 3, 4, and 6 are factors of 12' (Srinivasan 1948:179).
70. See Fig.3,2-56: any frame station marked by N/2, N/3, N/4, N/6 of the distances bow~Ci3 and C1-13.
71. Cf., e.g., Gadalla 2000: 18-9 [Egypt]; Kappraf 2002:18if [arithmetics]; <http://turba-delirantium.skyrocket.de/wissenschaft/rechen-seiLhtm> and <http://medievaljames>.



- blogspotcom/2011/05/medieval-construction-13-knot-rope.html, both last accessed 2013-09-20 [European medieval employment; arithmetics]). For the use of "folded" ropes in classic and medieval European shipbuilding see Bonino 2012: 123f
72. For a recent discussion of a number of examples for a comparable usage of 'single portions of segments [... and] integral multiples or simple fractions of a 'basic unit' in classic Mediterranean shipbuilding see Bonino 2012: 125f
 73. See pg-275ff.
 74. For the approach applied to reconstruct this value see the following section, pg.26gff.
 75. This pattern -first increasing the distances between the frame stations right aft of the constructional centre, and then reducing the lengths of the planks most aft- is comparable to the methods applied by contemporary traditional boat-builders of, for instance, Tana Bern (Liebner 1992: 29-30, 67ff)
 76. For the former, Manguin 2009b, Sugeng 2010, and Figs.3.3-7 and -8 in the following section; for the latter, Clark et al. 1993:152I here especially his Fig,14,
 77. Eg., the Sutton Hoc ship and a number of Viking vessels (Christensen 1996: yyff; Crumlin-Pedersen 2002), the Yassi Ada and Ser^e Limani ships (Bass et al. 2004; Bass and van Doorninck 1982; van Doorninck 1976; Steffy 1994: ygfQ or various cogs (Brand and Hochkireh 1995; Steffy 1994: 114f).
 78. It above has been argued that the rather rounded and uniform measurements reported by Visnikar throughout the aftship could be affected by the various concretions here covering a number of frames and the associated deformation of the remains of the stern.
 79. Cf. Liebner 1992: 7of for such irregularities in the contemporary traditional boatbuilding in Tana Beru.
 80. D. Visnikar, pers. comm., May, September 2005.
 81. Stringers along the turn of the bilges of a hull are employed in both contemporary western (e.g., Gerr 1999: îoSf, 120Q and Indonesian wooden boats (e.g., Liebner 2004: Slides 41, 46, 48).
 82. In the samples database noted as 'beams, round, 10-15 cm diameter', distinguishing these fragments from timbers probably related to floors/frames (any larger diameters) and the smaller proposed "cargo braces" discussed in Section 4.1.
 83. Based on visual inspection in the samples database provisionally classified as types 4 and 5. A number of samples of these timbers were readied for analysis, and several delivered to the Laboratory for Wood Biology at the Musée Royal, Tervuren, Belgium, in June 2007. As yet, no have been made available.
 84. Noted as such in the samples database are Si 69, 8279, S283, S288 and S305.

85. As most tree bark is prone to rot easily, it would seem rather unworkmanlike to use unstrapped timbers in an intended permanent construction. In contemporary traditional boatbuilding in Sulawesi it is explicitly forbidden to use timber retaining even the smallest pieces of bark in the construction of a hull (Liebner 1992: 76). N. Burningham (pers. comm., January 2013), however, argues that 'if the poles were mangrove wood, which is quite likely, the bark was full of tannin and actually a preservative'.
86. Cf. Horridge 1978: 40-1, 1982: *passim*.
87. Cf. Section 1.3 and the previous section, pg.232f
88. S113, S118, S119, surfaced on 50613. The fragments are distinguished from planking by an absence of tain- buku~lugs / lashing rope holes and a somewhat lesser thickness.
89. The sample database records 24 fragments of such beams on grid sections [ZF2029:ZG20-25].
90. "Non-commercial" items (here: fragments of beams and planking) were collected and recorded systematically only during the author's presence on board of the salvage vessel; hence comparable data from other locations along the tumulus's fringes is lacking.
91. Thus only a few possible fragments (S42-44, 46) of the construction could be sampled
92. See pg.28of.
93. See, for instance, the distribution of some of the valuables discussed in Section 2.3.3.
94. For the former, see Section 2.3.5; for the latter, Section 2.3.7.
95. See Section 2.3.6.
96. Cf. the Belitung wreck, where the lead ingots in the cargo were 'stacked on the ceiling timbers [over] the full length of the ship' (Flecker 2001a: 339).
97. S30, S294 and S574, all lost before they could be recorded adequately. Of these, only S30, reportedly found off starboard bow, could with some certainty be allocated on the grid (Fig.3.2-69).
98. On all three samples, the indentations were worked into their proposed "top" surface. While the opposite surfaces of S30 and S574 were flattened, on S294 that surface was rounded, conceivably to fit into a corresponding structure in the hull. The latter timber was far too substantial to have fulfilled any other function than that of a foundation.



3.3 Reconstruction

With records available for only about 40 per cent of the hull's planking and, presumably, less than ten per cent of the ship's other elements, any attempt at a reconstruction of the vessel will remain conjecture. As noted by Crumlin-Pedersen and McGrail (2006: 55), 'in most reconstruction projects there [hence] is a need for supplementary evidence from other finds, or inspired by ancient depictions of vessels', ideally of 'vessels of the same type and building tradition, and of the same or earlier date'. For the present wreck we have at our disposal only a limited number of archaeological records and iconographic representations that fulfil these criteria:¹ the region's only extant first millennium boat structure still retaining enough of a coherent shape to allow for comparison is the seventh century Punjulharjo vessel; the only detailed and roughly contemporary representations of insular Southeast Asian ships are the late eighth to early ninth century reliefs on the Borobudur. The small and fragmentary corpus of written sources on ships of the first millennium was mainly produced by Chinese travellers who generally were not mariners. There are no technical accounts, as would be the case for many a Western shipbuilding tradition.² It will consequently be necessary to refer frequently to a number of later finds and representations of such vessels, and to rely heavily on the ethnographic record.³

It can hardly be imagined that a people with a seafaring tradition of at least three mil-lennia and experience in organised maritime trade for at least 1000 years before the keel of the Nanhan/Cirebon ship was laid would construct a vessel defying the basic rules of hy-drodynamics and seaworthiness. As noted by Clark et al. (1993:117), any speculative re-construction, therefore:

would have had to meet, during the life of the vessel, accepted standards of strength, watertightness, seaworthiness and durability. The design would have to suit its purpose and function; and [...] should conform to normal stability and hydrostatic requirements.

Scantlings for most of the hull's elements -and, thus, their hypothetical strength and durability are deducible from the recorded measurements; due to the missing stem and stern arrangements, however, we have to infer the present vessel's overall size. As no traces of the inevitably rather substantial fittings for outriggers were found, she most likely was a single hulled ship,⁴

and as such should have complied with length:beam and beam:depth ratios of craft of a corresponding size and usage. The basic hydrodynamic constraints on a sailing trader would be the same at any point in time and space: Fig.3.3-1 hence lists confirm- and comparable⁵ ratios of a number of such bottoms. It is, first of all, the balance of these ratios that defines the 'qualitative assessment' of an appropriate look and feel' (Fraga. 2001: 588) of a reconstruction.

Despite their numerous pledges to the contrary, possibilities, opportunities and cooperation with the various stakeholders did not allow for the implementation of the rigorous reconstruction process recommended by McGrail (2007: 255) or applied by, for example, Clark et al (1993) or Lin (2003:15\$); the solutions presented here hence are based on virtual 3D modelling only.⁶ For reconstructing the hull shape I employed "lofted", i.e., computer-drawn "fair" surfaces (and resulting solids) generated around profiles and sections which were, as far as possible, deduced from the extant remains of the vessel.⁷ It will be noted that these surfaces in many a case closely reproduce the geometry of hull sections that had not been subject to extensive post-depositional deformation. For a vessel built "shell-first", the hull's planks are carved, i.e., not bent, to shape, and the 'sheer dynamics of the carpentry impose limitations on the hull design' (Pryor 1991: 65⁸). The resulting hull shape apparently is reproducible in virtual surfaces that are created around a small number of conscientiously chosen sections and profiles.

Any attempt at a reconstruction of a vessel found in an archaeological context leave[s] room for a wide variety of proposals', and more often than not entails an outcry for imaginative reconstructions' (Crumlin-Pedersen and McGrail 2006: 55, 56). As discussed below, the data available for the present vessel allows a well-founded reconstruction only for the hull's overall measurements and her framing. I accordingly will follow the concept of a 'minimum reconstruction' proposed by the latter authors, and limit endeavours at remodelling the ship's inner strengthenings and upper works. A conceivable comprehensive model has been presented by Liebner (2008, 2009) and Wirasantosa and Dillenia (2008), to which I will refer where appropriate. To narrow down the various options, I shall test a number of virtual drafts against constructional features observed in the previous section,



the cargo-carrying capacity of the resulting hull models and dimension ratios recorded for comparable ships. A second section will outline a number of probable arrangements of the various beams and stanchions that had reinforced the hull; a third part, then, shortly discuss possible layouts for upper works and rigging.

Hull: Overall Dimensions

Remodelling the ship's hull hinges on a number of interdependent variables, all of which are critical to her shape. As it is uncertain how much of the vessel's original height is represented by the remaining fifteen plank strakes, the hull's depth can only be estimated by a projection of the overall volume and weight of the cargo; as we are missing both stem and stern arrangements, a possible overhang of fore- and aftship -and thus the hull's eventual overall length and volume- can only be established through assaying her lines; as noted in the previous section, it was assumed in the initial drawings of the vessel's remains that her midship bottom planking was lying flat on a horizontally even sea bottom, having lost any of her initial deadrise; it has to be expected that the hull, despite being embedded in the surrounding sandbed, had "flattened out" progressively also around and above the turn of the bilge and to bow and stern, distorting any cross section (and thus estimations of her beam) that could be deduced from the ship's remains alone. To overcome these problems it proved necessary to test a number of possible solutions, not all of which can here be detailed.

Ostensibly, the elevation of the tumulus over the remains of the ship would indicate the lowest possible depth of (as to be discussed below, the planked part of) the hull. As the vessel had settled more or less upright on the seafloor, the reportedly highest point of the mound of artefacts, 350 cm,⁹ then should mark the least possible depth of the hull (Fig.3.3-2). To allow for a margin necessary to test a number of possible solutions, for the initial virtual models I presupposed a moulded depth of 400 cm.

It proved more difficult to estimate the vessel's original length and beam. Following fairly faithfully the lines of the extant remains of the ship, previous attempts at a reconstruction resulted in hull models of length:beam ratios of 2.1:1 and 2.25:1,¹⁰ far less than the length-beam ratio of about 3: Indonesian vessels very often have'¹¹ (Burningham 2003; 'Nanhan/Cirebon Wreck,

preliminary models' in Fig.3.3-1). For the present purpose I hence attempted a number of further approaches based on assumptions drawn from both interpretations of the hull's remains and the various correlatives noted above.

If the vessel's overall dimensions are to be based on the beam of the remaining structure, the hull's initial deadrise is a pivotal factor. Combined with a reasonably deep deadrise# the rather sharp lower entrance (which appears to have preserved its original shape¹²) would have helped in preventing 'slamming or pounding by the forward portion of the hull in waves' (Tunaley und.: i); conceivably a desirable quality for a vessel operating in the 'short aggressive waves of the Java Sea'.¹³ It would seem incongruous (and, with only three planks in the whole length of the garboard and the following strake, a rather intricate undertaking) for the shipwrights to continue the fine and pointed lower bows into a flat midship bottom planking.

It must remain speculation as to how far seakeeping had to be balanced with carrying capacity and necessities arising from a proposed lack of harbour and docking facilities. As a number of trial models showed, volume of the hull depends (to some extent¹⁴) on both the shape of her bilges and her initial deadrise; when falling dry, a vessel built on a keel- plank would not have to heel over a keel protruding off the lower hull's planking, but could settle fairly easy on her floors, thus considerably reducing her initial list;¹⁵ however, careening as [to be] done regularly, for repairs and to prevent weed growth' (Horridge 1979b: 10)- can be carried out efficiently only if the hull actually leans over.¹⁶ Withal, to the best of my knowledge none of the existing models and drawings of planked ships indigenous to the region display the flat bottom planking so characteristic to historic cargo vessels of Europe and, partly, China.¹⁷

Assuming the hull's reported starboard list of about 10° to the seabed as her initial deadrise¹⁸ cross sections taken off the accordingly "adjusted"¹⁹ extant starboard planking at C13 and C14 turn out a beam of more than 10 m; extending C14, here provisionally taken as the point of widest beam²⁰ to the projected overall height of 400 cm results in a beam of about 10.6 m (Fig.3.3-3). A vessel with a length:beam ratio of 3:1 would, then, have a length of about 31.8 m, thus effecting an overhang of >35%.²¹ My best attempt at modelling pertinent bow and stern profiles -a high raked bow following the angle of the bow-wing's protruding "cheeks", and, as intimated on the Borobudur



reliefs and the seventeenth century Dutch illustrations of *Jong* discussed in Section 3.1, a rounded aftship- produces a look and feel' rather unusual for a medieval merchantman (Fig.3.3-4), with beam:depth and keekbeam²² ratios hardly comparable to other ships of (not only) Southeast Asia (Model (i) in Fig.3.3-1).

However, around C12-18, i.e.v mid-aftships, cross sections taken off virtually solidified NURB surfaces generated along the above assumptions²³ follow reasonably close the lines of the extant planking if angled onto the assumed midship deadrise (Fig.3.3-5). By its very nature, NURBS modelling generates fair lined shapes which approximately replicate the "natural" flow of a surface bound by the points they pass through;²⁴ compliance of the reconstructed and extant contours hence appears to indicate that at least around the midship sections the hull's remains had not lost all of the vessel's original lines, and that the choice of stem/stem profile-Ci4 as delineators for a virtual surface is genuine enough.

By its very look and feel', a lightly raked bow line would appear as a cogent extension of the prow of the bow-wing, and comply with the few readily comparable archaeological remains²⁵ as well as the representations of planked ships on the Borobudur.²⁶ A virtual model generated around such stem and stem profiles and, based on the resulting overall length, a lengtkbeam ratio of 3:1 at C14 turns out a hull shape not unlike the Punjulharjo ship,²⁷ which Manguin (2009b: 4) 'by extrapolation [...] estimated preliminary [as] íym in length, [with] a beam of 5.7m, and 2.3m depth' (Fig.3.3-6, -7, -8). Tests models based on the above assumptions and the proportions proposed for the Punjulharjo wreck result in hulls with, depending on her cross-sectional shapes, a carrying capacity between approximately 115 and 140t, much less than the wreck's estimated cargo of at least 225 t²⁸ (Fig.3.3- 9). With a mere 28 m³ difference of volume between the two most divergent shapes there also is no significant effect of varying angles of deadrise and/or shapes of the turn of the ship's bilges onto the hull's overall carrying capacity.

Fig-3-3'10 shows an attempt at projecting the vessel's extant starboard planking into a half-model of the above dimensions and an assumed 5° of initial deadrise over a hard bilge; I chose this model as it allows for the highest displacement and the largest girth of all models presently tested. Without adding any possibly lost strakes, a hull of this shape would have an

approximate freeboard of about 45 cm when carrying the assumed minimum cargo (broken magenta line in Fig.3.3-9). The resulting beam:depth ratio (Nanhan/ Cirebon Wreck, Model (ii) in Fig.3.3-1), however, places this model with a number of much smaller types of vessels of the region and highly specialised ships of completely different traditions, such as the high-boarded galleons of the sixteenth century, Spanish nau or the Dutch fluit. It will be noted that strakes X and XII, assumedly carrying stringers along the turn of her bilges, here are placed markedly higher than proposed.

The projection in Fig.3.3-10 also highlights the extent of deformation along starboard bows: the forward planking of strakes VII-IX had not only "flattened out", but had evidently been "tom off" the hull's initially fair lines which to a considerable extent are still preserved in the rest of the remaining planking (Fig.3.3-11). The most prominent rupture is visible around C5-6, where the site drawings show a distinct turn to downwards and off the lines of the preceding and following sections.²⁹ Its shape, here amplified by the virtual "re-arrangement" of the planking, seems to remind more of the effects of a sudden impact than of a gradual disintegration, and thus underlines my impression that the deformation of starboard bows could be due to an abrupt shift of the ship's cargo at the moment when the vessel touched the seabed. The relatively high degree of compliance of the midship sections with the virtual 3D model, however, again suggests that the computer generated surfaces about emulate the initial shape of the hull, implying that her lines can be approximated in mathematical models.

To fashion the fair run of a hull's planking to fore and aft, both her beam and the girth of her cross sections have to gradually Taper" to bow and stem. Values to estimate such curves can be taken off (i) the hull's beam at a number of "lifts", i.e., horizontal lines running parallel to the waterline of the ship, and (ii) the girth of the planking up to these lifts, here assumed as approximating the length of sectors of the cross sections' perimeters. For the present purpose, data was generated along lifts placed at (approximately) midship height of strakes X, XIII and XIV of models of the hull's starboard remains angled to both 5° and 10° initial deadrise. Beam of the lifts, (i) above, was measured between weatherside hull and half-breadth keel at the available frame stations (Fig.3.3-12, -13 for, respect, 5° and 10° initial deadrise); girth, (ii), over the planks' widths inside the hull (see Fig.3.2-17). The resulting values



then were entered into a spreadsheet program and charted as functions of {length over keel: beam / perimeter} (Fig.3.3-14).

The resulting graphs clearly reflect the deformation of the hull around the plank scarf joints and under the weight of the concretions in the aftship,³⁰ in the figures marked by transparent colours. Omitting a number of "stray" measurements taken at distorted frame sections, second order polynomial functions predicting the progression of curves based on these values arrive at about comparable results for the measurements of both the hull's half-breadth at lifts and its girth (Fig.3.3-15). The curves would represent the length of the hull at the height they were taken at; when attempting to transfer the resulting values into a concordant hull model with a lengtkbeam ratio of 3:1, however, it was unavoidable to adopt a number of compromises at, especially, the stem profile³¹ (Fig.3.3-16). The solution proposed here assumes an initial deadrise of 5° and a rather hard turn of the bilges, shaped around the supposition that the more radical changes in the rise of the hull's floors to her sides would occur along the more narrow strakes. If a first rise off the initial deadrise is placed at strake VI, following Visnikar's section drawings the narrowest plank of ship's bottom planking, the turn to the topsides should start at strake IX, and rise more drastically along strakes X-XII (Fig.3.3-17). Strake IX has above been noted as the point where the framing is partitioned into floors and futtocks, here, conceivably, as a straightforward method to shape frames that could effortlessly follow the turn between bottom and side planking (see Fig.3.2-47); strakes X and XII were proposed as accommodating stringers at approximately the turn of the hulls bilges (Fig.3.2-59).

As shown in Fig.3.3-18, this model could have carried 3001 of cargo and still have a freeboard of about 85 cm. If built up to the extant strakes alone, such a hull would bear sufficient depth to hold the assumed minimum cargo while still retaining about 50 cm of freeboard (black broken line in Fig.3.3-18). An actual ship, however, would not have the straight sheerline and rather low beamrdepth ratio of this "raw" simulation (see Model (iii) in Fig.3.3-1), but should include some of the features common to ships of the area, all of which necessarily influence her cargo carrying capacity. Figs.3.3-19 and -20³² show models based on the general shape discussed above, here sporting hulls of an approximate³³ height of 15 (Model (iv)) and 16 (Model (v)) strakes. With a reasonable sheer³⁴ and the raised side planking \$top[ping]

a short distance aft of the bows, and a square transom built across this point' (Gibson-Hill 2009 [1950a]: 18) noted consistently in the ethnographic record and early representations of Southeast Asian vessels,³⁵ the two models load considerably less than their "raw" prototype: laden with 2251, a vessel build around the extant 15 plank strakes would have a midship freeboard of not much more than 30 cm; a hull with 18 strakes is left with about 60 cm of midship freeboard when carrying 2501 of cargo (both estimates marked with broken lines in Fig.3.3-18). Although to me the former hull has the more appropriate look and feel¹ of an insular Southeast Asian vessel,³⁶ it is the latter of these two models that presents a beamrdepth ratio roughly comparable to ships of matching sizes found in both the area and the historic record (see Fig.3.3-1). As it allows for less demanding developing in 3D space³⁷ Model (v) will be used in the following as basis for further illustrations.

Judged by the ethnographic record, the rather hard bilges and vertical topsides of these models are relatively uncommon³⁸ features for ships of insular Southeast Asia: as shipwrights have to obviate the possibility of dowels breaking through the planking, edge fastening limits the 'acuteness of the angles which could be achieved at critical points, such as the turn of the bilges amidships' (Pryor 1994: 65; cf. Fig.3.3-23 below), hence necessitating more rounded shapes. Figs.3.3-21 and 22 outline models with such a midsection, generated around the delimiters discussed above for Models (iv) and (v) and an initial deadrise of 10°. The "natural and fair" run of the hull's lines produced by virtually modelled surfaces necessarily follows the criteria given; the computer program, thus, here posits that the flared topsides of Models (vi) and (vii) dictate a somewhat fuller fore- and aftship than it assumes necessary for the straight sides of Models (iv) and (v). Due to its reduced girth at midsection³⁹ and the steeper deadrise, the extant planking rises approximately 40 cm higher than that of Model (iv), and to more than 4 m if assuming an additional strake XVI (Fig.3.3- 23). As noted in Fig.3.3-18, Model (vi), build up to the extant 15 strakes, could carry a cargo of 2501 while amidships still retaining a freeboard of about 40 cm; for Model (vii) with its additional strake freeboard increases to about 90 cm, a fairly realistic value. Although considerably lower than found on contemporary traditional ships of the area,⁴⁰ the latter model's beamrdepth ratio falls well into the range of the majority of comparable historic vessels referred to in Fig.3.3-1. Within



the given parameters, lines and size of a Model (vii) hull thus would seem to give us the best possible impression of the shape of the ship here under discussion. Changing deadrise, beam and depth or various adjustments to the hull's lines, however, would allow for 'an almost infinite number of other possibilities' (N. Burn-ingham, pers. comm., January 2003).

Hull: Arrangements of Internal Strengthenings

As no systematic records of the placement of the various cross- and lengthwise beams are available, a reconstruction of position and number of any of the hull's structural members other than the extant frames and three possible stringers has to remain guesswork. The visual documentary shows a number of longitudinally laid timbers, but only one of the crossbeams the former seem to have rested upon is clearly discernible on the available video recordings (see Fig.3.2-65). Barely visible on the same recording are a probable beam embedded in ceramics, apparently placed perpendicularly below the crossbeam just mentioned (Fig.3.3-24), and a possible fragment of another crossbeam and an associated longitudinal at some place to portside aft of the former timbers (Fig.3.3-25). On requests, divers also reported of two allegedly major beams in the vicinity of frames C6-7 and C8, and a further thwart somewhere above the proposed 'tween-deck at C11-13. No details on the sitings of such beams are available for aftship. These crossbeams, which in all probability were placed upon stringers,⁴¹ would not only have a central role in the arrangement of the hull's internal framework (thus, e.g., outline the *petak* cargo spaces mentioned in the maritime law codices⁴²), but are also critical in moderating and distributing various stresses tending to deform the hull.⁴³

While in the Punjulhaijo wreck thwarts (and associated stanchions) apparently were placed at each *tambuku*-lug, the available documentary suggests that at least throughout the lower parts of the hull this not the case for the present wreck. Evidently, a "dense" placement of crossbeams and any associated timbers would have severely cluttered the cargo space of the vessel and, consequently, hampered loading: the possibly best reference for a practical size of such compartments, the bulwarks dividing the hulls of ships build in the South China Sea tradition, are on average spaced apart well above 125 cm,⁴⁴ more than 50% above the average 82.75 cm distance

between the frames in the present vessel.

The rather elegant solution attempted in the preliminary reconstruction of the vessel⁴⁵ was based on the assumption that the remains of the 'tween-deck in the central sections of the hull were placed atop frames C12-14 and supported by crossbeams secured to, respectively, aft and fore of these two frames, thus underlining the central position of C13 (Fig.3.3-26). It was also assumed (and will be discussed presently) that mast tabernacles would have been placed at C1-3 and C10-12, thus necessitating reinforcement of these frames by crossbeams. Additional beams then were plotted as symmetrically as possible over the remaining parts of the hull. While this interpretation is not supported by a more detailed examination of the 'tween-deck's position (see Fig.3.2-71), it however outlines an overall layout for a division of the hull into the *petak* compartments so consistently mentioned in historic sources.

Judged by reference to other objects visible on the video recordings,⁴⁶ the thwart on Fig-3-3'21 and the crossbeam of Fig.3.2-65 apparently placed above it were positioned about midway between frames C3 and 4, where they would have to be secured to stringers connecting the futtocks. Video recordings show at least four horizontal "layers" of longitudinally laid timbers in the lower parts of the hull, and we consequently would suspect a corresponding number of crossbeams onto which such timbers could be placed. Depending on the hull's working in, for instance, rough seas, any of these thwarts would convey different stresses than any other; if such a "column" of crossbeams were lashed to the frames that here hold the ends of plank scarfs, the kinetic energies carried by the beams would be spread onto the joints and possibly endanger the integrity of the evidently frail "stack" of scarfs.⁴⁷ If, on the other hand, the crossbeams were placed in between frames, they would transmit the strains they are subject to onto the stringers they are placed upon, and thus only indirectly onto the framing and the associated "stacks" of plank scarfs. Although employing a different approach, such an arrangement would be consonant with the Western method of fitting thwarts onto 'beam shelves [... that] spread their loading [...] to the rest of the framework [of the hull] and only indirectly and slightly into the planking' (Roberts x994: 25)-

Based on the divers' reports and assuming the same reasoning for the following scarf joint "stack" to aft, the next crossbeams would have been



placed in between C6-7, thus encompassing frame stations C4-5-6. The sequence of distances between these three frames is repeated at C7-8-9 (see Fig.3.2-57); we hence could suppose a further set of thwarts between C9 and 10. Roughly doubling the space between these two "columns" of crossbeams leads to C13, the proposed central frame of the hull, again encompassing three frames (C10-11-12); at least one crossbeam, in all probability positioned atop a stringer lashed to strake XII, would here be needed to carry the aft expanse of the tween deck (see Fig.3.2-71). The same pattern of placing crossbeams in between groups of each three frames could be continued throughout to stern, where the beams then again would be placed in between the frames securing the aft plank scarfs (Fig.3.3-27). The measurements noted below the keel indicate that crossbeams placed in between frames are spaced about equidistant from the respective central frame in the groups of three frames they encompass. As observed in the discussion of the various relational dimensions that outlined the hull's blueprint, the thwart's positions thus could have been used to establish, at least, frames stations C2, C5, C8 and C11, which otherwise are undefined by or have to be calculated as complex fractions of the lengths defining the frames stations (see Fig.3.2-56).

As video recordings indicate that the longitudinal timbers are of a smaller diameter than the crossbeams, the distances in between the thwarts proposed above would seem to be extended too far for a secure support.⁴⁸ Marked in light brown in Fig.3.3-2 are a number of additional thwarts, placed midway in between the former crossbeams, which could reinforce the longitudinals. Of these at least the beam at C11/ strake XII would be required to carry the forward extremity of the tween-deck. A possible extension of the deck into the foreship then could have been laid from here to the proposed beam midway between C9-10⁴⁹ (see inset in Fig.3.3-27). To allow for enough space for secure lashings, these thwarts could not have been placed "head on" to the vertical centre of the frames, but, as observed on the Punjulharjo wreck, the lashed lug boats of Lamalera⁵⁰ or the *belang* of Aru, would have been somewhat offset to fore or aft of the futtocks.

Applied to the frame stations around Ci3, this pattern proposes the placement of two "columns" of crossbeams in between C13 and the frames to its fore and aft, marked in transparent red in Fig.3.3-27. The ship's builders evidently were well aware of the effects hogging and sagging would have

on the construction, and apparently for that reason had not provided lashing rope holes for the floor planking at this frame station.⁵² Dividing the longitudinals and supporting them by separate crossbeams to fore and aft of C13 could have avoided convergence of possibly opposing forces along the timbers' lashings. Such an arrangement, however, would have left the aft section of the proposed 'tween-deck un-supported and cluttered the space above that deck. If two "columns" of thwarts were used, they might have been placed closer to C13 than, as implied by the pattern used at other frames stations, equidistant between here and, respectively, C12 and C14. I marked this solution in transparent brown.

As coherent as they may seem, these arrangements are, nevertheless, subject to a number of questions. Firstly, the beams assumed in between C16-17 and C19-20 partly coincide with blocks of concretions that do not show the 'transverse gaps' produced 'by tiers of lashed thwart beams' that Flecker (2002: 139) proposes for the Java Sea wreck. It is possible that the concreted iron implements here were packed around (and thus enveloped) the crossbeams; as their height was not logged, it likewise is conceivable that these concretions had been stacked below a first, now lost, beam. However, while Visnikar between C16 and 17 recorded a fragment of a stringer above strake XII (Figs.3.2-7, -60), he did not note any associated beams. Even if we, secondly, assume "double" crossbeams around C13, the thwarts around midships are spaced significantly farther apart than in the rest of the hull. It is here where most of the considerable strains that prise apart the hull when working in high seas occur⁵³ and a tighter placement of thwarts would be expected. It is possible that some of these strains to fore were compensated by additional crossbeams at Cio-12 that, as to be discussed presently, might have held the vessel's main mast; aft of C13, however, this could only be achieved by randomly adding further beams.

Hull: Timugh-Beams; Fittings for Mast and Rudders

It would seem rather imprudent had the builders placed beams only upon stringers: the above stresses are countered most effectively by linking beams with the hull's upper side planking. One common solution, through-beams interlocked with plank strakes⁵⁴ is shown on two of the ships depicted on the Borobudur⁵⁵ and the Belitung wreck and a number of recent types of



vessels from the Western Indian Ocean and Indonesia⁵⁶ employ (ed) such thwarts. None of the extant planks of the present vessel, however, exhibit the slots necessary to mount through-beams.

By their very nature, lashed-lug ships would be (more or less⁵⁷) flexible structures. Any joints between beams passing through and interlocked with the planking would, inversely, form rigid assemblies, and stresses transmitted through such an arrangement could easily compromise the more pliant lashings of frames, stringers, thwarts and stanchions.⁵⁸ Therefore, perhaps, are the cross-beams projecting over the sides of the more detailed ships depicted on the Borobudur apparently placed atop the planked sections of their hulls.⁵⁹ As described for, e.g., the Lamalera *tena*,⁶⁰ here these thwarts could have been notched to be fitted over the sheerstrakes. On the vessel on panel 1.86 of the Borobudur such beam heads apparently are topped by a longitudinal "sheer-timber"⁶¹ that is positioned to weatherside of the frames and above the actual sheerstrake (Fig.3.3-28). If lashed to the beams and frames, such a "sheer-stringer" could suggest a solution that counterbalances stresses attempting to "open" the hull without effecting the excessive concentrations of strains arising in a rigid assembly of thwarts and planks.

Compared to the distances between the other frames, the greater proximity of C1-3 and C10-12 suggests that the shipwrights here had anticipated structural features in need of additional support. In the preliminary reconstruction of the vessel it hence was assumed that these frame stations mark the positions of masts.⁶² While the tops of the two- masted vessels depicted on the Borobudur generally are placed at about thirds of their deck-lengths, a number of European illustrations of ships of the Malay Archipelago of the late sixteenth and the seventeenth centuries⁶³ depict masts placed slightly to fore of midships and in the bows of the vessel. As shown in Fig.3.3-29, the masts of the probably most detailed of these drawings, the 'Javanese *jong* in the report of the first Dutch voyage to the Far East,⁶⁴ approximate the positions of the frames noted above. Marked in the figure are, too, frame stations C23-25, the counterparts of C1-3 if mirrored over C13, that here about correspond with the lateral rudders of the *jong*.

Judged by the examples on the Borobudur⁶⁵ and the historic and ethnographic record,⁶⁶ a mast would have been stepped onto the vessel's deck, in an arrangement that allows to pivot and, eventually, strike it. This

assembly would have to absorb the considerable forces masts exert on a hull, and thus, in all probability, requires additional horizontal and vertical strengthenings. On most of the recent types of larger sailing cargo vessels of the area as well as on a number of historic models, masts are held in tabernacles that are firmly embedded into a dedicated framework of thwarts, floors and other supports.⁶⁷ Assuming that the builders of the present vessel had intended to spread the masts' load over the three frames here indicated as their fittings, the two-legged masts of the Borobudur ships would seem a rather unbalanced solution: the required tabernacles then would have been held by only two of the three crossbeams. Following the examples of the models and recent vessels mentioned above, the preliminary reconstruction of the ship hence adopted tabernacles for tripod masts (Fig.3.3-30).

However, the ship on panel 1.53 on the Borobudur, the only relief allowing an unob-structed (and rather well informed) view into the hull, does not show any internal strengthenings other than frames and stringers (see Fig.3.2-61). Heide (1928: 350, Fig.IV; 355/ Fig. VII) assumes that the masts of the Borobudur vessels were stepped onto the extremities of crossbeams, where they could have found additional support in stringers and/or the futtocks the thwarts were attached to. The ethnographic record also notes a number of alternatives to tabernacles, as, for instance, the large wooden fixtures [... that] act as pivots' for the two-legged masts stepped 'over the [mast] thwart' observed by Barnes (1996: 219) on vessels of Lamalera. Similar to such an arrangement, on the present ship the major beam reportedly found atop the 'tween-deck could have functioned as base for forked mastshoes of bipod masts. However, it is hardly possible that a single crossbeam alone could have contained the considerable strains masts and sails of a size appropriate for this vessel would exert: a structure able to distribute such stresses should have employed a number of additional thwarts, lengthwise timbers and stanchions - of which, possibly, no remains were found, or no records taken.

Equally, no records of (fragments of) steering devices and/or their, judged by the vessel's size necessarily rather substantial, fastenings are available.⁶⁸ The main rudder beams on the Borobudur vessels are, invariably, single rounded timbers protruding through the upper stem planking; only the ship on panel 1.53 shows what would seem to be a rounded "upper bracket" and a number of additional fastenings to aft of the rudder shaft (Fig.3.3- 31). Both



Erp (1923: 21) and Heide (1928 *passim*) assume that at least the bigger vessels depicted on the temple would have carried rudders on star- and larboard, and none of the reliefs shows the central post on which the single lateral rudders characteristic for contemporary Javanese and Madurese vessels would be suspended.⁶⁹

Except for the apparently forked or “bracketed” rudder beams shown on Eredia’s drawings (see Fig.3.1-28), I know of no other early European representations of insular Southeast Asian ships that show details of rudder fittings. Most of the illustrations, however, show pairs of quarter rudders or stern arrangements that would obstruct the unavoidable shifting of a single rudder. The ethnographic record notes a wide variety of rudder fastenings, where ships designed for far-distance voyaging use often rather complex structures employing more than one beam:⁷⁰ a single timber could not effortlessly secure a rudder attached to it in an approximately vertical position and would not allow to counterbalance the considerable stresses the blade of a lateral rudder is exposed to. Following Burningham’s arguments (2000: i03ff), I for this vessel would assume an assembly based on his ‘group 1’ type.⁷¹ How the necessary beams were fastened –and whether they, as in a number of contemporary vessels of the region, would be extended into an overhanging aft deck (see below)– remains speculation.

Semi-Permanent Assemblies?

The visual documentary and a number of samples suggest that atop the thwarts lengthwise timbers were laid. The possible arrangement of these timbers in Fig.3.3-32 is loosely based on numbers and positions of the longitudinal timbers visible in the mound of ceramic cargo over the foreship on video recordings taken in August 2004. While this assembly produces the ‘look and feel’ of sufficient structural strength for a vessel of this size, the dimensions of the compartments bound by these timbers apparently would limit the sizes of cargo items that were to be loaded into her hold and severely confine the space available for manoeuvring freight consignments (Fig.3.3-33). In the case of the ceramic cargo⁷² such obstructions could easily lead to increased breakage.

It is conceivable that a number of crossbeams and most of the longitudinal timbers were rigged in course of the loading process: laid successively on top

of those sections of the hold's compartments that are already sufficiently broken down, such timbers could have functioned as both dunnage and a framework that provided treads for stevedores and their hands when stowing further "layers" of cargo. I noted above that there is reason to assume that the positions of the thwarts placed in between frames are related to the overall layout of the hull; these beams, thus, should have been a more permanent part of the hull's inner strengthenings. Both those crossbeams positioned about equidistant in between the former as well as any longitudinal timbers, however, could have been laid alongside with the cargo consignments.⁷³ As we are missing detailed records of the placement of the various beams, Fig.3.3-34 can only outline a general concept: lashed, and thus detached and reassembled without much effort, the arrangement of these beams could have been adapted to any possible requirements arising during the lading of the ship.

Rig

Based on representations and models of historic vessels of insular Southeast Asia as well as the ethnographic record,⁷⁴ one would expect the vessel to have been rigged with tilted rectangular *tanja* sails. I above proposed that masts were stepped at frame stations C1-3 and C10-12; we thus could envisage that the ship carried a main mast at around midships and a, possibly,⁷⁵ shorter foremast in her bows. Such an arrangement is suggested by Burningham (2000:118) for a reconstruction of Lodewijk's Javanese *jong* and was adopted in the preliminary reconstruction of the vessel here under discussion (Fig.3.3-35). However, this solution contradicts both the two-masted ships depicted at the Borobudur and a number of recent *tanjarrigged* bottoms, all of which set main-mast and -sail at about one third from the bow and aft carry a considerably smaller mizzen. Smaller foresails and bigger main, on the other hand, are a consistent feature of vessels rigged with oceanic lateen' sails, in the Malay Archipelago generally carried by Madurese ships.⁷⁶

Sizes of masts and sails can only be guessed at. A *tanja* rig based on the approximate dimension ratios of modern *patorani* (Fig.3.3-36⁷⁷) would seem exaggerated: its main could not clear the foremast, while the foresail has to be set inside the main - an unwieldy arrangement of doubtful aerodynamics



(Fig.3.3-37). The foremast in Bumingham's reconstruction of the late sixteenth century *jongs* sailplan hence is raked and stepped far into the bows. In any case, the boom attached to the loose foot of a mainsail of about 400 m², the size here indicated for the present vessel, would prove an unhandy affair in any but the most favourable conditions, and setting such a sail on the pivoting bipod of the Borobudur vessels appears a parlous gamble. If the main was not raised on a bipod, it would seem peculiar to suppose such an arrangement for the foremast.

A cargo vessel should carry a sufficiently powerful, wieldy and balanced rig; these qualities would be critical, first of all, on upwind courses.⁷⁸ One would expect mainsail and -yard to run clear of the foremast, and the foresail to be set to lee of the main. Fig.3.3- 38 assumes such a rig, based on two sails of similar size with headdeech ratios of 1:0.5, set at points of 0.6:0.4 of the yard,⁷⁹ and, as about usual for a reasonably closehauled course, tilted to 30°. The "traditional" method of assuming the sails' geometric midpoints as their centres of effort (CE; green) arrives at a lead of 4.5 % of the waterline of an amply laden hold;⁸⁰ estimations using Palmer's revised approaches (2009a; blue⁸¹) seem to indicate a rather well-balanced vessel with a slight weather helm. Arguably, we should not expect a high inclination for luffing: to avoid her sails ending up on the masts' weathersides, a *tanja*- rigged ship would -if ever⁸²- be tacked by beforehand taking in and shifting her sails, and excessive weather helm hence might be as precarious as lee helm. As the vessel would have carried lateral rudders, she too could not benefit from the additional lift produced along the lateral plane of a hull with a median rudder laid slightly weatherly⁸³ and not convey to the helmsman the "apposite feeling" of a weather helm (c.f. Palmer 2009a: 95),

As to be expected, shortening foresail area⁸⁴ moves the sails' combined CE to aft (Fig.3.3-39) - but, judged by the "traditional" approach of comparing the positions of the centre of lateral plane (CLP) and CE, perhaps too far for a well-balanced rig. While this deficiency could be tallied by changing the position of the halyard of the foresail, to, for instance, the 0.5:0.5 ratio of yard length reported for the sails of a number of example ships, such an arrangement would perceivably underexploit the possible potential of the foresail when sailing closehauled. Besides, the resulting sailplan is not supported by any of the models, historic representations or recent examples

known to me.

Fig.3.3-40 tests the centroids of a "traditional" rig of the area that regularly employs a smaller foresail, the Maduran oceanic lateen' mentioned above, here approximating ratios reported by Blake (1929). With the given positions of the masts the combined CE of Blake's original rig falls far behind the CLP, in all probability resulting in a vessel with excessive weather helm. Applying the conventional corrective of increasing foresail size (marked in broken lines/yellow in the figure) causes the CE of the fore to move considerably aft, and thus does not effect a significant change of the combined centre of effort of the sails.

Within the parameters proposed above it evidently is Lodewijk's representation of a *tanja* rig with fore- and mainsails of about the same size that provides the most probable solution, here, very possibly, with sails of a somewhat smaller area to aft of the masts than assumed in Fig.3.3-35.⁸⁵ Such an arrangement would move the centroidal axis of the yard closer to the point the halyard is attached to, and thus greatly ease handling of the sails.⁸⁶ Though by their look and feel' perhaps somewhat undersized for the present vessel⁸⁷ sails approximating the ratios of a 'Javanese tanjd proposed by Burningham for a reconstructed *jong* hence generate a lead that would seem sufficiently acceptable by "traditional" Western approaches (Fig.3.3-41).⁸⁸ However, a *tanja* rig is a rather versatile affair, and altering sail sizes, halyard points and tilt of the yards allows for numerous alternatives.

Decks md Upper Works

Sails were possibly not the only means of propulsion. A number of the vessels depicted on the Borobudur⁸⁹ display oars, and Chinese sources of the early second millennium report of cargo vessels with sweeps so big that one had to be rowed by four men¹ (Ku- wabara 1928: 68⁹⁰). Descriptions of ships in Southeast Asian literary works of the first half of the second millennium mention crewmen particularly tasked with rowing and paddling;⁹¹ nineteenth-century traders and raiders of Sulawesi and the southern Philippines were equipped with (rows of) sweeps,⁹² and unmotorised *pinisiq*-schooners of the twentieth century were rowed through calms.⁹³ The velocity achievable with a heavily laden merchant vessel under oars could not have been impressive⁹⁴ - rowing through the tedious hours and days of a calm, however, would provide



an entertaining and disciplinary diversion for crew, officers and passengers alike, and sweeps could prove helpful when manoeuvring the vessel in, for instance, a confined anchorage.

Heide (1928⁹⁵) proposes that the sweeps of the Borobudur vessels were operated from rowing galleries' that project over the sides of the ships. Erp (1923: 19, 20), on the other hand, sees the rowers seated on a 'deck in the hold', fitted on crossbeams that Together with the lengthwise ribs form compartments which correspond to the rowing-portholes'; the trusses of these galleries then would have formed 'a framework for a shed that could have been covered with mats or an awning'. Weather-screens of matting or attap could also be employed to close the portholes in higher seas.⁹⁶ A reasonably detailed drawing of a Moluccan kora-kora of the early nineteenth century⁹⁷ combines both possibilities: here the rowers inside the hull sit on beams that support a gallery projecting over and along the gunwales, upon which a second row of oarsmen is seated. Comparable arrangements are found on drawings of insular Southeast Asian privateers of the late eighteenth and early nineteenth centuries with their up to three banks of sweeps.⁹⁸ Fig.3.3-42 illustrates a possible arrangement of such rowing galleries for the present vessel.

On all of the above representations of ships, the various timbers associated with the rowing galleries are integral part the vessels' upper works. Although not referring to the bottoms 'resembl[ing] covered galleries' noted in the eighth-century Taiping Yulan,⁹⁹ the interpretations of the Borobudur reliefs assume that rowing deck and galleries would be topped by a further deck level. As supposed by Heide (1928: 346, 350, 354-5), the sailing replica of a 'Borobudur vessel',¹⁰⁰ *Samudra Raksa*, was fitted with a planked structure raised above the crossbeams the framework of the rowing decks was placed upon; noting the rowers inside the hold, Van Erp (1923: 30) contrariwise suggests that the topmost deck would be supported only by the framework of stringers, trusses and stanchions depicted on the reliefs, an arrangement followed for an earlier replica of such a vessel, *Damar Sagara*.¹⁰¹ The reliefs seem to support the latter interpretation: while the rowers shown on panel 2.41 are seated behind portholes that appear to be cut into what could be the upper side planking of the hull, the top deck nonetheless is placed upon the stanchions and stringers that frame these openings (Fig.3.3-43); the ship

on panel 1.108 shows only stanchions as frames of the portholes;¹⁰² relief 1.53 allows a view throughout the hull to the opposite sides of an empty hold, and the top deck here seems to be carried by frame- heads and a number of stringers attached to these.¹⁰³

The deckhouses on the four bigger vessels on the Borobudur appear to be small and are unlikely to represent all the accommodation space in the ship' (Burningham 2003).

The deckhouse of *Samudra Raksa* hence is but a large skylight atop a cabin in between the raised sideplanking. For *Damar Sagara* it was assumed that the hut's floors would be level with the rowing deck, and a number of platforms resting on the various beams of her superstructure were added. The reliefs, however, clearly show the huts placed above the top deck; any additional accommodation, then, would be placed on the rowing deck. Both 'Borobudur replicas' were fitted with planked weatherdecks running over the whole length of the hull¹⁰⁴ - on panel 1.86, however, the topmost deck is assembled from traverse single grating (QFig.3.3-44). A possible arrangement of accommodation space under such a deck might be echoed in an early Portuguese description of the upper works of a merchant vessel seen in Cannanor:

In lieu of decks, the hold was built up with huts and compartments [...] covered with plaited palm-leaf thatch, acting as roof; [...] on top of these thatched roofs they would dispose strong lattice-work, on which one could walk without damaging the huts below. (Pearson 2008 [2003]: 65, quoting Correia 1858-6)

Reliefs 2.41 and 1.86 show additional structures that could be interpreted as raised aft decks for the helmsmen, and the latter vessel depicts a flat unrailed platform projecting over the stem that reminds of the overhanging poop-decks on historic and contemporary vessels from Sulawesi and the Straits areas.¹⁰⁵

Fig.3.3-45 attempts to adapt the above assumptions onto hull model (v) of the Nan- han/Cirebon vessel. I here follow Petersen's assumption (2006: 53-4, and his Fig.8.7) that 'the frames were extended to the full height of the rowing-gallery', on top of which a further deck of single grating and a deckhouse would be placed on additional thwarts and longitudinals. The



unavoidably rather imaginative results raise the question how such a ship could have been laden efficiently; if we are to follow the placement sequence of the various cross- and lengthwise beams proposed above, we have to assume that a number of the timbers carrying the decks were disassembled before unloading, and reassembled when the hold was sufficiently filled. This could have allowed to adjust the layout of cargo space and decks to any necessities arising during loading; on the other hand, such labours would undoubtedly have been a drawn-out process that could have endangered the structural integrity of both hull and superstructures if not carried out with proficiency. Besides, constant dis- and reassembling would not permit employment of firmly rigged structures like permanent cabins or planked decks: instead of planking, I in Fig.3.3-45 hence have opted for the weather-screens of matting and attap still today used as easily removable covers for any openings in the superstructures of ships.¹⁰⁶ The rather high upper works also form a large windage area that could not have improved the vessel's manoeuvrability, speed and seaworthiness, and it would be an interesting exercise to compute the ship's metacentric height when carrying an adequate number of passengers, crew and their goods and provisions on her topsides.¹⁰⁷

Most models and representations of Southeast Asian bottoms displaying extensive upper works depict vessels of war, raid and plunder.¹⁰⁸ The possibly best example for such a vessel would be the bronze ship model known as the Mt. Dobo boat¹⁰⁹ with its well-armed warriors stationed on the various platforms raised above the hull. Birmingham's opinion (2005:10) that the Borobudur vessels are "war galleys" has been discussed in Section 3.1 (pg.235f): one would indeed expect an ocean-going cargo vessel not to parade a maze of intricate (and, as noted above, for loading purposes rather impedimental) galleries and decks, but to be fitted with the clear decks and easily accessible hold that characterise the sturdy and seaworthy overall layout of its class.

A number of smaller and less detailed reliefs on the Borobudur depict vessels that by their narrative context are marked as merchant vessels.¹¹⁰ None of these carries the galleries and balustrades that in the case of the imaginative reconstruction in Fig.3.3-45 remind more of the flightdeck of a World War II escort carrier than of the topsides of a cargo ship. Fig.3.3-46 illustrates the more austere layout common to a wide variety of (not only)

insular Southeast Asian traders, indicated in historic models¹¹¹ as well as the ethnographic record¹¹²: a large hatch between the masts and under a deckhouse behind the main allows for both a freer access to the hold and stowage of deck cargo; coamings around the hatch and planked decks on forecastle, stem and along the gangways could prevent water break-ing over the hull to enter the hold;¹¹³ a raised poop¹¹⁴ built above the aft sheerstrakes would provide for a bridge deck. The reader, however, should be reminded that attempts at reconstructing possible superstructures for this vessel are pure conjecture, and that we could easily devise an ample number of alternatives.

Bermula akan ma'lim itu hendaklah ingat-ingat ia akan pelayaran di laut dan di darat, akan angin dan ombak dan harus dan dalam atau tohornya lautan dan bulan dan bintang dan tahun dan musim dan telok dan rantau dan tanjung dan pulau tukum dan terombu dan karang dan beting dan busong dan gunung dan bukit, maka sekaliannya itu hendak diingati ma'lim itu baik-baik supaya ia selamat sempurna dalam pelayaran.

As regards the pilot, he should bear in mind the principles of navigation, on sea and on land, concerning the winds, waves and currents, the depth of the sea, the moon and the stars, the years and seasons, bays, villages, capes and islands, shallows, reefs and sandbanks, mountains and hills, all of this should a pilot recall with prudence, so he will be safe and sound in his voyage.

(The Maritime Code of Malacca, §9, Winstedt and De Josselin De Jong 1956, 38)

(Endnotes)

1. For this and the following see Section 3.1.
2. See, eg., Dotson 1998; Monroy, Furuta and Castro 2008: 2jgff.
3. Cf., e.g., Fraga 2001: 592b Walker-Vadillo 2013.
4. For additional arguments pertaining to stability and carrying capacity see pg.24f above; for reports by Chinese eye-witnesses, pg.227. Re seaworthiness of the outriggered Borobudur vessels Heide (1928: 319) claims 'with certainty, that these praus could not put up with a more heavy sea [... as] waves would quickly loosen the wooden connections of the outrigger beams, and this would be the beginning of her foundering'. Cf. Liebner 2009b; Manguin 2009c.



5. Computing comparable ratios depends on how the initial measurements were taken. As the available sources employ a number of different approaches (e.g., waterline vs. keel length vs. length over deck; beam on deck vs. between frames vs. at waterline; etc.), our possible choices are rather limited
6. Due to the same reasons and notwithstanding my best efforts, the virtual reconstruction could not incorporate 'the cooperation of a large number of specialists (archaeologists, computer scientists, historians, architects, engineers etc.)' stipulated by the Seville Charter (International Forum of Virtual Archaeology 2012: 5). To at least fulfil Principle 8.3 of the Charter (or, for that matter, McGrail's [2007: 255] postulate of 'evaluation and criticism [...] by an "impartial and informed" group'), preliminary results were presented in the session on 'Nautical Approaches to Southeast Asian Archaeology' at the 11th EurASEAA Conference, Dublin, 2012-09-20, and at the 'Seminar Sehari Melacak Jejak-Jejak Tradisi Maritim di Nusantara', Universitas Indonesia, 2012-11-06.
7. For discussions of such techniques see, e.g., Green 2001 [1990]: 20if, 319b, Sanders 2011; Wells 2008: lyff. Lin (2003: 430 describes in some detail the lofting process for surfaces imitating a hull's planking.
8. Cf the discussion on possible shapes of shell-first hulls in Section 3.1.
9. See, however, the discussion of consistency and (inter) reliability of the existing grid records in Section 2.1.
10. ... and very shallow hull depths of a beam:depth ratio of, respectively, 3:1 and 3:3 (Fig.3.3-1; Liebner 2008: 31; Wirasantosa and Dillenia 2008: 89).
11. While a number of "informed observers" and participants in the excavation in discussions favoured a more beamy hull (pers. comm., Luc Heymans, Jean-Paul Blancan, Daniel Visnikar, Alain Dumesnil, 2005/6/11/12), it will be noted in Fig.3.3-1 that a lengtkbeam ratio of 3:1 about marks the broadest vessels on record: even a number of considerably smaller and thus less stable ships of the region and in the historic sources have higher ratios. As a lower ratio would produce an excessively slow and unwieldy vessel, I here and in the following assumed 3:1 as the lowest possible ratio.
12. See pg.249 above,
13. J, Conrad, Freya of the Seven Islands.
14. It will be seen below that, for instance, a hull with very hard bilges, nearly plumb stem and stern, a lengtkbeam ratio of 3:1 and an initial deadrise of lf has more volume than a round bilged one of 5° deadrise and similar ratios / stem profiles.

In terms of overall carrying capacity these differences are, however, not overly significant (see, e.g., Figs.3.3-9, -23), and, as observed for contemporary traditional boatbuilding, might have been more of an initial design decision than a momentous resolution (cf. Liebner 1992: zSf).

15. Supposing rather hard bilges and considering a certain softness of any given ground an unkeeled vessel would be beached upon, I would estimate about 7° of actual heel for a hull with 10° initial deadrise.
16. For a discussion of these arguments in an Indonesian context see Horridge op.at.
17. For sources on the first argument see Section 3.1; for the latter, e.g., Gould 2000: 68f; Vanhorn 2004: iy6f; and, perhaps most visually, the line drawings of sailing vessels at <http://collections.rmg.co.uk/collections.html#ksearch;collectionReference=subject~90352;athority=subject~90352>, last accessed 2012-06-12.
18. Re the reasons for this assumption see the previous section. Supposing an initial deadrise of 5°, the minimum value indicated by the position of the ships remains, would result in a greater overhang at stem and stern than presently to be shown for a hull with a deadrise of 10°, and thus a hull profile even less probable for a cargo vessel
19. Here: virtually rotated by this value around the point where hull planking at C13/14 meets the keel-plank.
20. As discussed in the previous section, aiming at a more deeply rounded aftship the builders of the vessel apparently had attempted to "lengthen" the hull's waist to stem to by extending the relational measurement €13-19 (see Fig.3.2-58). A prudent shipwright, though, would not have sacrificed beam around frame stations €10-12 that proposedly held the main mast of the vessel (see below). €14 thus suggested itself as the most logical delimiter for the initial virtual reconstructions.
21. Here allowing for a (as to be discussed below, rather oversized) keel of 23.1 m; see Fig.3.2-58: BOW-C13, 11.2 m + C13-C19, 5.6m x 2 + 1 m for the stem-wing.
22. For reasons of expediency not noted in Fig.3.3-1. This model has a ratio of 2.2, to be compared to, e.g., the Dartmouth, 3.18, carracks in the Timbotta Ms., 2.58, or the Con tar/m Wreck, 3.15.
23. Here produced by sectioning a surface "partitioned" into 16 horizontal segments that about imitate the run of the plank strakes. "Partitioning" was done by shaping the splines the initial surface is bound by around 17 "vertexes" (i.e., points defining angles and curvature in virtual 3D space). It will be shown below that the resulting 16 "virtual strakes" about reproduce the overall number of plank strakes employed



in the hull.

24. See, e.g., <http://www.boatbuilding.com/article.php/DirtySecretsHullDesign> (accessed 2012-02-14).
25. See Figs.3.2-9, -12, -13 in the previous section.
26. Comparing the raked bows of Indian ships to the reliefs on the Borobudur, Erp (1923:13) notes that 'the characteristic of the Borobudur-vessels is that the stems and stems invariably run smooth and vertical'; see also Heide 1928 passim, Petersen 2006: 52f.
27. With only five planks per strake to go with, the builders of the ship discussed here would indeed have faced difficulties in both selecting and shaping timbers that would have allowed for the full bows and stem of, for instance, the contemporary *pajala* or *patorani* of Sulawesi: although of a smaller size and employing more planks per strake, on the latter vessels the short planks in bow and stem due to their complicated geometry are made out of conscientiously selected timbers, and still are called the "easily going wrong" hoods (Liebner 1993: 70). For a short description of the Punjulharjo ship see pg.228f above.
28. Estimations of carrying capacity were computed by calculating the hull models' volumes at "steps" simulating 50 cm of draught; m³ of volume here were equated with metric ton [t] of burden (cf. Bureau International ... 2008:124: one metric ton is equivalent to liPkg, and thus comparable to the 'density (weight or mass) of [...] pure water at 4°C[. i.e.,] about 1 g/ cu.cm, 1 g/ml, 1 kg/litre, 1000 kg/cu.m, 1 tonne/ cu.m or 62.1lb/cu.ft' (http://www.simetric.co.uk/sj_water.htm, accessed 2012-07-31). Light ship displacement was based on the calculations of the weight of a virtual hull "complete" with a number of inner strengthenings and an adequate amount of equipment as detailed in Liebner 2008: 30-1 (here espc.fns.85, 86; cf. Wirasanto- sa and Dillenia 2008: 87).
29. See pg.250 above; and especially Figs.3.2-25, -26.
30. ... and, inevitably, any associated initial measuring mistakes at, first of all, the inaccessible aft sections: here, the projected end points of the curves for the perimeters' girth taken at a height of 13 and 14 strakes at the stern of the vessel arrive at measurements still "inside" the length covered by the remains of the keel, hence echoing the taper of the plank strakes to aft reported in Visnikar's (necessarily mostly assumed) 2d plots of the sections in questions. This trend could, conceivably, reflect the intention of the builders to allow for the broadest beam of the hull in the vicinity of the proposed mast steps along C10-12, thus somewhat to fore of

midships. To accommodate this possibility, the virtual models to be discussed presently are generated along two cross sections placed at, respectively, C11 and C14 (see Fig.3.3-17).

31. Measured over the values deducible from the functions, none of the resulting points allows for the fair curve one would expect. Projected to the heights they were measured at, the zero-points of the functions of half-beam for 10° deadrise produce a tumblehome bow at a rather impracticable angle; while suggesting the high chinned spoon bow adopted for the model, the girth functions generate an unrealistic rake (all solutions marked in red broken/dotted lines in Fig.3.3-16). The profile adopted here relies on heights of the strakes taken off the tentative model, resulting in a curve remarkably close to the angle of the bow-wing's "cheeks". Re the decision to assume a spoon bow profile see, eg., Gibson-Hill 2009 [1950a]; Hawkins 1982; Horridge 1978, 1979a, b, 1981.
32. As the two models differ only in the number of employed plank strakes, Fig.3.3-20 depicts Model (v).
33. While the overall height of a vessel built up to the extant 15 strakes can be taken off the virtual models, the additional 16th strake here is assumed to be of about the same width at midships as the preceding plank.
34. The employment of drop-strakes in fore- and aftship conceivably would have limited the height of 'the sweeping curve of both ends of the hull' (Roberts 1994: 24) to a rather moderate sheer.
35. This arrangement, to some extent, honours the impression of a possible tumblehome bow profile arising from the projection of the lift functions onto the virtual model (see fri.31 in this section). I am aware of a number of further possibilities, as, e.g., a bifid bow, as found on the Maduran janggolan (e.g., Hawkins 1982: 61 f; Manguin 2007: 3, 2009c: Slide 60). Stenross (2007: 275f), however, argues that bifid bows and transoms are a local and probably rather recent characteristic of SW Maduran vessels only.
36. H. Jafar, a senior master shipwright of Tana Bern, suggested a depth of 2.75 m as appropriate for a vessel of 26 m length. He recommended a beam of V4 of LOD, resulting in a beam:depth ratio of 1:2.4 (pers. comm., January 2013).
37. Here, first of all, for its vertical topsides that permit uncomplicated adding (or subtracting) height and other features to the model.
38. ... though not an exception: the senior shipwright mentioned above recommended a haung kaqdarroq, 'U- shaped midsection', for a vessel with the qualities he thought



desired for a sailing cargo vessel (H. Jafar, pers. comm., January 2013).

39. If raised to the 16 strakes, about 15 % less than a midsection of Model (v) at frame station C14.
40. See fn.36 above.
41. See the positioning of the midships 'tween-deck on pg.264f above.
42. See Section 3.1, pg.232f.
43. See pg.263 in the previous section and below: here especially important would be the topmost crossbeams which have to counterbalance forces trying to spread open the hull.
44. Eg., Green et al. 1997: 20-1, 25; Kimura 2011a: 136-7; Flecker 1997: 68.
45. Liebner 2008: 26ff; Wirasantosa and Dillenia 2008: 86
46. The longer side of the yellow storage box on the picture to fore is close and approximately parallel to C3, while to aft it nearly touches the proposed crossbeam. The shorter side of such a box measures about 40 cm, somewhat less than half of the 96 cm between C3 and 4.
47. For the apparent weakness of these scarfs see pg.252f above and App.3.2-iii.
48. See pg.262 above: the diameters of the surfaced fragments of such beams, both thwarts and longitudinals, range between 10 and 15 cm.
49. If stretching to C9, such a deck could have given access to the bilge area at C9-7, where several packs of high grade iron ingots were found (see Section 2.3.6).
50. Barnes 1996: 217-8.
51. Horridge 1978: 26, Fig. 19.
52. See pg.256: 'conceivably, [to] allow for a more ductile response to the basic structural torques applied onto a freighter's hull'.
53. Cf. Roberts 1994: 25 and pg.263 above,
54. Re the function of such beams in European shipbuilding see, e.g., Roberts 1994: 23, 25; Steffy 1994: n8f
55. Panels 1.23 and B1.54. I in Section 3.1 also commented on comparable features of the ship painting in the Ajanta cave #2.
56. See pgs.225 and 23yf in Section 3.1.
57. See pg.23yf above.
58. Cf. pg.256 above.
59. Panels 1.86, 1.108 and, as far as still discernible, 2.41. Heide (1928: 350, Fig.IV; 355, Fig.VII) assumes that on the two former ships the hull's side planking is continued above the lowest of these beams, an impression that, however, is not supported by the reliefs.

60. Barnes 1996: 227, Fig.24. Comparable arrangements are found on the early seventeenth century drawings of two Southeast Asian ships by Erédia (Mills [transl, cd] 1930: 35-6; see Fig.3.1-28) and the mtepe of Lamu, a lashed, sewn and dowed vessel of East Africa (Prins 1965:121; Green 1996: 89).
61. Though not showing thwarts, such a "sheerbeam" is prominently visible on panel 1.53; see Fig.3.2-61.
62. Liebner 2008: 29; Wirasantosa and Dillenia 2008: 87.
63. Besides the vessels depicted in Figs.3.1-27 and -28, a ship with lateral rudders on a 1606 map by Jodocus Hondius (Suarez 1999:194-5).
64. See Fig.3.1-29.
65. Cf. Heide 1928: 350 Fig.IV, 352, 355 Fig.VII.
66. See Section 3.1: e.g., Hawkins 1982 passim, Horridge 1979a: 8 Fig.8, 33 Fig.29; Gibson-Hill 2009 (1950a): 48, 59. Horridge (1979b: ^ff) argues that masts passing through the deck onto a mast shoe on the floors/keelson are a recent introduction copying European models.
67. Additionally to the sources the previous fn., Horridge 1979a: 25 Fig.20, 26 Fig.21, 31 Fig.26, 1985: 57, 74-5 Figs. 34-5; Liebner 1992: 53; Matthes 1959b: Plates 16,17.
68. For a possible fate of the ship's rudders see the opening paragraphs of Section 4.
69. E.g., Burningham 2000: 10yff; Gibson-Hill 2009 [1950a]: 67 Plate 12; Stenross 2007:145 Photo 21; Wangania 1980/81: 88f.
70. See, eg., Burningham 2000; Gibson-Hill 2009 (1950a): 66-8; Hawkins 1982 passim, Horridge 1979a: 21, 1981: 9, 40.
71. Burningham 2000:103-6; cf. Horridge 1978: 21 Fig.14, 22 Fig. 16; Liebner 1992: 50-1, 55-6.
72. u Packs of "average" bowk of a -"presumably- manageable weight of 35-50 kg would measure approximately 100-150 cm in length if packed in a single stack.
73. While a number of sampled fragments of these beams retained traces of lashing rope (see Fig.3.2-62 and, for a pair of possible length- and crossbeams, Fig.3.2-66), divers reported that they did not note the lengthwise timbers to be lashed to all thwarts (F. Dobberphul, pers. comm., October 2012).
74. See. Section 3.1, pg. 234: 'quarter rudders and. tilted, rectangular sails [are] accepted, as the prominent means of propulsion of insular Southeast Asian craft, both past and present'.
75. Both Lodewijk's drawing of a Javanese *jong* and Erédia's *lanchara* (see Figs.3.1-28 and -29) note shorter foremasts. The former, clearly rigged with a *tanja* sail, though



carries a sail of about the same size as the main. It will be discussed presently that a considerably smaller foresail would not be advantageous for the balance of the ship; the foremast thus would not have been much shorter than the main.

76. Hawkins 1982: Siff; Horridge 1985: ijff, Sulaiman 1981/82: io8f; and, for the present vessel, below.
77. These ratios are taken off a number of photographs and drawings and thus can only represent estimates.
78. Cf.,e.g.; Palmer 2009b; Roberts 1995; Whitewright 2011.
79. Dimension for the vessels in Fig.3.3-33 range from about 1:0.4-0.5 for headdeech ratios, and from 0.5:0.5 (eg., the mainsail of Hati Marege) to nearly 0.7:0.3 (Borobudur, 1.86) for the point where the halyard is attached to the yard.
80. 'Even leading authorities do not always agree on the proper amount of lead', and in today's yacht industries 'The whole issue of helm balance and proper lead really comes down to intelligent guesswork based on previous experience' (Brewer 1999: 64, 67; cf. Palmer 2009a: 91). As far as I am aware, there are no figures readily available for a *tanja* rig, and there seem to be no confirmable values for comparable Western rigs such as a standing lug. Very much depending on the authority consulted, a lead of 4.5 % ranges at about the lower figures proposed, for schooners.
81. In contrast to the geometric centre-of-area of the underwater profile ('centre of lateral plane1, CLP) used in "traditional" approaches, 'tank tests and theoretical calculations [...] show that the centre of lateral resistance [CLR] of a hull that does not have a distinct and separate yachttype keel generally falls between 20% and 35% of the waterline length aft of the stem to the fore1 (Palmer 2009a: 91), a range here marked, with a blue rectangular; following Palmer's examples an estimate of 30% waterline length would seem the most possible solution for this vessel. As computed from wind-tunnel tests of batten-lug rigged, vessels (*ibid.*: 93, 96, ref to Masuyama et al. 2005), I assume, too, a foresail efficiency of 3.5 over the main.
82. There is only one certain way to tack with a jayar *tanja*, and that is to shift the sail around the mast while wearing round" (N. Bumingham, pers. comm., January 2013; for die techniques of such a manoeuvre with a latin sail see Pryor 1994: 67). A description of die handling of such sails is found in Bumingham 2005:12-3.
83. Cf.,eg.,Brewer 1999: 62: 'Having 3 to 4 degrees of weather helm improves performance. The rudder steers the yacht, of course, but it can also provide lift and reduce leeway if there is a slight weather helm, acting like the flaps on the aft end of an airplane's wing, in effect'

84. Here to 3A of die above sails, the smallest size still producing the look and feel' of an aerodynamically effective sail. I assume that an even smaller sail would "understream" the luff of the main and thus not exploit the full potentials of a two-sailed rig.
85. Less area behind the mast would move the combined CE more to fore and consequently reduce excessive weather helm. Speculatively, then, the hull's lines could have been somewhat less full and with a steeper deadrise than projected above: according to Palmer (2009a: 91), 'the actual value of lead [...] may vary between 2% and 10% of waterline length, being larger for fuller formed hulls'. Gerr (1988: 52) and Brewer (1999: 66) also count a low-aspect-ratio rig, 'heavy ballast', 'deep draft', 'fine forward waterlines' and 'slack bilges' as factors that allow moderation of a projected lead.
86. N. Burningham, pers. comm., January 2013.
87. As noted by R.Unger (1994: 121) at the example of the Dutch fhut, however, for 'an effective bulk carrier [...] speed did not matter as much as handling qualities'.
88. The 'Javanese *tanja* with its tapered luff (and any lateen rig without the pole supporting its yard [e.g., Hoogervorst 2012: 308ff]) might though be a later introduction (N. Burningham, pers. comm., January 2013).
89. Plainly visible on panels 1.88, 1.108 and 2.41.
90. Cf. Wang Gungwu 1958:108.
91. Eg., the Galigo epos (Liebner 2003: 396); Bujangga Manik's Journey, lines 115-20, 920-1 (Noorduyn and Teeuw 2006).
92. See, e.g., Horridge 1979a: 26; Matthes 1859b: PL 16 Fig.4, PL 17 Fig.1.
93. Eg., Collins 1936: 43.
94. Certainly less than the 'intended speed of 2-3 knots' (Ahlstrom 1997: 121) proposed for early nineteenth century Swedish 'archipelago frigates' under oars - which, anyway, proved 'too large and heavy to be manoeuvred even slowly with oars' (*ibid*); cf. Howard 1979: isof, 215-6. Light raiders of Southeast Asian waters, though, are known to have evaded their European opponents by 'pull[ing] to windward with great rapidity owing to their length and number of rowers' (Low 1850: 361; cf. eg., Logan [ed] 1849-51: passim.).
95. Eg., 346 Fig.II, 350 Fig.IV, 355 Fig.VII.
96. Cf. Green 2001: 78 Fig.20; Horridge 1981: 74. Petersen (2006: 53) assumes that such 'rowing ports could easily be opened or closed [by] a light-weight wall of bamboo poles'.
97. A readily available reprint is found in Reid (ed.) 1996: 86; cf., eg., Hornell 1920: 60.



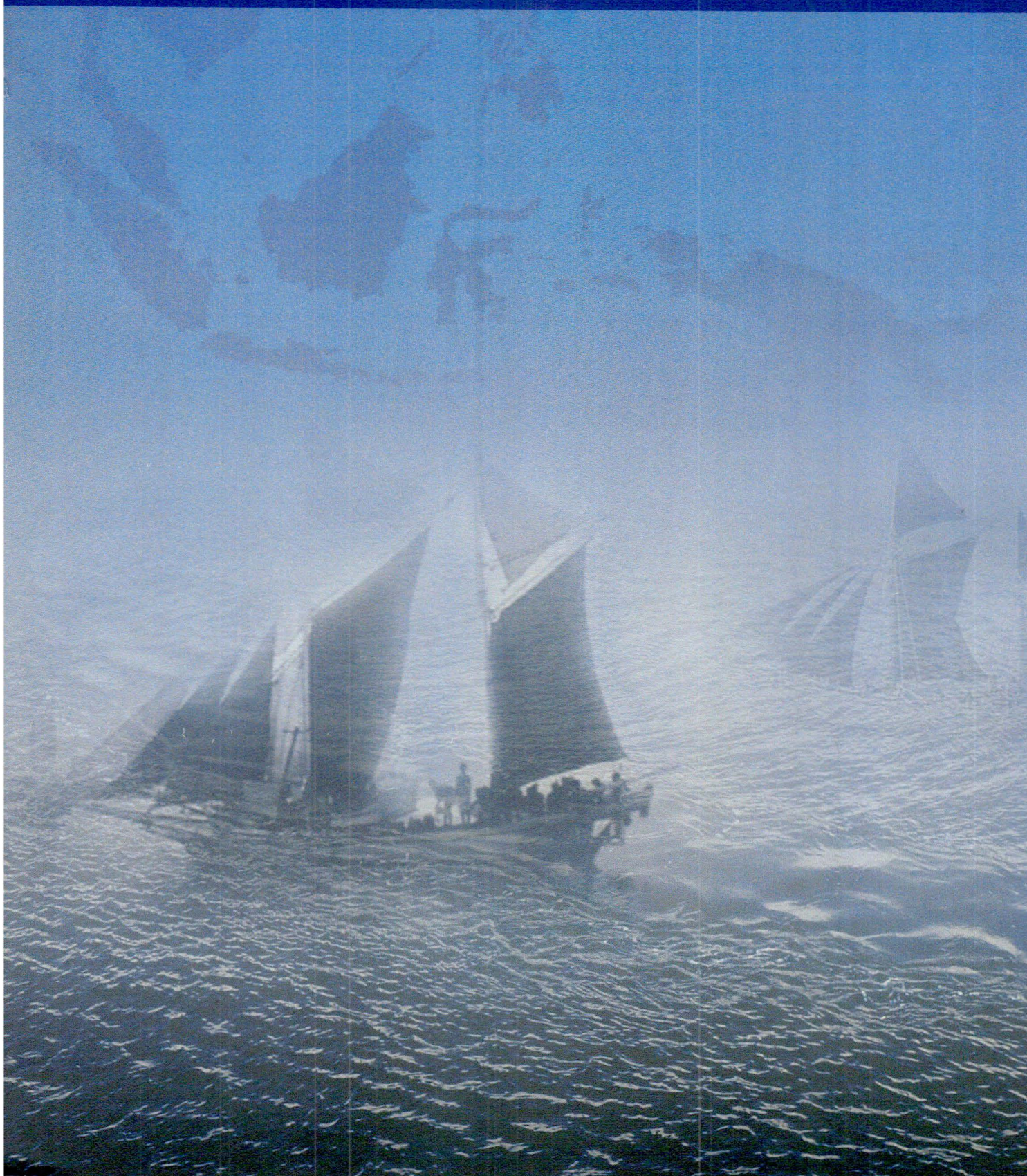
98. Additional to the sources in fn.92, see Warren 1987: 41 f.
99. See pg.226 above.
100. See Burningham 2003, 2005; Habibie et al. 2009.
101. Borobudur-sen ...1992.
102. van Erp 1923: 24 Fig.8.
103. See Fig.3.2-61
104. On the *Samudra Raksa* on top of her raised sides and on the lower stem and bow, on the *Damar Sagara* over what here has been termed rowing deck.
105. Cf., e.g., van Erp 1923: 21; Hawkins 1982: 41 if; Horridge 1979: 21, 31; Warrington-Smyth 1902: 578b *Damar Sagara* was equipped with such a construction; *Samudra Raksa* was not fitted with a poop.
106. Cf. fn.96 above
107. Chinese travellers on such bottoms report of 'over two hundred souls' (here, Faxian [Wheatley 1973: 38]) aboard, thus a liveweight of above 121 Even without an allowance for deck cargo and passengers and despite outriggers and floats, Petersen's model of a Borobudur ship 'capsized both in calm and windy conditions' (2006: 54), necessitating additional ballast and beam. Cf Mookerji (1912: 49) notes an 'exhibit of one of these Hindu-Javancse ships in the Philadelphia museum', where 'the whole [vessel and upper works] being so top-heavy as to make the outriggers essential for safety'.
108. To the slavers and raiders noted in fns.92 and 98 should be added the various drawings and models of Moluccan kora-kora (e.g.; Horridge 1978:11 Fig.5,17 Fig.10,19 Fig. 12) and hongji fleets or models of Malay privateers (eg., Mtiseo de Naval, Madrid, Ref.5022 [courtesy V.W. Vadillo]).
109. See Adams 1977; 97!?!; Spennemann 1985; VToklage 1940: 230!!; Zahorka 2012.
110. E.g., panels B1.54 or B1.193; see van Erp 1923:15-18.
111. Eg., Horridge 1978: 31 Fig.26; Museo de Naval, Madrid, Refs.1538,1747, 5023
112. Such a layout is found on a wide variety of contemporary traditional trading and blue-sea fishing vessels throughout the Indonesian Archipelago and the Philippines, and the standard basic layout for many a European steamer,
113. See pg. 23yf for a discussion on the likelihood of planked (weather) decks on Southeast Asian vessels. As noted in Section 2.3.7 there is some proof for human activity along both sides of a proposed deck cargo, thus, essentially, atop some sort of gangways, and over the foreship. A (partly?) planked deck
114. Here modelled after the ambeng rua kali of Sulawesian palari (see, eg., Collins 1937:

201; Liebner 1992: 55-6, 72-3). For an account of the rudder portholes see Wallace 1962 [1890]: 315: '[...] two holes, each a yard square, at three feet above the water-line, [...] completely open to the hold, so that half-a-dozen seas rolling in on a stormy night would nearly, or quite, swamp us. [...] This proves at all events that praus must be good sea-boats, for the captain has been continually making voyages in them for the last ten years, and says he has never known water enough enter to do any harm'.



The Siren of Cirebon

A Tenth-Century Trading Vessel Lost in the Java Sea



4 Conclusions

The events leading to the loss of the Nanhan/Cirebon vessel will doubtless remain unexplained; however, it is possible to make a number of educated guesses. The wreck settled upright on the seabed, with much of the ship's cargo still in place. Despite their potentially high kinetic energy, the consignments of metalwares stowed in the lower aft¹ and the stacks of tin ingots² in the midships hold appear to have remained in their original position, implying that the vessel sank on an even keel. This observation excludes more abrupt events such as capsizing or a sudden critical fault in the hull's integrity from the range of possible reasons leading to the vessel's demise, leaving us with a scenario where that the hold evenly filled with water until the ship lost her buoyancy.

There are a number of possible explanations for such an event. The most plausible ones would be a gradual intrusion of water through leaks and/or swamping by waves. As detailed in Section 3.2, there is considerable reason to assume that the vessel had under-gone repairs: the dowel placement pattern in the plank's scarf joints and the braces doubling over the foreship planking suggest the possibility of a loss of structural integrity along the ship's bows.³ Reduced cohesion of the planking would undoubtedly trigger leakage and could have considerably worsened when the vessel was facing high seas.

A ship's vulnerability to wave action depends, first of all,⁴ on her freeboard, and thus the overall weight of cargo carried. We have seen that the ceramics alone amounted to approximately 200 t; additional to the ceramic cargo there were at least 40 t of various metalwares and ingots and the weight of the ship's complement, their belongings and provisions.⁵ A vessel of the size of the Nanhan/Cirebon ship carrying this minimum amount of cargo could not have had a freeboard exceeding 90 cm; if loaded with 300 t, the maximum freeboard diminishes to slightly more than 50 cm (see Figs.3.3-18, -23). These estimates recall the vessel that carried the fifth-century Chinese monk, Faxian, from India to Java that, as is often the case still today in South and Southeast Asian waters, [was] overburdened for, possibly, reasons of profit' (Deeg 2005: 572 fn.2513). A *tanja*-rigged ship sailing from Sumatra to Java would have made use of the dominant westerly winds blowing throughout December to March,⁶ exposing the vessel to the squalls and associated higher seas common during that season.⁷ A combination of high waves and leaking could easily have caused an intrusion of more water than could feasibly be discharged by bailing or other means;



depending on the severity of the leakage or the height and steepness of the waves encountered, either of the two factors could have presented a considerable threat.

Foundering triggered by leakage and/or wave action would have been a gradual process. The ship's complement would certainly have tried to remove the water penetrating the hull by intensified bailing, thereby extending the time the vessel was still afloat. Until the ship finally went under, there may have been sufficient time to assemble means of possible rescue. The first materials to hand would have been the ship's masts and yards, especially so if these were of made of the large detachable bamboos still today often used for such purposes.⁸ I noted in Section 3.2 that no remains of the vessel's spars were found; if stepped into tabernacles, the masts and any attached yards, however, could also have been lost during sinking, or, if going down with the vessel, would have been subject to more severe decomposition on the surface of the mound of cargo and debris. Such could hardly have been the fate of the ship's rudders, necessarily sizeable and sturdy timbers securely attached to the hull:⁹ of these no traces were discovered, implying that they were unshipped from their fastenings before the ship foundered.

Whether masts, spars, rudders or any other possibly detachable segments of the ship would have been fashioned into makeshift rafts or deployed as plain floating aids is open to speculation; however, there can be little doubt that such buoyancy devices could hardly have accommodated the presumably 200+ souls aboard ship.¹⁰ Elinder and Erixson (2012: 3) consider 'aggressiveness, competitiveness and swimming ability' to be the most important assets for surviving the immediate moments of a shipwreck, and the first two qualities would have been particularly critical in struggles for the restricted space on floating devices assembled before and during the ship's foundering.¹¹ Just as described for many a modern nautical disaster, the crew and any more prestigious and/or physically superior passengers would have had the greatest chance for initial survival:¹² I noted above the possibility that some of the more affluent people aboard our ship might have attempted to rescue their smaller yet valuable possessions.¹³ The nearest land, Pulau Rakit, lies about 50 nm to SE, but would have been hard to reach on a raft drifting with the Northwest Monsoon; however, the Karimunjawa group, roughly 80 nm to WSW, may have offered a chance for salvation.

(Endnotes)

1. See Section 2.3.6: 206; and Figs.2.3-107 and 3.2-7.
2. See Section 2.3.6: 202.
3. See pgs. 252f.
4. I here exclude any more speculative possibilities like, for instance, excessive list caused by shifting cargo.
5. See Fig.2.2-1, Section 2.3.6: 201 and Section 3.3: fh.107. I here exclude any lighter cargo consignments eventually lost during foundering.
6. See, e.g., Knaap 1996: 45 ^ Knaap and Sutherland 2004: bgff.
7. National Geospatial-Intelligence Agency 2005: 29, 65,167.
8. Cf. Section 3.3: 280.
9. See Section 3.3: 281b for the apparent resilience of such objects cf. the surviving rudder at the Sambirejo site, Palembang (Manguin 1989a: 202F 2009c: Slides 5-7).
10. For this estimate see Section 1.3: 75.
11. Cf Faxian 2010 [1886]: 211.
12. See Elinder and Erixson 2012: passim.
13. Section 2.3.5:197.

4.1 The Voyage

The date found on bowl fragment <BD061/wh> provides the *terminus post quem* for the ship's tragic voyage, 968.¹ The majority of the examined coins are variants of the Nanhan tin-lead 乾亨重寶 *Qian Heng zhong bao*, first minted in 917-924/5 and since 958 by 'strict law'² circulated exclusively in the City of Guangzhou.³ We have seen that the Nanhan "Empire" was invaded by Song troops in 970/1, and that shortly before Guangzhou's fall in March 971 Nanhan courtiers 'destroyed by fire all government treasuries, palaces and halls' (Ouyang 2004: 547) in an attempt to divert the invaders by a tactic of scorched earth.⁴ Though Song coinage should have reached the lands of Nanhan with the invasion forces, no 宋元通寶 *Song Yuan tong bao*, issued by emperor Taizu throughout the 960s,⁵ were found on the wreck. Speculatively, the absence of Song coins and the de-struction of the city could mark the fall of Guangzhou as *terminus ante quem* for the shipment of the Nanhan/Cirebon vessel's cargo of Chinese ceramics.

Associated with the ceramic cargo were considerable numbers of fragments of branches and smaller boughs of various species of timber. Many



of these display shavings by lashings and indentations by other timbers, and some retained impressions by rims of ceramics.⁶ Smaller timbers in all probability were employed as lining and handles of packs of ceramics;⁷ those of a larger diameter could have been dunnage. Several⁸ of the branches exhibit signs of coarsely broken-off twigs, indicating that these timbers had been readied on an ad-hoc basis, and possibly so during lading of the ship. Branches used as dunnage in the lower hold might have provided indications as to the vessel's port of loading. However, no records of the initial placement of these timbers are available, and I have not been informed of the results of any analyses of the numerous samples submitted for examinations.⁹

Destination

Tenth-century harbours nearest to the position of foundering that could have provided the variety of cargo items found on the Nanhan/Cirebon wreck are to be sought in the Straits of Malacca, the rendezvous of the shipping lanes to and from western Asia and China. The first places here coming to mind are the entrepôts on the Batang Hari and Musi rivers in south-east Sumatra.¹⁰ Both of these ports are also known as source of a number of proposedly Sumatran commodities found in the cargo.¹¹

The example of the Intan and Java Sea wrecks with their cargoes of ceramics and metalwares led Flecker (2004: 2) to argue for an 'ancient trade route from Bangka Strait' that connected Sumatra and Java.¹² Seen from a position in the southern section of Stanton Passage, the principal entrance to Bangka Strait from S,¹³ the Nanhan/ Cirebon wreck lies in a bearing of 129.6°; continuing this bearing to Java leads to the vicinity of today's Jepara and Mount Muria, a prominent massif of around 1600 m height (Fig.4.1-1). Use of the magnetic compass for navigational purposes in Asia is conclusively attested only since the twelfth century:¹⁴ I thus assume that tenth-century Indonesian mariners would have relied on adaptations of the Austronesian navigational techniques noted in the ethnographic record.¹⁵ A crosscheck of the course the ship had taken to the site of her foundering against the best known of these methods, the so-called star-path navigation, is shown in Fig.4.1-2. It is of note that five of the stars with a magnitude of >3.0^m rising in the direction of the ship's course¹⁶ at approximately beginning and end of the Northwest Monsoon season of the year 970¹⁷ (Fig.4.1-3) are noted among the

58 Bright Navigation Stars' in use in modern worldwide navigation (Fig.4.1-4), indicating that this star-path should not have posed particular problems for a skilled pilot. For navigation in daylight there is the additional 'expanded target landfall'¹⁸ delineated by the coast of Java and the Karimunjawa group: together with Mount Muria, the latter islands figure as prominent landmarks in both Chinese and European sea rutters from the fifteenth to seventeenth centuries in which ships sailing from Bangka Straits to Java were advised to 'try first to sight Karimunjawa and then proceed to their final destination with whatever means they had at their disposal' (P.-Y. Manguin, pers. comm., May 2007¹⁹).

The possible length of a sea voyage depends on the stores of fresh water carried aboard ship. Such supplies would have been kept in the 'dusun'-type storage jars noted in Section 2.²⁰ The estimate of the storage capacities of the extant jars in Fig.4.1-5 is based on the average volume of three measured jars multiplied by the number of surfaced vessels, assuming that all of these containers were used for water only. While some of the jars initially taken aboard would have been lost during foundering (and some even might have been used as floating devices), any filled storage jars in especially bad weather would have been safely secured to the ship to prevent erratic movements of these rather heavy objects. The assumption that four out of five jars were lost therefore appears somewhat exaggerated; a more realistic estimation, reckoning with 25% surviving storage capacity and a daily consumption of three to four litre of water per head allows for a sailing time of roughly 10-14 days. A prudent mariner would have carried about double of the volume of fresh water thought necessary for a given voyage: apparently, the ship was not equipped for a lengthy passage. Assuming etmals of 72 and 96 nm (i.e., an average speed of 3 and 4 knots²¹), the about 500 ran of a crossing from the estuary of the Musi river, leading to Sumatra's possibly most important port of the tenth century,²² to the Muria Peninsula would have taken between five and seven days.

Monumental constructions and finds of imported ceramics of the eighth to eleventh²³ centuries mark the south-western shores of the Muria Peninsula and its hinterland as a likely gateway for trade with Central Java, and it has been proposed that ceramic debris found in the area of the confluence of the Kali Serang and Lusi rivers indicates the possible centre of a polity related to



this commerce.²⁴ Ostensibly, the region 'was not abandoned after 928 A.D., when the centre of [Java's] power was transferred to the east' (Degroot 2009 [2010]: 68), underlining its potential attraction to a merchant vessel of the early second half of the tenth century. This is accentuated by the resemblance of the lobed dishshaped whitewares in the present cargo (see Fig.2.2-159) to a porcelain saucer, 8th-10th cent.' from the 'Muria region, northern central Java' now in the collection of the National Museum, Jakarta (Orsoy de Flines 1975: Pl.7).

Following the move of Java's political authority to the eastern half of the island in the 920s, the commercial potential of the Muria Peninsula and its hinterland would have considerably contracted, implying that this region was not the ship's final destination. The greatest demand for imports should have occurred at the ports serving the seat of Java's power of the later tenth century, situated at the delta of the Brantas river and in Madura Strait.²⁵ Accordingly, I assume that after an initial sojourn at the Muria area the ship was bound to continue her ill-fated voyage along Java's north-eastern seaboard, possibly including a number of calls at smaller ports found on that shore. We will see below that this assumption might be reflected in the stowage arrangements of her ceramic cargo.

Port of Departure and Ports of Call?

While the ship's destination can be determined with sufficient confidence, the overall itinerary of her unfortunate voyage is open to conjecture. As discussed above, a last port of call in south-eastern Sumatra seems almost certain, and it is conceivable that, as argued for the Intan wreck,²⁶ the Nanhān/Cirebon vessel had taken her cargo on board in one of the entrepôts on that coast. In contrast to the Intan ship, however, no non-Chinese commodities in the freight of the present vessel had been stuffed under her main cargo of Chinese ceramics; instead, the hold afore and abaft the central 'tween-deck was filled from the bilges upwards with tightly packed rows of utilitarian ceramics and metalwares of Chinese origin. Non-Chinese cargo was only found in either the vicinity of the tween-deck or above the stacks of green-glazed Yue ceramics. This is particularly apparent in case of the consignment of tin, an evidently Southeast Asian product: in contradiction to the demands of prudent seamanship, the considerable weight of the metal was not

distributed throughout the lower hold, but concentrated in the vicinity of the proposed central deck, where the “pyramid” ingots even were stacked high enough to eventually scatter over the remains of the hull.²⁷ Obviously, most of the lower hold had already been filled with Chinese ceramics and metalwares when the ingots were taken aboard. The same observation is valid for the consignment of lapis lazuli stowed under the tween-deck.

The freight of Yue ceramics and the Chinese metalwares was arranged following nautical protocol: the dense packs of bowls, plates and utilitarian metal utensils were placed under the more voluminous and lighter jars, ewers and kendi.²⁸ The pragmatics of judicious loading demand to commence at the hold's two extremities, concomitantly breaking down sections of cargo space to fore and aft until the ship's centre is reached.²⁹ On the present vessel, this meeting point would be the 'tween deck, the vicinity of which apparently was left devoid of bulky cargo to allow for both access to the bilge and space for retreat and delicate or later charges.³⁰ The green-glazed stonewares filling the lower hold throughout the foreship, and, together with metal implements, the hull's aft quarters evidently were the first batches taken aboard ship.

The observations above leave the impression that the Nanhan/Cirebon vessel was laden in a port that offered Chinese ceramics and metalwares, but not supplied the weighty Malayan tin ingots or heavy packs of Afghani lapis lazuli that would have tendered themselves as a “paying ballast” that should be prudently distributed throughout the lower hold.³¹ Such a description would fit best a port in the Celestial Empire. A voyage commencing in China could also explain the findspots of the Fine Paste Wares in the ship's cargo, evidently a product of kilns on the Malay Peninsula: initially stowed somewhere on the foredeck atop and around the cargo of stonewares, these could have been picked up during a call at the eastern coast of Malaya, a plausible landfall after a crossing of the Gulf of Siam (see Map 2).³²

Until the end of the tenth century, Guangzhou was the foremost Chinese port of call for traders from Southeast Asia and the Indian Ocean.³³ We have seen that the vast majority of the coins found aboard the vessel are tin-lead editions of 乾亨重寶 *Qian Heng zhong bao*, a Nanhan coin minted since 917, the use of which since 958 was legally restricted to the City of Guangzhou. Carrying the death penalty, the law also prohibited the use of copper cash in the city, apparently an attempt to prevent the outflow of reserves of copper



coinage through trade transactions.³⁴ Regardless of such strict rulings, however, among the coins found on the wreck there yet were a small number of copper issues.

How copper cash could have reached the ship remains speculation. The state of Wu- yue, the origin of the majority of the green-glazed stonewares, did not mint own coins, and I assume that its economy relied on the coinage struck by the neighbouring Southern Tang and various editions of copper cash by the northern Five Dynasties. The Nantang as well as the small kingdom of Min issued both copper and lead-tin versions of 開元通寶 *Kai Yuan tong bao* that, if sufficiently eroded, can easily be mistaken for the 周元通寶 *Zhou Yuan tong bao* 955/6 issue by the Later Zhou reported by Trigangga (2008: 74; Fig.4.1-6). Yue wares evidently were the first consignments taken aboard; except for a concentration behind the 'tween-deck and above the incised green-glazed stonewares, we yet cannot establish a clear stowage pattern for the white-glazed ceramics, a possible product of Guangdong. This raises the possibility that the latter ceramics were packed into spaces still unclaimed by Yue pottery and metalwares, suggesting that the green-glazed ceramics were taken aboard before the whitewares, and, perchance, at some other port than Guangzhou. Wuyue's harbours of Ningbo or Hangzhou, located only some kilometres from kilns that could have produced the ceramics, come to mind. However, a voyage to Zhejiang would have added more than 1800 nm, under favourable circumstances at least three weeks of sailing through often treacherous waters,³⁵ to the vessel's itinerary.

Yet there is a further argument against a port of departure in Zhejiang. The analysis of the various types of "closed" stonewares in Section 2.2.i.ii indicated that ceramics of possible Guangdong origin were found together with Yue wares, suggesting that both of these types of green-glazed ceramics were laden at Guangzhou. Contemporary Chinese sources indicate that during the Wudai Shigou the southern kingdoms actively carried out seaborne exchange along their southern shores:³⁶ the copper coins of the Later Zhou or Southern Tang thus could also have come with a shipment of Yue ceramics that a local boat had conveyed to Guangzhou. The various possible scenarios thence lead us to questions concerning how and by whom the Nanhan/Cirebon vessel's cargo could have been handled.

(Endnotes)

1. See Section 2.2.1:120.
2. Guangdong, Provincial Museum ... 1989: 55.
3. See Section 2.3.5: ig6f
4. See Section 1.3: 51 f.
5. Taizu introduced a strict policy of banning of any "foreign" cash from circulation in Song-controlled markets: since introduction of the new coinage, 'holders of these coins were required to present them at public exchange offices, created for the purpose, apparently for redemption in the newly minted bronze coins or in silver bullion' (Hartwell 1967: 281).
6. Eg., S67, S148, S151 (shavings); S141, S237 (impressions by other timbers); Si38, Si63 (impressions by ceramics).
7. Cf. the reconstructed packing of ceramics on the Shinan shipwreck (National Research Institute of Maritime Cultural History 2012).
8. Eg., S16, S17, S280, S282, S284.
9. See Section 3.2: 244; and fn.83 in that chapter.
10. See Section 1.3: 43t.
11. For the considerable number of candlenuts found on the wreck (e.g., Sio6; Si07, S605, S610) cf. Flecker 2002: 93; for possible aromata of Sumatran origin, Section 2.3.7: 213.
12. Cf. Mathers, and Flecker (eds.) 1997:182
13. National Geospatial-Intelligence Agency 2005: 35.
14. E.g., Agi us 2005: i58f; 2008: îgôf; Needham 1970a [i960]; Ricker 2005.
15. See, e.g., Akerblom 1968; Ammarell 1999; Gladwin 2009 [1970]; Halpern 1985,1986; Lewis 1972; Thompson and Taylor 1980.
16. I here allow for a deviation of 10° off the projected course, a rather small figure for a sailing vessel navigating without a compass and out of sight of land.
17. For the months here calculated, changes in time of rising until 980 do not exceed 7\
18. See Lewis 1972:157f besides actual sight of the landmarks, 'cloud signs, deflected waves, deep phosphorescence, wave patterns [...] and landbased birds7.
19. Cf., e.g., Huang 2005: 31 f; Mills 1979: 8off.
20. See pgs-Byf and 124.
21. Cf. Casson's (1951) estimates for the speed of ships on open water voyages with favourable winds.
22. Cf. the 'mouth of the river Bhoga' where the monk Yijing in 689 'went on board' a



ship that accidentally took him to Guangzhou (Yijing 2007 [1896]: xxxiv).

23. Most of the authors mentioned in the following footnote date the ceramic finds in the region into the eight-tenths centuries; Christie (1982: 205), however, argues that 'datings on [these] ceramics appear to have been consistently at least a century too early'.
24. For a recent overview see Degroot 2009 [2010]: 65\$; cf Lombard 2005: II, 15b Orsoy de Flines 1949; Soekmono 1967.
25. Christie 1998a: 36of, 1999: 244; Marwati et al. 2008: II, 21 gf.
26. See Flecker 2002:122, 2004: 2.
27. See Sections 2.3.6: 202f and 3.2:265f.
28. See Section 2.2:164, and especially Figs.2.2-221, -222.
29. Shipowner's Club 2007; cf. Fig.3.3-34.
30. Cf. Section 3.2: 263k
31. Cf. Flecker (2001a: 339) on the tin ingots on the Bilitung wreck.
32. Flecker (1997: 70) observes for the thirteenth-century Java Sea Wreck that earthenware kendis were stowed throughout the ship, although there are much higher concentrations just forward of midships and at the bow. As the kendis are probably not from China, but rather were picked up at a port en route to Java, it is reasonable to conclude that they were loaded on top of the Chinese ceramics cargo along the length of the ship wherever there was remaining hold space. In fact, some of the Chinese ceramics may have been bartered for the kendis which were very popular in Indonesia.
33. See, e.g., Heng 2009:174; So 2000: 37f, 61.
34. Elvin 1973:152.
35. Cf. Wuyue's envoys who on their yearly tribute voyages 'died by maelstroms at sea' (Ouyang 2004: 571] and the loss of numerous cargoes Min sent to the Later Liang (Schafer 2006 [1954]: 76); see also the respective sections in National Geospatial-Intelligence Agency 2013a, b.
36. Cf. Section 1.3: 71 and Clark's arguments around Wuyue's 'ties with ports farther south in Min and Southern Han that gave access to the South Seas trade' (2009:182).

4.2 The Cargo

The composition of the ship's freight has been detailed in Sections 2.2 and .3; Fig.4.2-1 summarises the verifiable¹ proportions of the objects carried aboard ship. Both the huge preponderance of the green-glazed stoneware, representing more than 95% of all recorded ceramics, and the wide differences in the respective composition of the white-, earthen- and Yue wares are obvious. The enormous volume and restricted variety mark the Chinese ceramics (and, judged by a small number of samples, the unresearched utilitarian ironwares) as mass production of an equally restricted number of manufacturers. Contrastingly, the southern Thai Fine Paste Wares, though also composed of an only limited range of common types, exhibit much less uniform shapes and decorations.² The far smaller shipments of non-ceramic objects represent widely distinctive commodities from a broad range of sources. Despite their often small sizes, several of the latter consignments -of note are the jewellery and the glasswares with their hypothesised costly contents- were of a considerable value. Most of such pricey commodities were products of the Western Indian Ocean.

We have seen on the example of the lapis lazuli and rock crystal that the ship carried not only the crude material, but also wrought objects and, possibly, persons commanding the skills to work such stones. The western Asian symbolism of the intaglii they produced would have been as strange to tenth-century Hindu Javanese as was, I assume, the allegory of a Chinese *long*-dragon incised into a Yue bowl. The most common motif found on crystal stamps and lapis lazuli intaglii yet is the Indian-inspired 'vase of plenty', an emblem known from Southeast Asian coins and religious architecture:³ the stonecutter obviously was willing to cater for a symbolism more common to his anticipated clientele. In contrast to the Chinese imagery on the incised stonewares, such objects had not only their presumed aesthetic appeal, but would convey the ideas represented in their very motifs. Throughout the centuries, the impressions on 'Indonesian' religion and culture left by the concepts symbolised in the Daoist zodiac on the mirror, Art.153158, were far from the influence that the Islamic formulas on the mould, Art.28815,⁴ were destined to have. China supplied aesthetically appealing and practical merchandise - the ideas that formed Insular Southeast Asia yet came from the lands to her West.



Pedlar Trade?

Distribution of the consignment of the "western" merchandise in the ship's cargo readily confirms the concept of pedlar trade discussed in Section 1.4. There were traders in Middle Eastern glasswares who had packed their batches of beakers and bottles on the vessel's foredeck, and dealers in the fine scents of Persia whose phials were stowed somewhere on starboard deck.⁵ The jewellery came in at least three different consignments, marked by contrasting proportions of the precious stones retrieved from distinct quarters of the site;⁶ even such small and profane articles as beads were divided into separate batches, recovered from discrete areas of the tumulus (see Fig.2.3-49). Not all of the vessel's non-Chinese freight was necessarily merchandise: the concentration of fragments of pedestals, lion-feet tripods, mirrors and ritual vessels⁷ over the foreship and off the port- side bows or the conches found off starboard aft⁸ could have been shipments intended for religious foundations.

An analysis of the spatial distribution of the Chinese ceramics proves more difficult. Due to their sheer numbers and limited variety, none of the major types of plain green- glazed bowls and dishes that filled the ship's hold from bilge to deck can unambiguously be pinpointed to distinctive quarters of the site. Analysis and reconstruction of the wreck in 3.2 and .3 assumed that the Nanhan/Cirebon ship's hold was divided by crossbeams into sections reminding of the *petak* mentioned in the Maritime Law of Malacca or the compartments apportioned to individual merchants described in Chinese sources.⁹ If the vessel's main load of ceramics, as postulated for the pedlar-trade model, was procured, owned, managed and intended to be marketed by a number of individual traders, one would expect to find notable differences in the composition of the cargo stuffed into such compartments: it would appear strangely uncompetitive had all merchants aboard ship invested in the same choice of pottery. Supposedly, pedlars would also strive for individual arrangements with the manufacturers of the goods they were to acquire, and more often than not choose distinct suppliers, and thus distinct types of products. Even if a number of traders were dealing in largely the same range of merchandise, one would assume that they would have selected different proportions of specific types of goods when assembling their respective shipments. Such arrangements should result in a number of individually

composed "vertical stacks" of cargo consignments that parallel the divisions of the hold (Fig.4.2-2).

I found no firm evidence of such a stowage pattern in the Nanhan/Cirebon wreck's ceramic cargo. As detailed in Section 2.2.1 and noted above, the principal categories of ceramics appear to have not been distributed in "vertical stacks" corresponding to compartments in the hold, but were laden in "horizontal layers" that concur with prudent nautical practice: densely packed batches of bowls and plates in the lower hold were topped by the lighter, less compact consignments of jars, ewers and kendi (Fig.4.2-3). The only identifiable "vertical stack" of specific pottery that might indicate an individual consignment is the concentration of whitewares stowed behind the 'tween-deck. As argued above, however, this pattern could also indicate an "opportunistic" use of the cargo space still available after the Yue wares had been taken aboard: the white-glazed ceramics comprised, at best, 6 m³ of volume,¹⁰ space for which could have been found in any empty quarter of the hold. Yet, much of the whitewares, reputedly objects of abundant demand and great esteem, was stowed close to and apparently atop the incised Yue wares, the most valuable of the ceramics in this cargo.

We have seen that the various types of Yue bowls and dishes, my category "open", constituted nearly 90% of the overall ceramic cargo.¹¹ The examination of the percentages of the main waregroups of "open" green-glazed ceramics found along selected cross-sections over the central hull in Fig.4.2-4 indicates that the most numerous type of bowls, <OP07>, is proportionally more frequent over bows and aft-ship. This pattern appears to conform to a stowage scheme where the hold is filled by concomitantly breaking down fore- and aftship. Contrarily, <OP01>, the second most frequent type, emerges more often over the central sections of the hold. These two types of bowls are discriminated by their basic profiles,¹² and thus could have been products of different kilns that had been contracted by different investors. However, distribution of <OP02>, a larger version of <OP01> and therefore almost certainly a product of the same manufacturer, except for a somewhat higher occurrence in the aftship roughly follows the pattern of <OP07>, contradicting the assumption that this stowage pattern represents individual arrangements between particular producers and brokers.

This observation is even more pronounced in the distribution of the green-



and white-glazed covered boxes and small jars, clearly products of different areas: independent from their glazes, both boxes and jarlets had initially been stowed in the same quarters (see Figs.2.2-120, -167, -168, -223). The same picture is seen on the example of the green-glazed 'depressed jarlets' and a number of "closed" earthenwares, again products of geographically widely separated kilns, that also were stowed in adjacent sections of the cargo space.¹³ Here one could assume the presence of merchants specialised in particular types of ceramics; however, I doubt whether trade in small consignments of a highly specific nature but relatively low market value could have generated much return. Likewise, it is uncertain how such small-scale segments of the ceramic shipment could have been separated from the overall financial transactions that had facilitated the procurement of the vessels, and would have taken place when marketing the cargo at the ship's destination. Hence it is more likely that specific quarters of cargo space were allocated for specific types of ceramics, implying that burdening of the ship followed a predetermined overall loading pattern. A tangible example for this assumption is the concentration of incised Yue wares of all types in the vicinity of the 'tween-deck in the central lower hold.

There are two further arguments against an individualised ownership of the ceramic cargo. The first refers to the highly uniform character of the ceramics: it has been seen in Section 2.2 that not only the vast majority of the green-glazed stonewares, but also much of the white- and earthenwares are composed out of a limited number of general shapes, thus confining the number of possible sources and allowing for only restricted choices when compiling individual shipments. One indeed would expect a cargo assembled by a number of individual merchants to exhibit a much greater variety of shapes and types of ceramics, collected from a much wider range of producers.

My second contention questions the nature of the financial transactions behind the acquisition of, first of all, the freight of Yue ceramics. As detailed in Section 2.2.1, the very conformity of the green-glazed stonewares mark these ceramics as the product of a single kiln complex. I imagine it unlikely that a single manufacturer intending to market such an amount of pottery would have been inclined to deal with a number of individual buyers and the unavoidable range of requests and biddings these would have entailed.

Such a sales policy conforms with the monopolistic approaches so common in medieval Chinese economic dogma: we have seen in Section 1.4 that at least under early Song rule foreign trade was an unopposed state monopoly. However, our knowledge regarding the particulars of the commerce in tenth-century export ceramics does not exceed the general observation that the agencies supervising this monopoly 'collected porcelain through delivery obligations to local offices that were instituted at the centres of production' (Lewin 1973:64).¹⁴

The Xu kiln signing for the green-glazed stonewares in this cargo could be related to a Wuyue 'tribute kiln' of that name, indicating the possibility that such a monopoly system was also operated during the Wudai Shiguo.¹⁵ This manufacturer would have marketed his produce through Wuyue's bureaucracy, and therefore within the limitations of the 'tributary trade' described in Section 1.4. If so, the financial transactions related with sale and purchase of the green-glazed Yue wares could not have been conducted by individual private enterprises, but would have been instituted and organised through a monopoly office that dealt with a single authority representing prospective buyers. I assume that this "authority" would be closely related to the personnel in charge of nautical affairs, and thus could easily have overseen the loading of the ship.

A small number of decorated Yue vessels had found their way to the very fringes of the tumulus, where they at least in case of the "dishes" with a shallow conical profile were found associated with equally small numbers of their undecorated version.¹⁶ These ceramics could not have been stowed in the central hold, but must initially have been packed in the uppermost of the cargo. The extant vessels could not have been all there was: objects in the upper tiers of the mound of debris and cargo were more exposed to both elements and looters than those deep inside the tumulus, and the decorated ceramics found along the peripherals of the site accordingly would represent a proportionally smaller fraction of the overall amount of such items than do those retrieved from inside the hull. We can only speculate why a small number of valuable ceramics were not stowed following the obviously well-established pattern of the bulk of comparable items. Smaller batches of ceramic vessels could have been prepared for earlier unloading and sale than the main cargo during, for instance, the anticipated sojourn



in the Muria region; as intimated in the extant law codices regulating insular Southeast Asian trade discussed in Section 1.4, the objects could also have been personal possession or shares of distinct sailors, traders or officers; they might even represent a kind of sales catalogue containing an “overview” of much of the more valuable ceramic objects in the cargo. However, any of the possible explanations underlines the high grade of organisation and well established procedures behind the ship’s venture.

Volume and Demand

The ceramic cargo of the Nanhan/Cirebon ship is the largest yet discovery of such a shipment on a medieval trading vessel: the roughly contemporary Intan and Karawang wrecks held around 30,000 and 70,000 ceramic objects;¹⁷ both the ninth-century Belitung and the thirteenth-century Java Sea wrecks carried perhaps 100,000 pieces.¹⁸ The approximately 600,000 stone- and earthenwares aboard the present wreck¹⁹ hence raise a number of questions regarding the possible volume of demand for ceramic articles at the ship’s destination.

The only available figures for market volumes for imported ceramics in historic Java are late eighteenth-century records of the Dutch East India Company. Due to the monopolistic trade system introduced by the company, ships intending to import ceramics into Java were obliged to call at Batavia, where their cargoes were meticulously registered; onward transport to other destinations was handled by both company and local ships, the cargoes of which again were recorded in detail.²⁰ Based on data compiled by Knaap (1996:218ff), Fig.4.2-5 summarises the yearly averages of imports and exports of Chinese ceramics into Javanese ports east of Batavia for the years 1774-7. For a number of ports no figures are available; here I adopt averages of the overall imports into central and eastern Java. The total, around 250,000 ‘bowls and plate’ of Chinese origin, is far from the numbers of ceramics found on the Nanhan/Cirebon vessel, yet corresponds with the figures reported by Raffles for the British interregnum of Java (1811-15)²¹ or Dutch records of the seventeenth century.²²

The volume of the population these imports were to be catered to is still widely discussed. Ricklefs (1986:12) assumes that in the late eighteenth century ‘probably no more than about three million’ people resided on Java;

Peper (1970) reckons on eight to ten million inhabitants at around 1815. Recent reviews of these calculations tend to estimate an early nineteenth-century population of around seven to eight million.²³ Any population figures for earlier centuries are but mere guesswork. A reviewed median number might be 'MacDonald's [1980] guess that the population of Java could have reached five million by the fourteenth century' (Christie 1991: 290). This figure appears to be supported by, for instance, Reid's (1988:14) and Ricklefs (1991:22-3) assumptions of around 14-15 million people inhabiting the area of today's Indonesia (without Papua Barat) and Malaya in 1800: in light of the modern distribution of Indonesia's population, approximately one half of these peoples resided on Java; one-third of the island's inhabitants would live in, respectively, its western, central and eastern parts (Fig.4.2-6²⁴). Reid proposes a figure of about ten million people for the year 1600, reducing the estimate for central and eastern Java to around three million. It is generally agreed that population numbers did not rise significantly before the European "pacification" of the area during the nineteenth century; instead, warfare and possible 'short-term, catastrophic effects' (as, for instance, 'volcanic activity in central Java during the later ninth and early tenth centuries' [Christie 1991: 23]) could have seriously affected population density.

The available figures of ceramic imports in the records of the Dutch East India Company were taken about 30 years after the treaty of Giyanti, ending "eight troubled decades" (Ricklefs 1986: 31) of war and unrest. This situation is not too different from that of Eastern Java in the late 960s, again about 30 years after the exodus of the polity's centre from the central parts of the Island. Both the unsettled conditions throughout the times of the various wars for Java's succession in the eighteenth century and the proposed climactic events leading to the shift of the island's political hub in the tenth would have had serious impact on population density: it is only realistic to assume moderately low figures for the island's residents.

However, neither higher nor lower estimations of Java's population are readily relatable to the number of ceramics carried aboard the Nanhān/Cirebon ship. Even if we assume the smallest of the population estimates above and add 20% of unrecorded ceramic imports, possible market demands and volume of cargo only match at an assumed tenth-century population of around six million people (Fig.4.2-7). There are two possible



reasons for such incongruities: the first is that consumers in tenth-century Java harboured a higher demand for imported ceramics than those in the late eighteenth century; the second is the assumption that a considerable volume of ceramics was bound to be reexported to other destinations.

I noted the modern use of vessels resembling the vase-shaped Fine Past Wares for funerary purposes,²⁵ and imagine that many of the stoneware jars in the cargo were intended for similar functions. Still today bowls, plates and stemcups are widely sold throughout Southeast Asia and India as popular containers for offerings to Hindu and Buddhist shrines and temples (Fig.4.2-8). An assessment of a possible ritual use of imported ceramics in tenth-century Hindu Java remains mere guesswork; for the present purpose I estimate that such practices could have increased demand by a factor of two to, rather speculatively, three.

Ceramics could have been re-exported to areas beyond Java for exchange against commodities for a possible return voyage. Many such goods would have been the produce of the Malay Archipelago's eastern parts, presumably carried to ports in eastern Java by smaller vessels.²⁶ These ships could also have distributed ceramics²⁷ throughout the numerous islands producing potential articles for further exports.²⁸ Imported ceramics are known to have been employed as grave goods in areas beyond the principal Indianised societies of Java and Sumatra, and would have been an article of constant demand.²⁹ Based on a mortality rate of 30/1000³⁰ and assuming a population between one and two million people³¹ as possible market for such re-exports, three pieces of imported ceramics in every second funeral³² occurring in areas outside of Java add a requirement of between 90,000 and 180,000 pieces of imported ceramics per year. The resulting overall figures, in Fig.4.2-9 calculated based on a lower and higher estimation of central and eastern Java's late eighteenth-century population of, respectively, four and six million people, again show that the Nanhan/Cirebon ship's ceramic cargo would have easily covered the largest part of the possible demands for ceramics on the islands' tenth-century markets. Only the lowest assumptions for eighteenth century demands/population and unrealistically high estimations for consumption/population in the tenth century call for more than one ceramic shipment of the size found on the vessel.

The huge cargo of ceramics on the Nanhan/Cirebon ship may have been

an exception. Fig.4.2-10 estimates figures for the average volume of the medieval ceramic shipments to Java, based on the most credible assumption of a late eighteenth century central and eastern Javanese population of five million people,³³ a doubled volume of consumption to allow for tenth-century ceremonial usage and the lower estimate for re-exported ceramics. Evidently, two to four voyages of such "average" bottoms could have covered Java's yearly demand for imported ceramics — a far cry indeed from the 'hundreds, if not thousands, of such ships' that often are assumed to have been 'plying the islands and mainland ports of Southeast Asia in the tenth century' (Gordon 2009: 58).

The Impact of a Trading Voyage

One would expect that trading ventures to China were the task of larger ships than those operating only between Sumatra and Java. Based on the numbers used in the previous figure, Fig.4.2-11 outlines estimates for voyages to China with vessels of cargo capacities varying between somewhat less than a twofold freight of the average ship sailing between Java and Sumatra and payload of the Nanhan/Cirebon cargo. It is apparent that the latter's freight approximately matches the yearly demand for ceramics for a tenth-century population of between four and five million people living on Java. Even if we assume unrealistically high population densities for tenth-century Java and the lowest conceivable cargo capacities, four ships would have been sufficient to supply all of the island's demands for imported pottery.

I have noted that with the fall of Guangzhou the Song administration instituted a monopoly over foreign trade frequenting that port. If we are to assume that the reports of audiences for foreign ambassadors and traders preserved in the Song annals reflect the actual number of ships arriving in the Celestial Empire, the records for insular Southeast Asian legates calling at the court between 960 and 990 imply an average yearly trade volume of somewhere between 200,000 and 450,000 pieces of ceramics (Fig.4.2-12). We have seen above that in the early seventeenth and the later eighteenth century the yearly total of ceramic imports into the ports under control of the Dutch East India Company averaged around 250,000 ceramics³⁴ roughly half of the cargo of stonewares carried on the Nanhan/Cirebon vessel.

Until the Javanese embassy of 992, all official state missions and private



traders hailing from insular Southeast Asia arriving in China were recorded as representing (San)foqi, and none of the few Javanese goods in the "tributes" noted in the Chinese reports were accompanied by ambassadors of that island.³⁵ The Javanese ambassadors had availed themselves of the help of an 'owner of many vessels, and a great merchant' (the *Songshi*, Groenveltdt 1887:144) by the name of Zhang Suyi - Java herself apparently did not command over the means for such ventures. One would imagine that the same was the case at around 970: Java's lack of maritime expertise thus leaves us with Śrī Vijayans as the most likely operators of the Nanhān/Cirebon vessel.

The repairs to the hull discussed above indicate that the ship had been in use for some time. Her last disastrous voyage might have been a reprise of the vessel's previous ventures: the numerous parallels to the contemporary Java-bound Intan cargo imply that our ship's supercargoes knew of commodities in demand on their destination's markets. Particularly of note is the large amount of the unique "ceremonial lanceheads" retrieved from the Nanhān/Cirebon wreck, numerous examples of which were also found in the Intan cargo.³⁶

The huge amount of Yue wares aboard the present ship is striking. The calculations above indicate that the ceramics covered the best part of Java's yearly demands for such pottery; and it would seem odd had the investors in freight and ship not been aware of this fact. I cannot say how the funds for such an enterprise were raised. However, the stowage pattern of the ceramic freight indicate that purchase and handling of at least the ship's cargo of Yue wares were organised under a single authority. If acquired as a single shipment; the ceramics in all probability would have been sold as such; had they reached eastern Java; the freight's sheer volume is indicative of a virtual monopoly of the island's markets. If this tragic voyage was not the vessel's first venture; we may assume that the control the undertaking's backers wielded over Java's commerce in imported ceramics was comfortably established. Such a commercial policy would not only have included imports into Java; but also entailed liberal command over shipping space; and thus the handling of possible exports. The strongest candidate for such a commercial strategy is, again; Sri Vijaya. The *Pingzhou ketan*, written around 1100, tells us that

In recent years San-fo-ch'i has established [its own] monopoly in sandalwood. The ruler orders merchants to sell it to him. The market

value of the product [therefore] increases several times. The subjects of that country do not dare to sell it privately. This is an effective way of governance. [...] The Chinese Maritime Trade Office at the port of call would handle such goods [sent in Śrī Vijayan ships] as a government monopoly and purchase the entire shipment after receiving a proportion of it as customs duty. (So's translation [1998: 299])

If commodities exported to China were disposed of in bulk to the Celestial Empire's bureau for maritime trade, return cargoes of ceramics could have been mustered from the office's stocks of pottery collected through delivery obligations³⁷ or produced at state-controlled 'tribute kilns'. Such shipments could well have been of the rather uniform character observed in the Nanhan/Cirebon wreck's cargo of Yue stonewares. Song economic policies were a continuation and enhancement of those harnessed by the Tang administration, and I have argued above that there is ample reason to assume that the various states of the Five Dynasties and Ten Kingdoms relied on comparable regulations. The Nanhan/Cirebon ship's ceramic cargo thus could represent the outcome of such a "governmental trade" that, necessarily, encouraged monopolies.

How such a policy was received by those not directly involved in its procedures is aptly illustrated by Middle Eastern impressions of Śrī Vijaya's attempts at guarding her control over the traffic passing through the Straits of Malacca; the men-at-arms policing the (unavoidable) Riau archipelago

are a licentious and hostile people. They carry weapons with them wherever they go. At times they board [Middle Eastern] ships and threaten the [merchant] vessels - eating their goods, hindering the people and preventing any access save for those whom they have appointed. There is no avoiding their exactions and wickedness. (Al-Idrisi; Laffan's translation [2005: 37])

Combined with a virtual monopoly over shipping space and Chinese imports, these practices, sooner or later, could not but have raised opposition. Speculatively, such could have been the reasons for Java's attempts at quashing Śrī Vijaya in the 990s or the Chola's maritime expedition of 1024/6.³⁸

It appears that the owners of the Yue ceramics in the Nanhan/Cirebon cargo had entrenched themselves sufficiently in the trade to be able to secure, convey and market a volume of import that controlled a considerable share of Java's markets for Chinese imports, dictate prices and control



supplies. These were not pedlar traders, but the epitome of the patrician *puhawang*³⁹ van Leur's 'merchant gentleman' (1967 [1955]: 201ff) of later centuries. We have met some of the people involved in such ventures in Section 1.3: there was Li Memo, in 971 'sent at the head of a mission to bring tribute'⁴⁰ offered by Sanfoqi; or the unfortunate Pu Yaduoli, representing Śrī Vijaya in 983 and 988. As is so evident in the offer to provide the 'guidance to come to [the Song] court and bring tribute extended by the 'great merchant' Zhang Suyi⁴¹ to the ruler of Java, these patricians of trade were close to those in power - in China, the likes of Pu Yaduoli and Li Memo were readily accepted as representatives of Sumatra's political authority. They not only provided the status-enhancing merchandise that could fulfill the ceremonial and representational commitments of Southeast Asian potentates⁴² as well as facilitate barter for the services and allegiance due to a sovereign, but also pooled the sophisticated knowledge of navigation (and, possibly, shipbuilding) and the economic acumen necessary for successful maritime ventures. Retainers of such erudition would have been an invaluable asset for a thalassoc- racy like Śrī Vijaya.

In 971 Li Hemo represented both Śrī Vijaya and 'the Arabs'⁴³ in audience to the Song court; the Śrī Vijayan ambassador of 988, Pu Yaduoli, in 995 and 998 attended upon the Son of Heaven in his function of 'Master of Ships', now but on behalf of the Perso-Arabian Dashi. We should not automatically read their names as Arabic titles: Zhao Rugua knows that 'a large proportion of the people of this country [Śrī Vijaya] are surnamed "P'u" (1911: 60), and would have called them Dashi had they been of pure Middle Eastern stock; Pu Yaduoli would possibly not have been affected by the Java-Sumatran war of the 990s that forced him to return to China and ask for the Celestial Empire's mediation in the conflict⁴⁴ had he been a Persian or Arab. "Co-representation" of Sumatran and Middle Eastern interests, however, indicates the close relationship between the two. Speculatively, we could relate the rise of the "second", tenth-century Śrī Vijaya⁴⁵ to the massacre of Guangzhou's foreign residents in course of Huang Chao's rebellion in the 870s and the ensuing exodus of trade and traders to the Straits of Malacca.⁴⁶ Middle Eastern commercial perspicacity and capital could well have provided the guardians of the Malacca Straits with a new cadence for what Wolters (1975 [1970]: 39ft) has called a rhythm in Malay history', thereby facilitating the shift of

power in the Straits of Malacca from Zhanbei-Malayu to Sanfoqi- Palembang observed in the Chinese records of the later ninth and early tenth century.⁴⁷

Buzurg (1981: 98) relates an eyewitness report of a tenth-century shipwreck:

In 306/918 I set off from Siraf in a vessel going to Saymur [in NW India]. With us was a ship belonging to Abdallah b. Junayd and one from Saba. These three ships were large vessels, well known at sea; and their shipmasters were respected. On board the three ships were 1,200 persons, merchants, shipowners, sailors, traders, and others. The provisions and cargo were of incalculable value. After eleven days' sailing we were in sight of the mountains on Sandan, Tana and Saymur. Never before, they said, had the voyage been made so quickly. We rejoiced greatly, and congratulated each other on a lucky voyage. We believed ourselves free from danger, and expected to land next morning.

But the wind changed, coming against us from the mountains. All of a sudden a gale got up, with lightning, thunder and rain. The sails could not be reefed, and the gale carried us away. [...] For six days it got worse. On the sixth day, seeing that the ship was about to founder, [the captain] Ahmad gave order to jettison the cargo. They could not throw anything overboard, because the rain had made the sacks and bales heavier. What had weighed 500 maim now weighed 1500. They floated the ship's boat, and thirty-three men embarked. Ahmad was asked to get in, but he said: I shall not abandon my ship! It is safer than the boat. If it goes down, I shall go down with it. What good would it be to me to return home safely if I have lost everything I possess?

The ship's tender, with Buzurg's informant on board, drifts away from the doomed vessel] We stayed five days in the ship's boat, without anything to eat or drink. Hunger, thirst and suffering so much took away our ability to speak. The ship's boat was the plaything of the wind and waves. We did not know whether it was swamped by the sea or floating. We were so hungry and desperate that we made signs to each other that we should have to eat one of ourselves. In the boat we had a very fat boy, who had not yet reached puberty, whose father had stayed on board the ship. We decided to eat him. He guessed our intentions, and I saw him looking at the sky, and screwing up his eyes and lips. As luck had it, at the moment we saw first signs of land, and soon we saw it clearly.

The ship's boat ran on shore and turned turtle. We had no strength to get up and right it, [Inhabitants of a nearby village rescue the shipwrecked] Of all people who embarked on the three ships, not one was saved, except some who were on the ship's boat. Among the dead was the ship's captain, Ahmad, whose name is still well known. The loss of these ships and their cargo, of officers, captains and well-known merchants aboard contributed to the decline of Siraf and Saymur.



(Endnotes)

1. See the discussion of the ambiguities in the classification systems in Section 2.1.2.
2. See Section 2.2.3,
3. See Section 2.3.2: i8o£
4. See Sections 2.34:195 for the former, 2.3.3: i8gf for the latter.
5. See Section 2,3.1.
6. See Section 2.3.3.
7. See Section 2.3.4:193.
8. See Figs.2.3-71, -75.
9. See Section 1.3: 75f.
10. See Section 2.2.2:152.
11. Section 2.2.: 75.
12. See App.2.2.1: 2f on the DVD accompanying this thesis; and Fig.2.2-89.
13. See Sections 2.2.1 .ii: 142! and 2.2.34:160.
14. Cf. Section 1.3: 8if.
15. See Section 2.1.1:121.
16. See Section 2.2J: 132.
17. See, for the Intan wreck, Flecker 2002:101; for the Karawang wreck, Liebner 2009c!: 7.
18. Numbers for the Belitung wreck are extrapolated from Yang Liu 2011:147 (and information by P. Schwartz and F. Dobberphul, pers. comm. 2007/8); and Flecker 2003:397 for the Java Sea wreck
19. See Fig.2.2-1.
20. Knaap 1996,1999; Knaap and Sutherland 2004.
21. 1 Raffles 2008: 367.
22. Ho 1994b.
23. For recent overviews see Owen 1987 or Zanden 2002.
24. Due to the considerable proportion of migrants from other islands of the Archipelago, I here partly exclude the modern urban conglomerations around Jakarta and Surabaya, comprising around 14% of Indonesia's current population, but add Malaya and Malaysian Borneo.
25. See fa. 144 in Section 2.2.3.i.
26. Assuming that the Nanhan/Cirebon vessel would have continued her voyage into eastern Indonesia appear speculation: the volume of yearly production of, e.g.; cloves in still the early sixteenth century did not exceed 1501, harvested on widely dispersed islands (see Bulbeck et al. 1998: lyfff and thus almost probably would not

have been a profitable venture for a ship of at least 2501 of cargo capacity.

27. Cf. the trade in Chinese ceramics in the late eighteenth century noted above.
28. See Section 1.3: 78f for some these products; cf. Zhao Rugua 1911: 204ff for possible "Indonesian" imports into early thirteenth century China.
29. Besides the general notion that 'trade ceramics have been recovered from graves throughout Southeast Asia' (Witowski 2013a: 284; cf. Hall 2011: 64), as yet no overview of the various mortuary traditions practiced throughout the early medieval Malay Archipelago is available. Cf. the sources noted in Section 1.3: fn.2; and, for case studies, e.g., Bulbeck and Prasetyo 2000; Chang 2008; Druce, Bulbeck, and Mahmud 2005.
30. For the choice of this ration see, e.g., Hatcher 1986 or Russel 1958: 34ff.
31. Cf. Reid's (1988:14) and Ricklefs (1991:22-3) assumptions quoted above.
32. To allow for possible domestic use, these numbers about double those reported by Chang (2008: nsff), the only study of imported grave goods in a considerable number of burials available to me.
33. 2/3 of the seven to eight million of recent estimates: see fn.23 above.
34. Pg. 305; Ho 1994b: sjff; Knaap 1996: 218ff.
35. The singular mention of a Javanese mission to the Nantang in 971 by Hartwell (1983: 182) might be related to the 'goods from Champa (Zhancheng, in central modern-day Vietnam), Java (Shepo) and Arabia (Dashi- guo) that had been sent to Jinling previously' (Kurz 2011:101) and were forwarded by its ruler to the court of the Song in 992. Cf. the few pieces Javanese of silk and brocade arriving at the Song court in 963, also forwarded by the ruler of the Southern Tang, who had received them from 'an envoy from the country of Champa' (Wade 2005: 7) who had passed through his realm. I could not consult Hartwell's source, the Yongle Dadian (12308.8a).
36. See Section 2.3.6: 203.
37. Lewin 1973: 64, as quoted above.
38. Cf. Section 1.2: 48f.
39. For their privileges and liberties see Section 1.2: 40 and .3: 73, 77f.
40. The Songhuiyao, Hartwell 1983:173.
41. The Songshf, Groenveltdt 1887:144; cf. Section 1.3: 74 and pg.308 above.
42. See the discussions on the incised Yue ceramics of 'dish-type shapes that warrant better visibility of the incisions' in Section 2.2.1:128.
43. Bielenstein's (2005) and Hartwell's (1983) heading for Dashi, the Perso-Arabian merchants frequenting China's southern ports.



- 44. See Section 1.2: 30.
- 45. Cf. Section 1.2: 41ff.
- 46. See Sections 1.2: 50f and 1.3: 69.
- 47. See Section 1.2: 31f.

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Abbreviations

(lw)	in references to frescoes on the Borobudur, 'lower row'
(up)	in references to frescoes on the Borobudur, 'upper row'
App.	Appendix
BN.NN	in references to frescoes on the Borobudur, 'balustrade'
ca. [c]	'circa.' [if so used in quotations]
Chpt[s].	'Chapters', law texts and quoted sources
comp.	'compare'
cont.	'continued'; in captions denoting a figure continued over two or more pages: Fig.N.N-NN: [caption]; cont. ... > Fig.N.N-NN, cont.: [caption]
dgr	'degree' of angular measurement
ER	'Excavation Reports' submitted to the Indonesian authorities. The (mostly) weekly reports by the salvagers are noted by the time they cover (e.g. ER 2004-06-06/2004-06-27); others are added the name(s) of their respective author(s).
espc.	'especially'
Fig.	'Figure'
fn.	'footnote'
PanNas BMKT	<i>Panitia Nasional Pengangkatan dan Pemanfaatan Benda Berharga asal Muatan Kapal yang Tenggelam</i> , 'National Committee for Salvage and Utilisation of Valuable Objects belonging to the Cargoes of Sunken Ships'
pers. comm.	'personal communication'
r.	'reign (ed)', 'rule(d)'
reg,	'regarding'
ŚNNN	Śaka year NNN
s.c.	'so called'
Sect	'Section', law texts and quoted sources
(SEAMEO) SPAFA	(Southeast Asian Ministers of Education Organization) Project in Archaeology and Fine Arts
transl.	'translator'
UNESCO	'United Nations Educational, Scientific and Cultural Organization'
unpg.	unpaginated'

Writing Conventions

The following will have to talk a lot about and in numbers. References to objects recorded in the salvage database, usually abridged to "Art.123456", will be the most common numerals. I leave it to the reader whether the abbreviation denotes an "article" or an "artefact"; for reasons given in Sections 1.2 and 2.1 I prefer the former reading. There is some variety in the notation of these objects: several items registered in the temporary storage facilities in Jakarta were given the code "WH[##]", 'warehouse'; others were marked "B/A[##]" or "BARC[##]", the meaning of which I do not know. Articles recorded in the samples database are given the indicator "S".¹ The three latter notations will not be preceded by "Art."

In contrast to the undivided numerals noting database records, "normal" numbers -amounts, sums and the like, here mostly related to objects in databases and spreadsheets— for the reader's convenience are separated into thousands and decimals by commas and dots ("12,345.67"). To avoid ambiguities, measurements, weights and many (mostly computed) percentages and ratios use the units, signs and conventions outlined in the *International System of Units*² and are written in this font. Accordingly, the "three- digit" separator for measurements above 9999 will be a 'thin space', and decimals be marked by a dot (e.g., 12 345.67 m[eter]), 67.5% [per cent], 45° [degree]). Formulas are {separated from text by braces}; if they refer to measured units or computations, the measurements font is used; any other formulas will be written in the font of the running text.

References to codes used in the databases are written <in between chevrons in this font>. This could include abbreviations for, e.g., materials or colours (which, were convenient, will be explained on their first appearances: for instance, <C[eramic]>, <G[old]>, <bl[ue]>) as well as codes for "waregroups" (e.g., <BL006a-c>, <Ke4>). Explanations for such codes will emerge in course of the assessment of the data and the cargo in Chapter 2. There also elucidated are the two separate coding systems applied on salvage location and in the onshore storage facilities ("warehouse"), referral to which, separated by a slash, often will have to follow the codings (e.g., <Ke4/loc>, <BL006a-c/wh>).

For convenient sorting, dates used in the database were formatted as YMMDD. To clearly distinguish between these dates and any other number,



references to dates of unearthing of objects are written in this font (e.g., 40721, 21/07/04; 51014, 14 October 2005). Any other references to dates follow the conventions outlined in ISO8601,³ i.e., the format YYYY-MM-DD, in the text's font (2014-03-31, 31 March 2014).

The gridding system is discussed in Section 2.1, 'Mapping the Site: Grid Layout'. References to grid notations are noted | between upright lines in this font | in the sequence |x-value y-value| (for instance, |B24|). If a depth, |z|, is noted, it will be separated from horizontal grid records by a slash (|C47/200|). Z-values are in cm. Ranges of gridpoints are indicated by a colon: thus, |B10:O10|, a "row"; |ZM18:ZM36|, a "column"; |B27:H30:H25|, a triangle; |N18:P31:ZA35:ZB24|, an irregular rectangle (Fig.0-1). Where possible, I will note such areas clockwise, starting at '(lower-)left'.

To conveniently refer to larger and/or general quarters of and directions on the grid, I will use (grid[+]ABbreviations for compass-bearings) (Fig.0-2), here adapted onto the orientation of the grid. Hence, the "upper-right", shaded portion of the grid in Fig.0-1, could be assigned "gridNE"; the "row" |B44:044| would be in gridSW; triangle and "column" in, respectively, gridW and gridE. Additionally, references to locations relative to the ship's remains employing nautical designations will be used where applicable: e.g., "off portside bow", "under starboard side", "aft off ...", "to the fore off ..." (Fig.0-3).

I frequently will give the word to others; if so, orthography of the source will be maintained. Thus, while my text transcribes Chinese words in Pinyin, quotations will retain the sources' transliterations. Pinyin will also be employed for the names of medieval Chinese authors in both text and bibliography. Most of the Chinese transcriptions are without tone marks; diacritical signs though will be used for a number of Arab, Persian and Indian names and terms.

(Endnotes)

1. The salvage database uses "H", presumably referring to "Horst", the personal name of the collector.
2. Bureau International des Poids et Mesures 2008.
3. See http://www.iso.org/iso/catalogue_detail?csnumber=40874.

The Siren of Cirebon

A Tenth-Century Trading Vessel Lost in the Java Sea

This book examines data collected during the salvage of the cargo of a merchant vessel foundered in the Java Sea, by a short inscription in a fragment of a bowl and coins dated to around 970 CE. The wreck's position indicates that the ship was on her way to the island of Java; the vessel herself belongs into the so called lashed-lug and doweled', Western Austronesian ('Malayo-Indonesian') tradition of boat-building. The surviving cargo ranges from Chinese stonewares and Southeast Asian ceramics to Middle Eastern glassware, tin and lead from -proposedly- the Malay Archipelago, and a wide variety of "smaller finds", most of which can be attributed to the broader area of the western Indian Ocean.

The find palpably demonstrates the far-reaching and well-institutionalised trade relations throughout early medieval Asia. It is often assumed that pre-modern Asian commerce was largely organised in small-scale ventures, the so called "pedlar trade", and a number of sources indicate structural features of the ships facilitating this commerce that could have supported such a "particularised" exchange. However, a critical assessment of the composition and distribution of the ship's payload and a virtual reconstruction of the ship and her initial loading pattern reveal that the vessel's ceramic cargo in all probability was not acquired, handled, and bound to be marketed as a particularised "peddling" venture, but managed by a single authority. The huge amount of ceramics carried on the vessel raises questions regarding frequency, volume and modus operandi of maritime exchanges in tenth-century Southeast Asia, implying that the ship's tragic voyage was but an attempt at instituting a virtual monopoly in such trade.

