



Ceramic Assemblages from Shipwrecks in Southeast Asia from the Last Half of the Eighteenth to the Early Twentieth Centuries

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Abstract

Previous research suggests that the peak of Chinese and Southeast Asian ceramic trade in Southeast Asia occurred after the late fourteenth century and possibly ended in the first half of the eighteenth century. This has led to a lack of understanding about what occurred with this trade after the early eighteenth century. This article identifies six shipwrecks from the region with ceramic assemblages dated from the last half of eighteenth to the early twentieth centuries: Samed Ngam, *Diana*, *Tek Sing*, Desaru, *Francis-Garnier* (Man Nok or Ruea Mail) and Tha Krai. By analysing the origins, typologies, dates, functions and selections of these ships' ceramics, it is clear that the Chinese-made armorial, Chinese-made Bencharong and European ceramics offer diagnostic evidence of post-peak ceramic trading patterns. These ceramics were products for sale, remains of earlier ceramic shipments or utensils for on-board living. This body of evidence is comparable with that of terrestrial archaeological sites that suggest other cultural influences among the more recent maritime ceramic trade in Southeast Asia.

Keywords Junk · Sailboat · Steamer · South China Sea · Strait of Malacca · Modern period

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Introduction

Southeast Asia, located between the South China Sea and the Indian Ocean, is comprised of Mainland Southeast Asia, the Malay Peninsula and Insular Southeast Asia. There are several straits that connect the South China Sea and the Indian Ocean, the most important of which is the Strait of Malacca (between the Malay Peninsula and Indonesian island of Sumatra) and the Sunda Strait (between the Indonesian islands of Sumatra and Java). The geographical orientation of Southeast Asia has lent itself to regional and international relations being established through maritime contacts.

Ceramics are almost always present in shipwreck assemblages in the region, found with agricultural commodities, forest products, metal objects, glass objects and other evidence mentioned in historical records such as textiles (Reid 1988; 1993; Tarling 1999a; Qingxin 2006; Wade and Laichen 2010), which were all products transported for long periods of history. Additionally, crews' personal belongings could include ceramics. However, in terms of resistance to degradation, ceramics (and metals) are particularly durable in the marine environment. Because ceramics were shipped over a considerable period of time, comparison of ceramic assemblages in shipwrecks is one method of archaeological research that provides good indications of changes in ceramic production and the dynamics of maritime contact within and beyond Southeast Asia. Ceramics from shipwrecks can also be used to indicate trends in chronology, a vessel's origins, routes and cargoes. Additionally, other cultural aspects related to daily routines and crew life on-board vessels can also be determined.

Research conducted by Anthony Reid (1988; 1993), Barbara Harrison (1995; 2003), Nicholas Tarling (1999a, 1999b, 1999c), Roxanna Brown (2009a; 2009b), John Miksic (2009) and Geoff Wade and Sun Laichen (2010) refer to the "Age of Commerce in Southeast Asia" generally occurring from the late fourteenth century to the first half of the eighteenth century. This is a commercial boom reflected in currency (Chinese metal coins and gold leaves) in exchange of spices, wood, ivory, animal skins, textiles and especially ceramics that sustained political and trade relations. All of the authors similarly hypothesise that the regional trade of Chinese and Southeast Asian ceramics peaked in Southeast Asia after the late fourteenth century. However, the termination date of these Southeast Asian ceramic exports remains unclear. They suggest that the termination occurred in the sixteenth or the seventeenth centuries (Reid 1988; Harrison 1970; 2003; Miksic 2009: 93–94; Wade and Laichen 2010) or even in the eighteenth century (Tarling 1999a), based on evidence from the Chinese and Southeast Asian ceramic assemblages and other factors (Praicharnjit et al. 1990; Reid 1988; 1993; Harrison 1995; 2003; Tarling 1999a; 1999b; 1999c; Brown 2009a; 2009b; Schottenhammer 2007; Miksic 2009; Wade and Laichen 2010; Flecker 2015).

In 2009, Brown published two books of archaeological relevance entitled "The Ming Gap and Shipwreck Ceramics in Southeast Asia: Towards a Chronology of Thai Trade Ware" (Brown 2009a) and "Southeast Asian Ceramics Museum, Bangkok University" (Brown 2009b) with the most recent data on ceramic cargoes from shipwrecks in the South China Sea during the Ming Dynasty (c. 1368–1644) and the period of the "Ming Ban" (1371–1509 and 1521–1529). Her method included analysing the origin, typology and date of ceramics found in shipwrecks from these periods, including dating each group based on comparative finds from production sites and the shipwrecks themselves. Her results in the first book suggested that the chronology of ceramic cargoes from the shipwrecks mentioned can be divided into five phases (Brown 2009a: 67), but her other book suggested six

phases (Brown, 2009b: 37–43). However, both chronologies focus on Chinese and Southeast Asian ceramics produced in the same period between 1368 and 1584.

The research on shipwreck assemblages from the “Age of Commerce in Southeast Asia” appears to indicate that ceramic cargoes are well studied and understood in comparison to other periods. For example, our research has identified 35 shipwrecks with Chinese and Southeast Asian ceramics from this period (Table 1; Fig. 1). The period afterwards, beginning largely in the early eighteenth century, still lacks information and remains relatively unknown. This article therefore attempts to fill in this gap by identifying the characteristics of ceramics cargoes from six shipwrecks in Southeast Asia during the following period. We suggest that the disappearance of Southeast Asian ceramics in the first half of the eighteenth century indicated a new period of ceramic trends in Southeast Asia. Moreover, the Second World War in Southeast Asia (1942–1945) was another historical event that affected the economy and maritime transportation in the region. Hence, studying the role of ceramics within this period, between last half of eighteenth century and the early twentieth century, can help provide a better understanding of regional cultural patterns related to ceramic trade and use after the earlier commercial boom.

Historical Background

The evidence provided by terrestrial and maritime archaeological finds in and beyond Southeast Asia confirms maritime-based contacts prior to the first century AD. For example, unglazed Chinese Han style earthenware sherds with a seal-on-net design are present at Khao Sam Kaeo in Chumphon, Thailand, on the Upper Malay Peninsula (Bellina et al. 2014: 77). Afterwards, contact from the East (China, the Ryukyu Islands and Japan) and the West (the Mediterranean, the Arabian Peninsula, Persian Gulf and the Indian Subcontinent) met in Southeast Asia, for a variety of purposes: exploration, diplomatic relations, trade, pilgrimage, evangelism, colonisation and even warfare. During the first millennium AD, shipwrecks, including remains found in rivers and at inland sites, are usually associated with ceramics and other types of products especially textiles, agricultural commodities, forest products, metal objects and the personal belongings of crew members. The Belitung shipwreck, which sank near the Belitung Islands, Indonesia, and the Phanom Surin shipwreck, which sank onshore in Samut Sakhon now around eight kilometres from the current shoreline of lower central Thailand, were both sewn-hulled sailing ships carrying large shipments of ninth-century Tang glazed ceramics and smaller numbers of Persian glazed ceramics (Effeny and Krahl 2011; Guy 2017: 180–188; Wongnoi, Jumprom and Premjai 2017), and are good representations of trade relations between East and West of the period.

Most of the ceramics from shipwrecks are glazed stoneware and porcelain of a variety of forms and decorative techniques, but earthenware ceramics have also been found. Production technologies and possible ports of origin and destination can be interpreted from the evidence. Furthermore, the economic and political relations between sellers and buyers and methods of supply and demand can be discerned. Each wreck also demonstrates shipbuilding technology and the methods of arranging cargo (Chandavij 1994; Brown 2000: 41–56; 2004; 2009b: 23; Srisuchat 2005: 194–206; Miksic 2009: 56–57; Rooney 2010; Effeny and Krahl 2011; Guy 2017: 180–188; Wongnoi, Jumprom and Premjai 2017; Miksic 2009: 72–76; Bellina et al. 2014: 77).

From the twelfth century onwards, the purposes of maritime contact in the region became more focused on the expansion of political influence and trade. Chinese,

Table 1 Lists of shipwrecks with identified ceramic cargoes in Southeast Asia between the late fourteenth and first half of the eighteenth centuries

Shipwreck designations ^a	Date of loss	Ship types	Ceramic cargoes												Sources					
			Earthen-ware ^c	Yuan ^b	Chi-nese Ming ^b	Chi-nese Armo-rial ^b	Chi-nese Qing ^b	ROC/PRC ^b	Hai Duong ^c	Binh Dinh ^c	Bang Fun ^c (Ko Noi) ^c	Si Sat. (Pa Yang) ^c	Suk-hothai ^c	Bang Racham ^c		San Kampaeng ^c	Kaw Don ^c	Marta-ban ^c	Twen-te ^c	Ben-chai-rong ^c
Rang Kwiem Thailand	14th c	N/A	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	(Intakosi and Charoen-wongsa 1988; Praichanjit et al. 1990)
Song Doc Vietnam	14th c	N/A	×																	(Brown 2009a)
Turiang Malaysia	15th c	Chinese junk (Flecker 2009; 41–43; 2015:39; Guan 2012:33)	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	(Brown and Sjostrand 2001; Brown 2009a)
Si Chang II Thailand	15th c	N/A	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	(Intakosi and Charoen-wongsa 1988; Praichanjit et al. 1990; Brown 2009a)
Maranei (Bakaui) Indonesia	15th c	Chinese junk (Flecker 2009:41–43; 2015:39)	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	(Brown 2009a)

Table 1 (continued)

Shipwreck designations ^a	Date of loss	Ship types	Ceramic cargoes										Sources										
			Earthen-ware ^c	Chi-nese Yuan ^b	Chi-nese Ming ^b	Armo-rial ^b	Chi-nese Qing ^b	PRC ^b	ROC/ Hai Duong ^c	Binh Dinh ^c	Bang Pui ^c	Si Sat. (Ko Noi) ^c		Si Sat. (Pa hothai) ^c	Suk-Racham ^c	Bang San Kampaeng ^c	Kaw Martate ^c	Twen-chai-rong ^c	Ben-chai-rong ^c	Euro-pean ^d			
Phu Quoc, Vietnam	15th c	Southeast Asian junk (Guan 2012:56; Flecker 2015:39)																				(Brown 2009a)	
Nanyang, Malaysia	15th c	Southeast Asian junk (Guan 2012:34; Flecker 2015:39)																					(Brown and Sjostrand 2001; Brown 2009a)
Khram, Thailand	15th c	Southeast Asian junk (Flecker 2015:39)																					(Praichanjit et al. 1990; Brown 2009a; Sankhprasit 2016)
Ko S'dech, Cambodia	c. 1405–1490 (Beaven et al. 2012; Grave et al. 2019)	N/A																					(Tep 2014)

Table 1 (continued)

Shipwreck designations ^a	Date of loss	Ship types	Ceramic cargoes										Sources								
			Earthen-ware ^c	Chi-nese Yuan ^b	Chi-nese Ming ^b	Armo-rial ^b	Chi-nese Qing ^b	ROC/PRC ^b	Hai Duong ^c	Binh Dinh ^c	Bang Pui ^c	Si Sat (Ko Noi) ^c		Si Sat (Pa Yang) ^c	Bang Racham ^c	San Kampaeng ^c	Kaw Don ^c	Marta-ban ^c	Twen-te ^c	Ben-chai-rong ^c	Euro-pean ^d
Longquan, Malaysia	15th c	Southeast Asian junk (Guan 2012:36; Flecker 2015:39)		×																	(Brown and Sjostrand 2001; Brown 2009a)
Royal Nanhai, Malaysia	15th c	Southeast Asian junk (Guan 2012:36; Flecker 2015:39)		×																	(Brown and Sjostrand 2001; Brown 2009a; Grave et al. 2019)
Pandaman, Philippines	15th c	Southeast Asian junk (Dizon 2003:9; Flecker 2015:39)		×																	(Brown 2009a)
Belanakan, Indonesia	15th c.-16th c	N/A		×																	(Brown 2009a)
Brunei, Brunei	15th c.-16th c	Southeast Asian junk (Guan 2012:36)		×																	(L'Hour 2001a; 2001b)

Table 1 (continued)

Shipwreck designations ^a	Date of loss	Ship types	Ceramic cargoes										Sources					
			Earthen-ware ^c	Chi-nese Yuan ^b	Chi-nese Ming ^b	Armo-rial ^b	Chi-nese Qing ^b	ROC/PRC ^b	Hai Duong ^c	Binh Dinh ^c	Bang Pui ^c (Ko Noi) ^c	Si Sat. Suk-hothai ^c		Bang Racham ^c	San Kampaeng ^c	Kaw Martate ^c	Twen-ban ^c	Ben-chai-rong ^c
Lena Shoal, The Philip-pines	15th c.-16th c	Southeast Asian junk (Flecker 2015:39)	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	(Goddio et al. 2002)
Santa Cruz, The Philip-pines	15th c.-16th c	Southeast Asian junk (Flecker 2015:39)		×						×					×			(Brown 2009a)
Hoi An, Vietnam	16th c	Southeast Asian junk (Flecker 2009:43–44; 2015:39)					×			×								(Butterfields Auciteneers Corp 2000a; 2000b; Brown and Sjostrand 2001)
Kiang Aow (Australia Tide), Thailand	16th c	Southeast Asian junk (Flecker 2015:39)	×															(Praicharnjit 1992)
Samui, Thai-land	16th c	N/A	×															(Intakosi and Charoen-wongsa 1988; Praicharnjit et al. 1990; Brown 2009a)

Table 1 (continued)

Shipwreck designations ^a	Date of loss	Ship types												Sources					
		Ceramic cargoes						Euro-pean ^d											
		Earthen-ware ^c	Chi-nese Yuan ^b	Chi-nese Ming ^b	Armo-rial ^b	Chi-nese Qing ^b	ROC/PRC ^b	Hai Duong ^c	Binh Dinh ^c	Bang Pui ^c	Si Sat (Ko Noi) ^c	Si Sat, Suk-hothai ^c	Bang Racham ^c	San Kampaeng ^c	Kaw Don ^c	Marta-ban ^c	Twen-te ^c	Ben-chai-rong ^c	
Kra , Thailand	16th c																		(Saelao 2005; Suktswan 2010)
Si Chang III , Thailand	16th c																		(Intakosi and Charoen-wongsa 1988; Praichanjit et al. 1990; Brown 2009a)
Española , The Philip-pines	16th c																		(Brown 2009a)
Singtai , Malaysia	16th c																		(Brown and Sjostrand 2001; Brown 2009a)
Xuande , Malaysia	16th c																		(Brown and Sjostrand 2001; Brown 2009a)
Kradat , Thailand	16th c																		(Praichanjit et al. 1990)

Table 1 (continued)

Shipwreck designations ^a	Date of loss	Ship types	Ceramic cargoes										Sources					
			Earthen-ware ^c	Chi-nese Yuan ^b	Chi-nese Ming ^b	Armo-rial ^b	Chi-nese Qing ^b	ROC/PRC ^b	Hai Duong ^c	Binh Dinh ^c	Bang Pui ^c (Ko Noi) ^c	Si Sat. Suk- (Pa hothai ^c Yang) ^c		Bang Racham ^c	San Kampaeng ^c	Kaw Don ^c Martta-ban ^c	Twen-te ^c	Ben-cha-rong ^c
Bangkachai II, Thailand	16th c	N/A	×	×						×								(Vatcharakul 2017)
San Isidro, The Philip-pines	16th c	Spanish Manila clinker (Dizon 2003:11)		×														(Dizon 2003)
San Diego, The Philip-pines	c. 1600 (Brown 2009a, b:167; Orillaneda 2012:18–19)	Spanish Manila galleon/warship (Dizon 2003:8–9; Brown 2004:53; Orillaneda 2012:18–19; Jagon and Orillaneda 2019:129–145)	×	×														(Dizon 2003; Brown 2004; Orillaneda 2012)
Si Chang I, Thailand	16th c.-17th c	N/A	×	×														(Intakosi and Charoen-wongsa 1988; Praichanjit et al. 1990)

Table 1 (continued)

Shipwreck designations ^a	Date of loss	Ship types										Sources							
		Ceramic cargoes																	
		Earthen-ware ^c	Chi-nese Yuan ^b	Chi-nese Ming ^b	Armo-rial ^b	Chi-nese Qing ^b	ROC/PRC ^b	Hai Duong ^c	Binh Dinh ^c	Bang Pui ^c (Ko Noi) ^c	Si Sat, Suk (Pa Yang) ^c	Bang Racham ^c	San Kampaeng ^c	Kaw Don ^c	Marta-ban ^c	Twen-te ^c	Ben-chai-rong ^c	Euro-pean ^d	
Wanli, Malaysia	16th c.- 17th c		×																(Sjostrand and Idrus 2007)
Binh Thuan, Vietnam	17th c			×															(Flecker 2004)
Hatcher, Indonesia	17th c				×														(Sheaf and Kilburn 1988)
Vung Tau (Con Dao), Vietnam	17th c. (Flecker 1992: 241–242; Jörg and Flecker 2001: 122–123)			×															(Flecker 1992; Jörg and Flecker 2001)



Fig. 1 Map showing shipwrecks and ceramic production sites dated between the late fourteenth and the first half of the eighteenth centuries in Southeast Asia. (Atthasit Sukkham)

Khmers (Cambodia), Chams (Southern Vietnam), Malays (Malaysia), Ryukyu Islanders (Southern Japan), Makassarian (Sulawesi Island, Indonesia) and Japanese were the main Asian groups who were apparently provided the right to live in several port cities, although the date of their initial trading activities and settlement is not known. Among the European powers, the Portuguese were the first to reach Southeast Asia in 1511, with the Spanish arriving in 1564, the Dutch and the English around 1604–1606 and the French in 1662 (Rajanubhab 1927; Tarling 1999a; Vatcharangkul 2001; Hongjamrassilp 2017).

According to Natthapatra Chandavij (1994), Kritsada Pinsri et al. (1992), John Stevenson and John Guy (1997), Roxanna Brown (2000), Pariwat Thammapreechakorn (2014) and Yew Sing Tai et al. (2020), Chinese Yuan (1280–1368), Ming (1368–1644) and Early Qing (c. 1644–1795) ceramics were developed at kilns that had been utilised in earlier dynasties. This is especially the case of monochrome glazed and ‘blue and white’ wares. The one exception is overglaze enamelware, which was a decoration technique created in the Ming Dynasty. The demands of specific customers resulted in “Imperial Ware” for foreign courts, as opposed to the “Domestic Ware” for the general populace. “Export Ware” was both Imperial and Domestic Ware but was exported in the form of a tribute trade specifically for the international market (Qingzheng 2002: 177–183).

The newly established Chinese Ming Court enacted a number of policies that limited the production of ‘blue and white’ wares and participation in international maritime trade. The first emperor of the Ming Dynasty, Emperor Hongwu (c. 1368–1398), imposed a ban on maritime trade starting around 1371. This ban was a response to the predation of Japanese pirates or “waka” that had been harassing Chinese and neighbouring kingdoms’ coastal regions for several centuries along shipping lanes stretching from Korea to Vietnam. During the early Ming period, the imperial court used porcelain as part of a system of “Ceramic Diplomacy.” The court sent diplomatic missions with selected types of ceramics and other valued materials overseas to be distributed as imperial gifts to vassal states (as tribute trade). There are at least two additional records of Ming missions in 1383 and 1386 to Ayutthaya or Siam (now Thailand), Champa (now central and southern Vietnam) and Chenla (now in Cambodia, Laos PDR, Thailand and Vietnam) that presented ceramics to the rulers of foreign polities during the Hongwu reign. During the Yongle (1403–1424) and Xuande (1426–1435) reigns, Chinese emperors sent Admiral Zheng He with a large fleet on seven voyages through Southeast Asia and the wider Indian Ocean world. He brought along sets of highly distinctive ceramics, as well as other presents, for rulers of the polities he visited during his missions (Tai et al. 2020: 2–3). These early Ming (c. 1368–1424) and middle Ming (c. 1426–1573) foreign policies indicate that China was officially exploring a wider world than previous periods, and ceramics were used as diplomatic gifts.

According to Ming law, the imperial kilns were located inland at Jingdezhen in Jiangxi province and Longquan in Zhejiang province. These kilns produced ‘blue and white’ (blue painted on white under the glaze) and ‘celadon’ (green glaze) wares during the early and mid-Ming periods almost exclusively for imperial use. By 1431, the imperial court exerted tight control over cobalt imported from both Persian and Chinese sources, effectively giving the court exclusive control over the production of ‘blue and white’ wares. The imperial court allowed commercial kilns to obtain cobalt only after 1435. This led to a rapid increase in the commercial production of ‘blue and white’ wares for markets within China. However, the Emperor Zhengtong (1436–1449), who ruled again as Emperor Tainshun (1457–1464) issued ordinances in 1439 and 1449 that limited the commercial production of ‘blue and white’ wares and punished violators with death, confiscation or banishment indicating imperial concerns on devaluing of ‘blue and white’ wares associated with the imperial court (Tai et al. 2020: 2–3).

While restrictions on maritime trade spanned much of the early and mid-Ming Dynasty, Roxanna Brown (2009a), Goeff Wade and Sun Laichen (2010) and Yew Sing Tai et al. (2020) called the period of restrained ‘blue and white’ ware production and internal maritime trade as the “Ming Ban.” Tai and others propose that two periods of official Chinese maritime bans existed during the Ming Dynasty: the First Ming Ban from 1371 to 1509 and the Second Ming Ban from 1521 to 1529 (Tai et al. 2020: 2–3).

The Qing trade ban was in part a result of the Manchurian conquest of China in 1644. This led to a period of turmoil and retaliation by the Han Chinese during which armed merchant ships that had formerly been considered ‘pirates’ became a vanguard against the Manchurian forces. In March 1654, the Supervising Secretary of the Ministry of Rites, Ji Kaisheng, proposed a sea ban to defend against Ming resistance forces. The following year, the Ministry of Defence decided “not even a single sail is allowed to enter the sea” (Tai et al. 2020:3). In 1656, the sea ban was formalised. The Emperor Shunzhi (c. 1644–1662) of the Qing Dynasty officially imposed a ban on all maritime activity to cut the supply and communication lines of the resistance forces. The imperial court ordered officials to erect barriers at all possible landing locations and not allow any ship to sail or land along the Chinese coast. Tai and others considered that this Qing Ban affected international maritime trade and ceramic export to Southeast Asia from 1654 to 1684 (Tai et al. 2020: 3).

In archaeological contexts, the numbers of Chinese export and Southeast Asian ceramics found on land sites in Southeast Asia rapidly increased in the fourteenth century (Chandavij 1994). The glazed ceramics produced in the kingdoms of Ayutthaya or Siam in central Thailand, Lanna in northern Thailand, Lan Xang in Laos and a part of north-eastern Thailand, Dai Viet in northern Vietnam, Champa in central Vietnam, Burma or now Myanmar, Majapahit in parts of Indonesia and Malaysia had begun in the fourteenth century. All ceramics were developed from Chinese expertise of glazed production with beautiful designs, which evolved parallel to increased diplomatic and trade expansion and even invasion by China from the Yuan to the early Qing Dynasties until around the early eighteenth century (Coedès 1975; Reid 1988; 1993; Rooney 1991; Tarling 1999a; 1999b; Surakiat 2005; Wade and Laichen 2010). Some Southeast Asian kilns ceased to operate earlier (Pinsri et al. 1992; Reid 1993: 203–204; Stevenson and Guy 1997; Brown 2000; Miksic 2009: 69; Wade and Laichen 2010: 44–79; Thammapreechakorn 2014: 67–84). However, the Southeast Asian kiln constructions, especially the cross-draft kilns of oval or a rectangle shape and up-draft kilns cylindrical in shape, do not represent direct imitations of Chinese kiln construction. The developments in China led to kiln construction in clay slabs or bricks in various forms on the ground, best represented by the “*Mantou*” (steamed bun) down-draft kilns and the “*Long*” (dragon) or hill kilns (cross-draft in principle but elongated) built up the slope of inclined ground. However, these are not kiln types found in Southeast Asia (Hein 2008: 2). Sometimes, the Chinese Southern Song (c. 1127–1279), Yuan and especially Ming ceramics have been found in-situ at some Southeast Asian kilns (Praicharnjit 1988; 2011; Sako 2017). Khmer and Vietnamese influences of ceramic forms and decoration techniques also appeared in other Southeast Asian ceramic productions (Brown 2000; Lim 2014; Sukkham 2018). The ceramics found at terrestrial sites are similar to those found on contemporary shipwrecks, confirming their maritime trade.

A total of 35 shipwrecks in the South China Sea in Table 1 are of wood construction of Southeast Asian (South China Sea) junks, Chinese junks, European ships and Chinese-European hybrid vessel types of which only the resistant or protected lower structures remained (Table 1; Fig. 1) (Intakosi and Charoenwongsa 1988; Flecker 2009, 2015; Manguin 2010; Guan 2012; Kimura 2016). All vessels represent specific shipbuilding traditions and diverse cargo origins especially with regards to the ceramic cargo which was mix of Chinese and Southeast Asian ceramics. The Chinese ceramics have been identified to be Yuan (1280–1368), Ming (1368–1644) and Early Qing (c.1644–1795) glazed stoneware and porcelain ceramics including white glazed, brown glazed, green glazed and ‘blue and white’ wares from Longquan (Fujian province), Cizao (Fujian province), Jingdezhen (Jiangxi province), Jizhou (Jiangxi province), Zhangzhou (or well-known as Swatow or Pinghe kilns in Fujian province), Shaowu (Fujian province), Dehua (Fujian province),

Anxi (Fujian province), Shiwan (Guangdong province), Yixing (Guangdong province) and Deqing (Zhejiang province) kilns. Southeast Asian ceramics included Dai Viet (now northern Vietnam) from the kilns in Hai Duong province which produced underglaze black, 'blue and white' and overglaze enamelled wares. There are green glazed and 'brown and white' wares from the kilns in Binh Dinh province as a part of Champa (now Central Vietnam). The Thai ceramic tradition is represented by Ayutthaya or Siamese unglazed jars from the Bang Pun (Suphan Buri province), Si Satchanalai (Ko Noi and Pa Yang) or Sawankhalok (one of districts in Sukhothai province), Sukhothai (capital city of Sukhothai province) and the Bang Rachan (formerly Mae Nam Noi kilns in Singburi province) kilns. These products were white glazed, brown glazed, green glazed, underglaze black and 'brown and white' wares. There are even a few Lanna green glazed wares from the San Kampaeng kilns in Chiang Mai province. Burmese wares include green and white wares from the Kaw Don kilns in Kayin state; the famous brown glazed jars from the Martaban kilns in Mon State and the green glazed ware from the Twente kilns in Yangon region (Pinsri et al. 1992; Stevenson and Guy 1997; Brown 2000; Tri and Nguyen-Long 2001; Hein and Win 2015). Finally, there are European glazed stoneware and unglazed earthenware ceramics which were of uncertain production.

The shipwreck locations also suggest that their routes connected the ports of Ayutthaya and Guangzhou directly with other parts of Southeast Asia, South Asia, Africa and Europe (Fig. 1). The purpose of Chinese and early European sailing vessels was related to exploration, political expansion and especially trade in Chinese Yuan, Ming and Early Qing and Southeast Asian ceramics and other products. That the diversity of ceramic cargoes especially those from Southeast Asian appears to lessen from the seventeenth or the first half of eighteenth century in every ship type is confirmed by Roxanna Brown's research (2009a; 2009b) (Table 1).

The ceramic cargoes in the Si Chang I, Wanli, Binh Thuan, Hathcher, Vung Tau (Con Dao), Ca Mau and *Risdam* shipwrecks (Table 1; Fig. 1) suggest that Bang Rachan or Mae Nam Noi brown glazed jars (Fig. 2) were the only Southeast Asian ceramics still found alongside Chinese Ming and Early Qing ceramics, commonly the 'blue and white' wares more than other ceramic patterns (Praicharnjit 1988; Wilaikaew 1990; Cort 2017). However, the Bang Rachan (Mae Nam Noi) ware evident from these shipwrecks were found on *Risdam* (Fig. 1) identified as a Dutch *fluyt* from 1727 described in the *Uitgezeilde schepen* (a sailing letter in the Colonial Archive from November 8, 1673, to February 23, 1796, now preserved at National Archives of the Hague; Green and Gangadharam 1985:1). According to this record, the V.O.C. *fluyt* *Risdam* operated in the Gulf of Siam (now the Gulf of Thailand) and loaded tin at Ligor, a territory of Ayutthaya Kingdom identified as the present-day province of Nakhon Si Thammarat (Rooney 1991) (Fig. 1). *Risdam* then went to Ayutthaya City where there was a V.O.C. trading post (Sihamat 2016). On November 29–30, 1726, *Risdam* loaded sappanwood (*Biancaea sappan* as an aromatic tree), barrels of ginger, 40 pots of *achar*, 30 pots of *klak* and 150 empty glazed pots. The vessel left Ayutthaya in a leaking condition on December 8, 1726. When the leak became substantial the vessel was intentionally run aground on January 1, 1727, 500 m north of Pulau Batu Gajah, near Mersing, Malaysia, to save the lives of the crew. From this date the Bang Rachan jars and other Southeast Asian ceramics disappear from shipwrecks in the South China Sea, suggesting the end of Southeast Asian ceramic exports.

This dating—c. 1727—of the end of other Southeast Asian ceramic exports is also supported by the ceramic evidence from shipwrecks found in other oceans. These wrecks are identified as European ships or Japanese junks sunk in eastern Asian waters, the Indian Ocean and the southern Atlantic Ocean, such as *São Bento*, a Portuguese galleon sunk



Fig. 2 Brown glazed jar, Bang Rachan (Singburi or Mae Nam Noi) kilns, dated between the fifteenth to eighteenth centuries, recovered from the Singtai shipwreck, Malaysia. (Roxanna M. Brown's Photograph Collection, Southeast Asian Ceramics Museum, Bangkok University)

in 1554 near the Transkei coast of South Africa (Auret and Maggs 1982:35), *Batavia*, a V.O.C. flagship which sank in 1629 near the west coast of Australia (Green 1989:150) and *Witte Leeuw*, another V.O.C. ship which sank in 1613 near Saint Helena (Pijl-Ketel 1982: 239–241, 244–245). Other sites include Penny Bay, in Hong Kong, dated from the fifteenth to sixteenth centuries (Wong 2015), the underwater sites near Kyushu Islands in Japan, dated to the sixteenth to early seventeenth centuries (Seyock 2006: 131–139; 2007: 335–360), and sites around Amsterdam dated from 1575 to 1625 (re-identified from Gawronski and Kranendonk 2018).

The result of these Portuguese, Dutch and possible Japanese merchant vessels sinking in other oceans indicate that they were the most significant conveyors and customers of Chinese Ming 'blue and white' wares dated between the reigns of Jiajing and Wanli Emperors, the Martaban brown glazed jars and especially the Bang Rachan brown glazed jars from the late sixteenth to early seventeenth centuries, until the first half of eighteenth century, dated by *Risdam*. Unfortunately, European and Japanese shipwreck remains have not yet been found along the coast of southern China and in Southeast Asia (Auret and Maggs 1982; Pijl-Ketel 1982; Green 1989; Tarling 1999a: 1–57; Qingxin 2006: 120–124; Cort 2017: 267–296).

All evidence from the South China Sea and other oceans assumes that the Southeast Asian ceramic trade ended in first half of eighteenth century. Hence, the peak period of the Chinese and Southeast Asian ceramic trade which was previously believed to have occurred between the fourteenth to sixteenth centuries should be re-considered to be the late fourteenth to the first half of the eighteenth century. This is in line with the concept of defining historical periods in Southeast Asia suggested by Nicholas Tarling (1999a, 1999b; 1999c). A new period of ceramic trade commences after the first half of eighteenth century.

From the eighteenth century, European expansion increasingly affected Southeast Asia as they continued to compete for a stake in the market for spices and other resources—mineral, timber and agricultural products. In some cases, the European powers sought full

or partial political control and expansion of territory under the “Colonial Regime.” This increased the European economic control of the region (Reid 1988; 1993; Tarling 1999a; 1999b; Qingxin 2006). Some Southeast Asian states that were previously independent became official European colonies in the nineteenth century, specifically British Burma (now Myanmar), British Malaya and the British Straits Settlements (now Malaysia and Singapore), British Borneo (now the Malaysian states of Sarawak, Sabah and Sultanate of Brunei), various indigenous states in the Dutch East Indies in the Indonesian Archipelago (now Indonesia) and French Indochina (now Vietnam, Laos and Cambodia). The Spanish rule in the Philippines since the sixteenth century transferred to American control in 1898 (Fig. 3). Colonial rule meant control of ports and created monopolies in tax collection, the export of local products and the re-supply of colonial shipping fleets and securing of maritime routes. Siam (now Thailand) recovered after the fall of Ayutthaya in the Second Burmese-Ayutthaya War (c. 1764–1767) and was the only Southeast Asian state to evade colonial control in the nineteenth century because of a strategic and strong monarchical leadership. Siam maintained its independence but lost some territories to the British and French during 1867–1909. A series of treaties and agreements were established around Southeast Asia, such as the 1824 Anglo-Dutch Treaty (Britain and the Netherlands), the 1826 Yandabo Treaty (Britain and Burma), the 1826 Burney Treaty (Britain and Siam), the 1855 Bowring Treaty (Britain and Siam), the 1805 Luso-Dutch Treaty (Portugal and the Netherlands) and the 1909 Anglo-Siamese Treaty (Britain and Siam). Most of these treaties involved restoring peace, acquiring rights on some territories, friendship and the establishment of trade. The boundaries of the modern Southeast Asian states were created during these times.

European emigration to Asia coincided with the Industrial Revolution (last half of eighteenth to middle of nineteenth centuries) taking place in Europe and the Americas. This meant that some technological transition was also introduced to Asia, such as decoration technique of transfer print on ceramics and steam-powered engines. Meanwhile, the Chinese and Japanese fully expanded trade with Southeast Asian, South Asian and European markets. In the nineteenth to twentieth centuries, wars, famine, invasion from various foreign powers and problems resulting from political corruption caused mass Chinese emigration to seek employment and new opportunities in North America, Australia and to a lesser extent, Europe. But large scale Chinese emigration to Southeast Asia was encouraged to meet the high demand for labour in European colonies (Solomon 1970; Skinner 1959; Chang 1982; Tracy 1993; Tarling 1999b; Wyatt 2003; Qingxin 2006; Leong 2009).

The Chinese and Japanese states still accessed Southeast Asian and South Asian port cities for direct local sale and exchange with European merchants. This is specifically the case at Hoi An (in Vietnam), Bangkok, Singapore, Malacca (Melaka), Rangoon (Yangon), Calcutta (Kolkata) and other port cities (Fig. 3). Since the eighteenth century, the established “Overseas Chinese”, who had been settled in Southeast Asia since around the fourteenth century, were promoted to higher positions in treasury, trade, interior or even maritime authorities especially in Dai Viet and Siam. Official relations between the Chinese Qing Dynasty and Southeast Asian states changed to one of relative equitable trading partnership (Cushman 1985: 83–119; Tarling 1999b: 1–74; Myint-U 2001: 186–254; Wyatt 2003: 122–165; Miksic and Low 2005: 95–105, 124–146; Qingxin 2006: 124–193; Win and Leng 2009: 67–79).

During 1942–1945, Southeast Asia experienced direct involvement in the Second World War, primarily at the hands of the Japanese, who invaded most of the allied European and United States’ colonies in the region. The Pacific Ocean, East China Sea, South China Sea and even the Indian Ocean were teeming with modern steam-powered

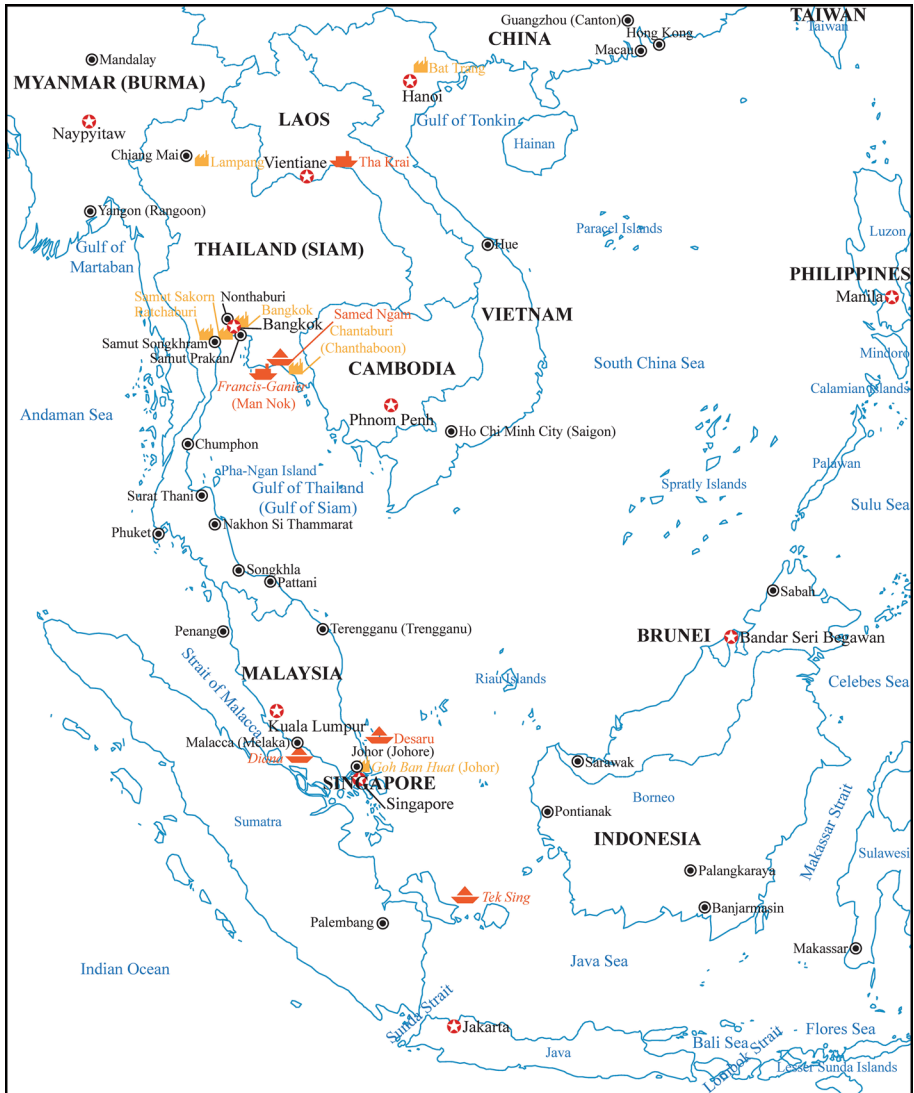


Fig. 3 Map showing shipwrecks and ceramic production sites dated between the last half of the eighteenth and early twentieth centuries in Southeast Asia. (Atthasit Sukkham)

battleships, air-craft carriers, submarines and cargo ships of either Japan or the Allied Forces. Some of them were destroyed in battle, others were used to block military supplies and troop movements. Most of these wrecks did not contain ceramics, with the exception of the Tha Krai shipwreck dated in 1942–1945 (Fig. 3). On August 14–15, 1945, the war and the Japanese occupation of Southeast Asia ended as the Japanese accepted the Allied terms of capitulation and the Japanese emperor officially announced his surrender. The Europeans returned to restore their colonies but most of those in

Southeast Asian sought independence by varied means and succeeded in the 1950s and 1960s (Tarling 1999c: 1–32), signalling a sign of change in modern Southeast Asia.

This brief review of the historical background demonstrates that ceramics were one of the important products of regional and international maritime trade in Southeast Asia for a long period, which was affected by official policies, specifically of the Chinese, European and Japanese states. The peak of the trade in ceramics in Southeast Asia began around the late fourteenth centuries when Southeast Asian ceramic production centres were founded, supplying other ceramics together with Chinese ceramics which were more complex in style, especially ‘blue and white’ wares introduced to Southeast Asian markets beginning in the late fourteenth century. Larger amounts of ceramics were also produced at this time, compared to the earlier period of Chinese ceramic export to Southeast Asia. European and, to a lesser extent, Japanese ceramics also arrived in Southeast Asia by the sixteenth or seventeenth centuries. The historical background also suggests that most of the Southeast Asian states were transforming politically since the seventeenth or eighteenth centuries and also undergoing technological transformations brought on by the Industrial Revolution that began in around the nineteenth or twentieth centuries, especially maritime transportation and ceramic manufacture in Europe, America, Asia and Australia.

Materials and Methods

The total number of ships wrecked after the first half of the eighteenth century in Southeast Asia, including the north-eastern Indian Ocean and the South China Sea, is quite large. However, some of these wrecks have not been systematically excavated or published, and some were not found with ceramics and were therefore omitted from the dataset of this study. Wrecks that were selected for this study include those that have recently been excavated and published as preliminary and final reports in academic articles, books and catalogues (Table 2; Fig. 3). In their assemblages, the shipwrecks contained ceramics in good condition that allow for adequate identification and interpretation. Six shipwrecks from Southeast Asia dating from the last half of eighteenth century to the early twentieth century were found to meet these criteria: ‘Samed Ngam’ (Praicharnjit 1989; 1990), *Diana* (Ball 1995; Brown and Sjostrand 2001), *Tek Sing* (Pickford et al. 2000; Guan 2012), ‘Desaru’ (Guan 2012; Brown and Sjostrand 2001; Sjostrand et al. 2003), *Francis-Garnier* (formerly known as ‘Man Nok’ or ‘Ruea Mail’) (Anon. 1921; Lagrillière-Beauclerc 2014; Rahothon 2016) and ‘Tha Krai’ (Wongadsapaiboon 2016).

These shipwrecks represent archaeological sites concentrated in the South China Sea and the Straits of Malacca; no shipwrecks with this study’s criteria were located in the north-eastern Indian Ocean and other straits, most likely due to a lack of archaeological work and adequate published research (Praicharnjit 1992; Vatcharangkul 2001; Guan 2012; Flecker 2015; Miksic 2015).

Only three shipwrecks can be identified by their original names, matching locations identified in historical records: *Diana*, *Tek Sing* and *Francis-Garnier*. The other three ships without known names were designated following the general rules for shipwreck designation in maritime archaeology: the nearest geographical features (i.e. sea, beach, island) especially ‘Desaru’ as the name of beach in the east coast of Johore, Malaysia, and administrative toponyms (i.e. sub-district, district, province, country), especially ‘Samed Ngam’ as the name of a sub-district or village in Chanthaburi and ‘Tha Krai’ as the name of sub-district of village in Bueng Kan, Thailand.

Table 2 Lists of shipwrecks with identification of ceramic cargo in Southeast Asia between the last half of eighteenth and early twentieth centuries

Shipwreck designations ^a	Date of loss	Ship types	Ceramic cargoes										Sources									
			Earthen-ware ^c	Chi-nese Yuan ^b	Chi-nese Ming ^b	Chi-nese rials ^b	Armo-nese	Chi-nese Qing ^b	ROC/PRC ^b	Hai Duong ^c	Binh Dinh ^c	Bang Si Pun ^c		Si Sat. (Pa Noi) ^c	Suk-hothai ^c	Bang Rachan ^c	San Kampaeng ^c	Kaw Don ^c	Marta-ban ^c	Twen-te ^c	Ben-chai-rong ^c	Euro-pean ^d
Samed Ngam, Thailand	18th c	Chinese junk (Prai-chamjitt 1990:25–47)	×																			(Prai-chamjitt 1989; 1990)
Diana, Malaysia	c. 1817 (Brown and Sjostrand 2001: 63)	British country (merchant) ship (Ball 1995: 121; Brown and Sjostrand 2001: 63)				×																(Ball 1995; Brown and Sjostrand 2001)
Tek Sing, Indonesia	c. 1822 (Pickford et al. 2000:18–25)	Chinese junk (Pickford et al. 2000:13–17)																				(Pickford et al. 2000; Guan 2012)

Previous research has demonstrated that in some cases, the place of construction can be identified for historical wooden- and metal-hulled ships. There are ample archival records on the purposes of voyages, routes, cause of loss or sinking, cargo lists, passenger lists, captain's accounts, personal diaries usually recorded by Europeans who travelled to and within Southeast Asia and newspapers accounts. Some of these accounts mention the history of each vessel, vessel type, cargo manifest, route and the date and cause of loss. Additionally, dates of manufacture on metal coins and the scientific dating of associated finds provide precise chronologies. Archaeological research suggests that, as in many cases globally, ships overloaded with cargoes or passengers, bad weather and collisions were the major causes of capsizing and loss of ships in Southeast Asia (Green and Gangadharam 1985; Brown and Sjostrand 2001; Manders et al. 2012; Pickford et al. 2000; Rahothon 2016). In a few cases, loss is identifiable by skirmishes or attacks at sea during the Second World War (Muangnapoe 2005; Priolo 2015; Manders et al. 2021).

The ceramics recovered from the six shipwrecks discussed in this study include large numbers of glazed stoneware and porcelain and, to a lesser extent, unglazed earthenware and stoneware. Most of the ceramics are in good condition with complete forms, glaze and underglaze painting. However, the overglaze enamel has usually been eroded by exposure to seawater (Praicharnjit 1989; 1990; Ball 1995; Pickford et al. 2000; Brown and Sjostrand 2001; Guan 2012; Rahothon 2016; Wongadsapaiboon 2016; Sjostrand et al. 2003). The quantity of ceramic assemblages can be affected by environmental factors, such as currents that can move the ceramics far from the wreck site. On the other hand, the extended duration of excavations is a common limitation to collecting complete assemblages, such as with *Francis-Garnier* (Wongadsapaiboon 2016). In some cases, complete excavation of the whole area of the shipwreck has been conducted, as in the case of the *Samed Ngam*, *Diana*, *Tek Sing*, *Desaru* and *Tha Krai* wrecks. In these excavations, whole assemblages were recovered for analysis during one season, with others requiring several seasons or recovery campaigns.

In this present study, the focus is only on the form, stylistic (decoration, mythical meaning of decorative elements and glaze) and functional attributes of the recovered ceramics. The re-identification of provenances and dates of ceramic production was done through comparative studies of excavated finds against ceramic production sites, terrestrial sites and museum collections (Chandavij 1994; Kowalsky and Kowalsky 1999; Brown 2000; Qingzheng 2002). The results of ceramic identification in Table 2 can be used to indicate date of loss or sinking, the dynamics of ceramic production and the difference in cultural patterns of ceramic selection of each shipwreck between the last half of the eighteenth and the early twentieth centuries, or even differences with the previous period from the late fourteenth to the first half of the eighteenth centuries (see Table 1).

The ceramics from these six shipwrecks are also generally quantified (Table 3), in order to identify the functions of the ceramics prior to their loss. Total amounts of ceramics identified by date, production site and type are used to indicate ceramics used on board (i.e. the date of the ceramics is not related to the date of other ceramics on board and the date of loss of the ship), product for sale or cargo (i.e. large amounts of similar ceramic productions, types and forms correlating to the date or loss of the vessel) and crews' or passengers' domestic use, as personal, kitchen or storage utensils (i.e. small amounts of similar ceramic productions, types and forms that related to the date of loss of the ship). Additionally, overall amounts of ceramics can also be used to identify the function of the vessel on which they were carried, such as passenger and cargo ships.

Table 3 Identification of ceramics found on each shipwreck dated between the last half of the eighteenth to the early twentieth centuries

Shipwreck designations	Date of loss	Origins of ceramics	Production sites of ceramics	Production site locations	Types of ceramics	Forms of ceramics	Approx. amounts of recovered ceramics (Pieces)	Functions of ceramics
Samed Ngam, Thailand (Prai-charnjit 1990)	18th c	Chinese Qing	Jingdezhen kilns	Jiangxi province, China	Blue and white ware	- Bowls	< 10	Utensil for daily-living on-shore
			Dehua kilns	Fujian province, China	Blue and white ware	- Bowls	< 10	Utensil for daily-living on-shore
			Anxi kilns	Fujian province, China	Blue and white ware	- Bowls	< 10	Utensil for daily-living on-shore
		Thai	Unknown	Unknown	Earthenware	- Pots	< 10	Utensil for daily-living on-shore
Diana, Malaysia (Christies 1995; Trustees of the British Museum 1995)	c. 1817	Chinese Qing	Dehua kilns	Fujian province, China	White glazed ware	- Figurines - Ewers - Vases - (Soup) basins with a lid - Cups with handles - (Soup) bowls with handles - Bowls with a lid - Dishes - Candlesticks	~ 570	For sale
					Blue glazed ware	- Jars with a lid (tea leaf container)	< 10	Utensil for on-board living? For sale? Or remains from previous shipment?

Table 3 (continued)

Shipwreck designations	Date of loss	Origins of ceramics	Production sites of ceramics	Production site locations	Types of ceramics	Forms of ceramics	Approx. amounts of recovered ceramics (Pieces)	Functions of ceramics
					Blue and white ware	<ul style="list-style-type: none"> - (Fruit) baskets - Plates - Dishes - (Coffee or tea) cups with a handle - Saucers - Ewers - Spittoons - Basins with a lid and handles - Boxes - Jars with a lid (tea leaf containers) - Jars with handles and a lid - Figurines - Bowls - Bottles with a lid - Dishes 	~9,160	For sale
			Jingdezhen kilns	Jiangxi province, China	Overglaze enamelled ware Blue and white ware	<ul style="list-style-type: none"> - Dishes - Bowls 	~40 ~9,080	For sale? For sale
					Overglaze enamelled ware (eroded colourful enamel)		~200	For sale?

Table 3 (continued)

Shipwreck designations	Date of loss	Origins of ceramics	Production sites of ceramics	Production site locations	Types of ceramics	Forms of ceramics	Approx. amounts of recovered ceramics (Pieces)	Functions of ceramics
					Armorial ware (Jingdezhen overglaze enamelled with European design of the British East India Company coat of arms)	- Dishes	~180	Utensil for on-board living? Or for sale?
			Anxi kilns	Fujian province, China	Blue and white ware	- Bowls	~80	For sale?
			Deqing kilns	Zhejiang province, China	Brown glazed ware	- Jars with loop handles	<10	Utensil for on-board living? For sale? Or remains from previous shipment?
			Shiwan kilns	Guangdong province, China	Shiwan lead green, yellow or brown glazed ware	- Figurines	~750	For sale
			Unknown	Unknown	Brown glazed ware	- Dishes - Jars with handles - Ewers with a lid	~12	Utensil for on-board living? For sale? Or remains from previous shipment?
		European	Unknown	Unknown	Salt acrid brown glazed wares	- Flasks	<10	Utensil for on-board living? Or for sale?

Table 3 (continued)

Shipwreck designations	Date of loss	Origins of ceramics	Production sites of ceramics	Production site locations	Types of ceramics	Forms of ceramics	Approx. amounts of recovered ceramics (Pieces)	Functions of ceramics
<i>Tek Sing</i> , Indonesia (Pickford, Hatcher and Freedman 2000; Trustees of the British Museum 2000)	c. 1822	Chinese Ming	Longquan kilns	Zhejiang province, China	Green glazed ware	<ul style="list-style-type: none"> - Jarlets - Saucers - Dishes - Bowls - Basins (incense burners) - Vases 	~320	Utensil for on-board living? For sale? Or remains from previous shipment?
		Chinese Qing	Dehua kilns	Fujian province, China	White glazed ware	<ul style="list-style-type: none"> - Boxes - (Tea) cups - Bowls - Bowls with a lid - Bottles - Short (soup) spoons 	~60,700	For sale
					Brown glazed ware	<ul style="list-style-type: none"> - Urinals with a handle - Boxes - Short (soup) spoons 	~1,540	For sale

Table 3 (continued)

Shipwreck designations	Date of loss	Origins of ceramics	Production sites of ceramics	Production site locations	Types of ceramics	Forms of ceramics	Approx. amounts of recovered ceramics (Pieces)	Functions of ceramics
			Qingxi kilns	Guangdong province, China	Blue and white ware	- Bowls	< 10	Utensil for on-board living? For sale? Or remains from previous shipment?
			Yixing kilns	Jiangsu province, China	Brown bodied ware Green glazed ware (eroded)	- Ewers with a lid - Saucers - Saucers	~ 710 ~ 630	For sale For sale
			Shiwan kilns	Guangdong province, China	Lead green, yellow or brown glazed ware (eroded)	- Figurines	~ 200	For sale
			Unknown	Unknown	Brown or green glazed ware, or unglazed ware	- Saucers - Jarlets (opium container?) - Vases - Ewers - Ewers with a lid (applied dragon design) - Jars - Jars with a lid - Candlesticks - Stoppers of bottle - (Cooking) stoves	~ 7,250	For sale?

Table 3 (continued)

Shipwreck designations	Date of loss	Origins of ceramics	Production sites of ceramics	Production site locations	Types of ceramics	Forms of ceramics	Approx. amounts of recovered ceramics (Pieces)	Functions of ceramics
Desaru, Malaysia (Brown and Sjostrand 2001; Sjostrand et al. 2003)	19th c	Chinese Qing	Dehua kilns	Fujian province, China	White glazed ware	- (Tea) bowls	< 10	Utensil for on-board living? For sale? Or remains from previous shipment?
					Blue and white ware	- Dishes	~ 138	For sale?
					Overglaze enamelled ware	- Dishes	< 10	Utensil for on-board living? For sale? Or remains from previous shipment?
			Jingdezhen kilns	Jiangxi province, China	Green glazed ware (with a blue mark on the base of the same piece)	- Bowls	~ 260	For sale
					Blue and white ware	- Bowls - Bowls with a lid - Ewers with a lid - Jars with a lid and handles - Dishes - Short (soup) spoons	~ 55,600	For sale

Table 3 (continued)

Shipwreck designations	Date of loss	Origins of ceramics	Production sites of ceramics	Production site locations	Types of ceramics	Forms of ceramics	Approx. amounts of recovered ceramics (Pieces)	Functions of ceramics
			Yixing kilns	Jiangsu province, China	Brown bodied ware Brown glazed ware Green glazed ware	- Ewers with a lid - Basins - Jars - Jars with lids - Urinals with a handle	~ 770 ~ 1,860 ~ 1,480	For sale For sale
			Deqing kilns	Zhejiang province, China	Brown glazed ware	- Basins - Basins with lids,	~ 870	For sale
			Shiwan kilns	Guangdong province, China	Brown glazed ware	- Jarlets with handles - Jars	< 10	Utensil for on-board living? For sale? Or remains from previous shipment?
			Unknown	Unknown	Overglaze enamelled ware (eroded) Blue and white, underglaze black, black glazed, or brown glazed ware	- Bowls - Bowls - Jars	~ 150 ~ 2,000	For sale For sale?

Table 3 (continued)

Shipwreck designations	Date of loss	Origins of ceramics	Production sites of ceramics	Production site locations	Types of ceramics	Forms of ceramics	Approx. amounts of recovered ceramics (Pieces)	Functions of ceramics
<i>Francis-Garnier</i> (Man Nok or Ruea Mail), Thailand (Rahothan 2016)	c. 1921	European	Unknown	Unknown	Salt acid brown glazed wares	- Flasks	< 10	Utensil for on-board living? For sale? Or remains from previous shipment?
		Chinese Qing	Shiwan kilns	Guangdong province, China	Brown glazed ware	- Jarlets with handles	< 10	Utensil for on-board living
			Jingdezhen kilns	Jiangxi province, China	Blue and white ware	- (Tea) cups - Dishes	< 10	Utensil for on-board living
		ROC/PRC	Jingdezhen kilns	Jiangxi province, China	Transfer-printed ware	- (Tea) cup	< 10	Utensil for on-board living
The Krai, Thailand (Wongasapatboon 2016)	c. 1942–1945	Thai	Unknown	Unknown	Earthenware	- Pots	< 10	Utensil for on-board living
		European	Charltonais and Panassier factory	Lyon and Toulouse, France	White glazed ware	- Ashtray	< 10	Utensil for on-board living
		ROC/PRC	Chao'an kilns	Guangdong province, China	Overglaze enameled ware	- Bowls	< 10	Utensil for on-board living
			Unknown	Unknown	White glazed ware	- Bowls - Jars	< 10	Utensil for on-board living

Dataset of Shipwrecks Dating from the Last Half of the Eighteenth Century to the Early Twentieth Century

The ceramic assemblages from shipwrecks dating from the last half of the eighteenth century to the early twentieth century, or before the end of the Second World War in Southeast Asia, were identified as ceramics used in passenger and cargo-carrying vessels. This was due to the fact that the number of ceramics and other assemblages in passenger ships were smaller than those of cargo-carrying ships with larger number of ceramics and other products. These included the Samed Ngam (1767–1782), *Diana* (c. 1817), *Tek Sing* (c. 1822), Desaru (1830–1840), *Francis-Garnier* (Formerly Known as Man Nok or Ruea Mail; c. 1921) and Tha Krai (1942–1945) shipwrecks (Tables 2 and 3; Fig. 3). The preliminary and final reports of underwater archaeological works are summarised in this section.

Samed Ngam

The Samed Ngam shipwreck is named after the village in Nong Bua sub-district, Meuang district, Chanthaburi, eastern Thailand. It is located in a dry dock on the riverbank of Chanthaburi River around 6 km from the mouth of the river connecting to the Gulf of Siam at Chanthaburi, eastern Thailand. The Underwater Archaeology Division of the Thai Fine Arts Department (FAD) excavated the site during 1981–1982 and established a museum there in 1986. The construction of Samed Ngam suggests it was a Fujian-type Chinese junk (i.e. built in Fujian province, China). The hull was 24 m long and 8 m wide. The vessel was intended to be used in battle against the Burmese troops in Ayutthaya after its defeat in the Second Burmese-Ayutthaya War during the reign of King Taksin the Great (c. 1767–1782) of the Thonburi period (Bradley 2006; 2011). It is unclear why it was left derelict in the dry dock. The excavation identified the wooden hull of the junk, wooden bilge blocks, an iron socket-axe, an iron scraper, a wooden hammer, iron nails and Chinese copper coins dated between the Late Ayutthaya to Early Rattanakosin periods (c. 1630–1910). Of special interest were Chinese ‘blue and white’ dishes and bowls produced at the Jingdezhen (Jiangxi) and Dehua (Fujian) kilns and local earthenware cooking pots found inside the hull remains. It is suggested that these were possibly for daily on-board use. However, in the surrounding area of the dockyard, a few Chinese ‘blue and white’ bowls from the Jingdezhen and Anxi (Fujian) kilns have been found, suggesting this area was continually used until the Early Rattanakosin period (c. 1782–1910) (re-identified from Praicharnjit 1989: 17–22; 1990: 25–47). The ship remains and some of the artefact assemblages are on display at the site museum in Chanthaburi, eastern Thailand (Tables 2 and 3; Fig. 3).

Diana

In the case of *Diana*, the date and name of the vessel are known from archival records. *Diana* sank on March 14, 1817, after hitting submerged boulders at the south end of the Straits of Malacca during a return trip from Guangzhou, China, to the Indian ports of Calcutta (now Kolkata) and Madras (now Chennai) in India. *Diana* was one of the 20 “Country Ships” owned by Palmer and Co., a powerful Calcutta agent that acted as investment bankers for the British East India Company and were licensed to trade in Indian cotton and

opium to China while returning with an assortment of Chinese ceramics and silk to India (Ball 1995).

A complete recovery of the *Diana* shipwreck assemblages was conducted by Dorian Ball with divers from his firm, Malaysian Historical Salvors (MHS), which obtained a contract from the Malaysian Government during 1993–94. Around 20,000 intact pieces were recovered, the major cargo by weight being the ‘blue and white’ tableware sets, including dinner plates, soup bowls, tureens, ewers, coffee cups, tea containers and vases, painted with traditional Chinese-style landscapes, animal and other designs. All these dining sets originated from the Dehua, Jingdezhen, Anxi, Deqing and Shiwan kilns. These have all been identified as Chinese Qing ceramics carried by *Diana* for sale in British India (re-identified from Christies 1995; Brown and Sjostrand 2001: 63, 108–109). European stone-ware cylindrical noggin flasks with handles have also been found.

The masterpieces of *Diana*’s cargo are oval-shaped plates with the coat of arms of the British East India Company, painted in the form of a shield flanked by two lions, each bearing a St. Georges flag. Below the shield, which also bears the red cross of Saint George, is the motto ‘*AUSPICIO REGIS ET SENATUS ANGLIA*’. The base is unglazed. Additionally, hundreds of glass bottles in various shapes produced in Britain are the only glassware in the collection of European production. Only two bottles are clearly identified by marks of their manufacturer and place. The first is a cylindrical-shaped port wine bottle with a mark ‘I.C. Hoffman of London,’ and the second is a square-shaped bottle marked ‘Gordon and Emmott, London.’ Other finds include glass beads, square marble slabs, organic remains of green tea, ginger, rhubarb, ginseng, camphor and dried fish. There are also the metal fittings of *Diana*, including plaques inscribed ‘Lord Minto’ and ‘L. F. Smith Esq no. 1.’ Preserved wooden packing crates variously stencilled ‘G.C. and Co, Madras’ with a box number and ‘Keep this side up,’ ‘Sweetmeats,’ ‘Ginger,’ and ‘Mrs Mc Taggart, Madras’ were also recovered (Ball 1995; Christies 1995; Brown and Sjostrand 2001: 63, 108–109) (Tables 2 and 3; Fig. 3).

Tek Sing

The *Tek Sing* shipwreck, meaning “True Star” in Chinese, was a massive Chinese junk bound for Batavia (now Jakarta), the capital of the Dutch East Indies. Archival records confirm that the vessel sank on February 6, 1822, after hitting the Belvidere Reef near the entrance to the Gelasa Straits, Indonesia. Though some passengers were rescued, this accident caused a huge loss of life. The junk is possibly a Fujian-type of Chinese junk with a 50 m-long, 10 m-wide hull, rigged with batten sails on three masts. It set sail from Amoy (now Xiamen in Fujian province) with almost 2000 Chinese passengers and crew members. The passengers included many migrants. On-board were over around 370,000 pieces of utilitarian Chinese ceramics, figurines and other cargo. All the shipwreck assemblage was salvaged by Michael Hatcher and his crews in 1999. The ceramic cargo was recovered and identified as only Chinese Qing ceramics including ‘blue and white’, overglaze enamelled wares produced from the Jingdezhen kilns, ‘blue and white’, white glazed and brown glazed wares from the Dehua kilns (Fig. 4), ‘blue and white’ wares from the Anxi kilns, ‘blue and white’ wares from the Qingxi kilns, brown bodied and green glazed wares from the Yixing kilns in Jiangsu province, lead green, yellow or brown glazed figurines from Shiwan kilns in Guangdong province and monochrome green or brown glazed wares from unknown kilns in Fujian and Zhejiang provinces. Green glazed wares produced at Longquan kilns in Zhejiang province dated to the Ming Dynasty are another group. Based



Fig. 4 Blue and white bowl, Dehua kilns, dated between the reigns of the Jiaqing (c. 1769–1820) and the Daoguang (c. 1821–1850) emperors of the Qing Dynasty, recovered from *Tek Sing*, Indonesia (Roxanna M. Brown's Photograph Collection, Southeast Asian Ceramics Museum, Bangkok University)

on the re-identification, there were some Bencharong wares used in the Late Ayutthaya period, dated around c. 1630–1767 (re-identified from Pickford et al. 2000: 264–265). The ceramics were commonly cups, dishes, bowls, covered boxes, spoons, figurines, chamber pots and candlesticks decorated with bamboo, mushroom, peony and other floral and alphabetical designs. Other personal belongings, parts of the ship's infrastructure and other products were salvaged. These include mercury, sextants, pocket watches, ink pads, an iron and brass cannon, a bronze cannon, boxes with needles, pocket knives, brass padlocks, incense burners, cooking stoves, stone figurines, telescope parts, coins and even European green glass bottles (Pickford et al. 2000; Trustees of the British Museum 2000; Guan 2012: 14–51) (Tables 2 and 3; Fig. 3).

Desaru

The Desaru shipwreck is named after Desaru Bay on the east coast of the Malay Peninsula where it was excavated by Sten Sjostrand and his team during 2001–02. In 2003, he submitted the final report and gave some artefacts for display in the National Museum of Malaysia, Malaysian Department of Museums and Antiques (now the Department of Museums). It is possibly a Chinese junk with a 30 m-long and 8 m-wide hull. Some 61,000 pieces of the ceramic cargo were identified as Chinese Qing ceramics including white glazed, 'blue and white', and overglaze enamelled wares from the Dehua kilns, 'blue and white' and green glazed wares from the Jingdezhen kilns (Fig. 5), brown bodied teapots and brown or green glazed jars produced at the Yixing kilns (Fig. 6), brown glazed basins produced at the Deqing kilns, and overglaze enamelled and brown glazed jarlets produced at the Shiwan kilns. Some underglaze black and brown glazed wares cannot be identified. A date on a cannon and a coin from the reign of Daoguang (c. 1821–1850) of the Qing Dynasty associated within the shipwreck are, for the time being, the best indication for the date of the shipwreck—likely to have sunk in the 1840s. However, while *Diana* included ceramics destined for western dining, the types of wares on-board the Desaru wreck were



Fig. 5 Green glazed bowls, Jingdezhen kilns, dated between the reigns of the Daoguang (c. 1821–1850) and the Xianfeng (c. 1851–1861) emperors of the Qing Dynasty, recovered from the Desaru shipwreck, Malaysia (Roxanna M. Brown’s Photograph Collection, Southeast Asian Ceramics Museum, Bangkok University)



Fig. 6 Brown bodied ewers, Yixing kilns, dated between the reigns of the Daoguang (c. 1821–1850) and the Xuantong (c. 1909–1911) emperors of the Qing Dynasty, recovered from the Desaru shipwreck, Malaysia (Roxanna M. Brown’s Photograph Collection, Southeast Asian Ceramics Museum, Bangkok University)

designed for the requirements of Asian dining (Guan 2012: 14–51; Brown and Sjostrand 2001: 65, 110–115; Sjostrand et al. 2003) (Tables 2 and 3; Fig. 3).

***Francis-Garnier* (formerly known as *Man Nok* or *Ruea Mai*)**

The shipwreck of *Francis-Garnier* was identified from *Malaya Tribune* newspaper, page 2, on September 7, 1921 (preserved in the National Library of Singapore Microfilm Reel NL3893; Anon. 1921), which reported the loss of *Francis-Garnier* citing the cause as a ‘marine accident’ and mentioning a rescue. In 2019, the Underwater Archaeology Division

of the FAD identified a shipwreck as the French iron-screw steamer *Francis-Garnier* built by Scott and Co., Greenock, Glasgow, Scotland, in 1881. This ship was listed in 1900 as one of 34 French river steamers owned by *Messageries Fluviales de Cochinchine*. It was a passenger and cargo ship servicing the Mekong River between Luang Prabang and Saigon (now Ho Chi Minh City) in French Indochina and along the coast as far south as Bangkok (Lagrillière-Beauclerc 2014). *Francis-Garnier* was sold to Malcolm Beranger and Co., Bangkok, in 1920 for continued service as a passenger and cargo steamer between Bangkok and ports on the east coast of the Gulf of Siam as far as Koh Kong (now in Cambodia). On August 26, 1921, the overloaded *Francis-Garnier* was hit by a high swell that washed overboard, flooding the lower deck and causing it to sink (Anon. 1921: 2). This shipwreck was formerly known as the “Man Nok shipwreck” after the nearest island of Man Nok near Rayong, eastern Thailand, where the wreck was found. It was also designated by a Thai nickname, the “*Ruea Mail*” shipwreck, which means “passenger ship.” The ongoing excavation is being conducted by the Underwater Archaeology Division of the FAD. The vessel was an iron-screw steamer, 41 m long and 6 m wide; some parts of the engine remain intact at the site. The upper structure has been destroyed. The recovery of artefacts included coins of King Chulalongkorn dated to 1869, French coins dated to 1913 and Chinese Qing and post-dynastic Republic of China/People’s Republic of China (ROC/PRC) ceramics comprising of a couple of ‘blue and white’ dishes (Fig. 7) dated to the Qing Dynasty and one blue transfer-printed tea cup dated to the post-dynastic ROC/PRC period, both from Jingdezhen kilns. Also recovered were one brown glazed small jar from the Shiwan kilns dated to the Qing Dynasty (Fig. 8) and one overglaze enamelled bowl from the Qingxi kilns in Guangdong dated to the post-dynastic ROC/PRC period found in the possible deck area, suggesting these were personal belongings of passengers for the duration of the voyage (Rahothan 2016) (Tables 2 and 3; Fig. 3).

Tha Krai

The last shipwreck is the Tha Krai shipwreck named after the village of Tha Krai, Meuang district, Bueng Kan, north-eastern Thailand, which sank along the Mekong riverbank. In 2016, the Eighth Regional Office of the FAD in Khon Kean province cooperated with the Underwater Archaeology Division of the FAD to conduct rescue archaeological work after the villagers towed the whole wreck for safe-keeping at the Phro Tha Ram Temple in Tha Krai village. The origins of the wreck are unknown, as is its name, although it is a French river screw steamer. The ship was probably one of the 34 river steamers owned initially by *Messageries Fluviales de Cochinchine* and later sold to *Saïgonnaisede navigation et de transport* to service passengers and cargo on the Mekong River, possibly linking Vientiane to Phnom Penh in French Indochina. The ship is 25 m long and 12 m wide with a steel hull. The hull included boilers, a stove, ashtray, engines, anchor winch, firewood, oil containers and other ship infrastructure in their original positions. Other personal belongings, such as a pan with a manufacture’s mark of 1945, forks with a manufacture’s mark of 1942, metal coffee cups marked ‘CESCO 1944’, a screwdriver with a manufacture’s mark of 1945, metal gallon tins of oil with a manufacture’s mark of 1945, scissors, Thai-style knives, European-style leather shoes, a European pocket watch, a pair of binoculars, canned food and screw-capped glass bottles were also recovered. Some of these can be identified with the places and especially the dates of manufacture providing the assemblage with a date between 1942 and 1945, contemporary to the Second World War when the Japanese



Fig. 7 Blue and white dish, Jingdezhen kilns, dated between the reigns of the Jiaqing (c. 1769–1820) and the Daoguang (c. 1821–1850) emperors of the Qing Dynasty, recovered from *Francis-Garnier* (Man Nok or Ruea Mail) shipwreck, Thailand, now preserved at the NMM and the UAD (UAD, MN022/2559)

military were based at Bangkok. The few ceramics that were found originated in two places, specifically the ‘Chicken Flower’ and the Chinese alphabet pattern bowls from Chao’an kilns in Guangdong (Fig. 9) and a white glazed ashtray made at Charlionais and Panassier’s factory in France. Other white glazed bowls and jars are of unknown origins, but they were possibly of Chinese manufacture, dated to the post-dynastic Republic of China/People’s Republic of China (ROC/PRC) period. The ship’s remains and its assemblage are presently on display at the Phro Tha Ram Temple in Tha Krai village, Bueng Kan (Wongadsapaiboon 2016) (Tables 2 and 3; Fig. 3).



Fig. 8 Brown glazed small jar, Shiwán kilns, dated between the reigns of the Daoguang (c. 1821–1850) and the Guangxu (c. 1875–1908) emperors of the Qing Dynasty, recovered from *Francis-Garnier* (Man Nok or Ruea Mail) shipwreck, Thailand, now preserved at the NMM and the UAD (UAD, MN021/2559)



Fig. 9 Overglaze enamelled bowls, Chao'an kilns, dated in the Republic of China period (c. 1912–1949), recovered from the Tha Krai shipwreck, Thailand, now on the display at the Phro Tha Ram Temple Museum (courtesy of Thippawan Wongadsapaiboon)

Characteristics and Comparison of the Ceramic Assemblages from the Shipwrecks

The ceramics recovered from these six shipwrecks presented above can be compared with ceramics discovered in other archaeological contexts between the last half of the eighteenth to the early twentieth centuries (Tables 2 and 3; Fig. 3). These are categorised into four main groups: Chinese, Armorial or Heraldic, Bencharong and European ceramics.

Chinese Ceramics

The Chinese ceramics recovered from these six shipwrecks were produced during the Qing Dynasty (1644–1911) which can be divided into Early Qing (c. 1644–1795) and Late Qing (c. 1796–1911), and those from the subsequent post-dynastic Republic of China (ROC; 1912–1949) and after 1949 People's Republic of China (PRC). The functions of the ceramics on-board can also be identified by the approximate amounts of recovered ceramics.

The few Chinese Qing ceramics recovered from the Samed Ngam wreck are identified as domestic utensils used by Thai soldiers when preparing Chinese junks in the dockyard. The thousands of Chinese Qing ceramics in *Diana* are the largest by weight of any ceramic cargo identified specifically for sale to British East India Company trading posts (stations or factories) in India. The *Diana* ceramics also include armorial wares. Nearly all of *Tek Sing*'s cargo is composed of Chinese Qing ceramics identified for sale at the Dutch East India (V.O.C.) capital of Batavia. Longquan green glazed wares produced during the Ming Dynasty (c. 1368–1644) and Bencharong wares (c. 1709–1720) produced in the Early Qing Dynasty have also been found in small amounts which are unusual for a shipment of this period. These could be utensils for on-board living, products for sale, or the remains of earlier shipments. The cargo of the Desaru wreck consists entirely of Chinese Qing ceramics, likely meant for sale at some undefined destination. A couple of the Chinese ceramics found in *Francis-Garnier* (Man Nok or Ruea Mail) are a mix of Chinese Qing and Republic of China (ROC) or People's Republic of China (PRC) ceramics used on-board by the Thai crew members or passengers. This is also the case of the few Chinese ceramics dated to the ROC/PRC period found with European ceramic and metal wares in the Tha Krai wreck.

The forms and decorations of the Chinese ceramics recovered in these shipwrecks reflect original Chinese traditions from earlier Chinese Ming Dynasty productions and new creations in the Chinese Qing Dynasty and ROC/PRC period, possibly with influences demanded by European, Thai, or even other export markets. These export ceramics can be arranged into several types of wares.

The first type is white glazed wares. Generally, white glaze application was a common practice in almost every Chinese kiln since the Ming Dynasty (Qingzheng 2002: 151–198). The white glazed wares recovered from *Diana*, *Tek Sing* and the Desaru wrecks are assumed to have been supplied by Dehua kilns in Fujian during the Qing Dynasty. Most were in the traditional Chinese style, especially the form of the round dish, the deep bowl with low foot, the deep bowls with a lid and low foot, the wide mouth tea cup, the ewer with a curved handle on the body and a lid. This also includes tall vases, tall bottles, tall candlesticks, short soup spoons and figurines in the forms of a Chinese god, goddess and a Chinese philosopher. All wares are devoid of pattern. Only the round-shaped boxes were decorated with impressed flower designs which was a refashioning of the Dehua boxes produced since the Song Dynasty (960–1279) (Chandavij 1994).

A second type is comprised of brown glazed wares recovered from *Diana*, *Tek Sing*, the Desaru wreck and *Francis-Garnier* (Man Nok or Ruea Mail) (Fig. 8) which were produced at the Deqing (Zhejiang), Dehua (Fujian) and Shiwan (Guangdong) kilns during the Chinese Qing Dynasty. Their form and decoration represented a tradition continued from the Chinese Ming Dynasty. Deqing brown glazed wares are comprised of jars with loop handles, basins and basins with lids and decorated with impressed abstract designs or symbols under a light-brown glaze. Dehua brown glazed wares are in the forms of chamber pots with handles, boxes and short soup spoons without any designs. Shiwan brown

glazed jarlets with handles and without design are the only form found (Fig. 8). The brown bodied wares without glaze are another type recovered from *Tek Sing* and the Desaru wreck (Fig. 6). The identified brown bodied ewers with lids, curved handles on the body and without glaze are the creation of the Yixing kilns in Jiangsu during the Chinese Qing Dynasty (Fig. 6). Some ewers also have incised Chinese alphabets of auspicious meaning on the base.

A third type of ceramic is represented by the green glazed wares from Longquan (Zhejiang), Jingdezhen (Jiangxi) and Yixing (Jiangsu) kilns which found in *Tek Sing* and the Desaru wreck (Fig. 5) and are indicative of traditional Chinese ceramic production. The green glazed wares from *Tek Sing* can be divided into two different periods: Longquan green glazed wares dated to the Chinese Ming Dynasty and the Yixing green glazed wares dated in the Chinese Late Qing Dynasty. Based on associated finds of *Tek Sing*'s cargo, most of the ceramics are all Chinese Qing ceramics. However, Longquan green glazed wares can be dated to the Chinese Ming Dynasty (Table 3) where jarlets, saucers, dishes, bowls, basins used as incense burners and vases with floral engravings and flower designs are found in very small amounts of *Tek Sing*'s cargo. It is therefore possible to consider that this type of ceramic comprised the utensils for on-board living, products for sale, or the remnants of earlier shipments. Alternately, the Yixing green glazed wares found on *Tek Sing* and even the Desaru wreck are identified as Chinese Late Qing ceramics. The forms of these green glaze wares—specifically saucers with impressed Chinese fret design (the green glaze degraded by seawater), jars with lids and chamber pots with handles—indicate that they were another type of ceramic produced with the brown bodied ewers at the Yixing kilns. In addition, Jingdezhen green glazed bowls with white glaze inside and a blue mark written in the Chinese alphabet in a square frame on the white glazed base have only been found on the Desaru wreck (Fig. 5). These represent a new decoration technique of the Jingdezhen kilns in the Chinese Qing Dynasty, but the mark was still similar to the blue and white ware production of the Chinese Ming Dynasty.

The fourth type is a blue glazed ware only found on *Diana*. This type is likely within the tradition of ceramic produced at the Dehua kilns during the Chinese Qing Dynasty. They are characterised by the round-shaped deep bowl with a low foot and decorated with a blue glaze without any design. These wares represent the reuse of Chinese Ming ceramic styles.

The fifth type is 'blue and white' wares which were commonly found in the Samed Ngam wreck, *Diana*, *Tek Sing* (Fig. 4), the Desaru wreck and *Francis-Garnier* (Man Nok or Ruea Mail) (Fig. 7). This type of ceramic is identified as a product of the Jingdezhen (Jiangxi), Dehua (Fujian), Anxi (Fujian) and Qingxi (Guangdong) kilns as most of them represent specific traditions of Chinese ceramic production. The forms comprise jarlets, jarlets with lids, various shapes of boxes, wide mouth tea cups with a matching lids and saucers without handles, round-shaped saucers, round-shaped dishes, round-shaped deep bowls with a low foot, basins to be used as incense burners, ewers with curved handles on the body and matching lids, jars with lids as used as tea leaf containers, jars with handles and lids where both the handles and lids are formed as figurines, figurines in the form of a children, bottles with lids, short soup spoons, spittoons with no handle and chamber pots with a handles. The painted Chinese-style floral or flower designs (i.e. bamboo, peony, chrysanthemum and shiitake mushroom) (Figs. 4 and 7) appear on ceramics produced in every kiln noted above. Chinese marks—especially the reign marks of Chinese Qing emperors, place names of production and auspicious quotes painted on the bases—were usually produced at the Jingdezhen kilns in the style previously associated with the Chinese Ming 'blue and white' wares. Chinese-style scenery designs (i.e. a Chinese-style pavilion beside a watercraft sailing in the sea, a person standing in the garden) were produced

especially at the Dehua kilns, which began to produce ‘blue and white’ wares during the Qing Dynasty and even at the Jingdezhen kilns, which commonly produced painted mountain and flower patterns. Handwritten Chinese words, especially the word ‘*Shuang Xi*’ or the well-known ‘longevity’ pattern, are also present. The unglazed circle ring is a feature of stacking the ceramics during the firing process on the centre or outside wall of the body and is characteristic of production from the Qingxi kilns. The words of auspicious meaning were also used to decorate the centre or outside wall of the Dehua and Anxi ‘blue and white’ wares but there are no unglazed marks inside as on Qingxi ‘blue and white’ wares. There is a Chinese-style tea cup with blue transfer-printed dragon design found on *Francis-Garnier* (Man Nok or Rueda Mail) which suggests a late phase of production at the Jingdezhen kilns in Jiangxi with the new invention or the European influence of transfer-printing technique that began during the ROC/PRC period.

A sixth ceramic type is lead green, yellow, or brown glazed wares, especially those with human and animal figurines in the forms of Chinese gods or goddesses, playing children, chickens, parrots, dogs and ducks, and one depicting a child sitting on a buffalo were recovered from *Diana* and figurines in the forms of a bird, chicken and even a child sitting on the buffalo were recovered from *Tek Sing*. These figurines have been identified as produced at the Shiwan kilns in Guangdong dated to the Chinese Early Qing Dynasty.

The last type of Chinese ceramic is overglaze enamelled ware. This type was found in large amounts in the *Diana*’s cargo and smaller numbers in the Desaru wreck, *Francis-Garnier* (Man Nok or Rueda Mail) and the Tha Krai wreck (Fig. 9). The overglaze enamelled wares recovered from *Diana* represent three sources of production: the Jingdezhen, Dehua and Shiwan kilns, all dating to the Chinese Qing Dynasty. The poor condition of Jingdezhen overglaze enamelled bowls from *Diana* was due to erosion by seawater as often happens to this type of ceramic, even in archaeological contexts of high-moisture soil deposited at inland sites (Suteerattanapirom 2016; Thawornwong 2016). Some overglaze enamelled designs are still visible, especially the olive-green painting and flower patterns with coin designs; flowers and cross-hatch designs in the panels with bands of lotus blossom design on the lower body can be discerned. The pattern of flowers and cross-hatch designs in the panels with the band of lotus blossom design are also found on the overglazed enamelled round deep bowls found on *Tek Sing* (Christies 1995: 100; Pickford, Hatcher and Freedman 2000: 264). This confirmed that this group of overglaze enamelled wares painted in red, yellow and green are characteristic of the production of the Jingdezhen kilns. The erosion by seawater seems to have affected the Shiwan overglaze enamelled bowls in the Desaru wreck. Some decorative elements on these bowls are assumed to be flower designs. Another group recovered from *Diana* and the Desaru wreck includes Dehua overglaze enamelled dishes painted with an underglaze blue and colour-washed by brown overglaze. The decoration can be divided into two different patterns comprised of flowers and birds flying around a tree with flowers.

The overglaze enamelled wares from *Francis-Garnier* (Man Nok or Rueda Mail) and the Tha Krai wreck represent overglaze enamelled ceramic productions dating to the ROC/PRC period. In *Francis-Garnier* (Man Nok or Rueda Mail), there is one overglaze enamelled dish with a painted flower design in pink and green that was produced at the Qingxi kilns in Guangdong. In the Tha Krai wreck, there are a couple of overglaze enamelled round deep bowls with a painted Chinese-style ‘chicken and flower’ pattern in blue, orange, green and brown as well as a Chinese alphabet design produced at the Chao’an kilns in Guangdong (Fig. 9).

However, some groups of the white glazed and blue and white wares produced at the Dehua kilns found on *Diana* have forms and painted designs different from the traditional

Chinese ceramic production mentioned above. This observation is based on comparing Chinese ceramic forms, especially the cylinder-shaped cups with curved handles on the body used to drink coffee or tea, hexagon-shaped plates, baskets with handles to carry fruit, soup bowls with handles and soup basins with lids. These are comparatively similar to the glazed ceramics produced in Europe. These forms were not evident in Chinese ceramic production in the Ming or Early Qing Dynasties. Moreover, all of them were decorated by 'blue and white', which was painted in only three patterns comprising the chrysanthemum design, the popular 'willow' (Chinese-style pavilions beside willow tree and pond, some also have two birds flying over the pond) and European scenery (European-style barns in front of a hill) (Christies 1995; Trustees of the British Museum 1995). The characteristics mentioned above suggest that European aesthetic tastes, including chinoiserie, were applied to produce white glazed and 'blue and white' wares at the Dehua kilns in Fujian, China.

All these types of Chinese Qing and post-dynastic ceramics are commonly found in archaeological contexts of domestic activities at port cities and inland sites throughout Southeast Asia, especially between the nineteenth and the twentieth centuries, such as at Bangkok, Chonburi, Yala, Kuala Lumpur, Palembang, Hanoi and Borneo. Some of these types were affixed together with European ceramics on the walls of Buddhist temples in Central and southern Thailand and tombs in northern Vietnam and east Java, Indonesia (Harrisson 1995; L  m et al. 2004; Sukkham and Chelao 2006; Piemmetawat 2015; Bautze 2016; Phonchai 2016; Suteerattanapirom 2016; Sukkham 2017a; 2017b; Kien and Huong 2018; Kitchener and Kustiarsih 2019; Otte 2019a; 2019b; Shahidan 2019). However, Longquan green glazed wares, dated to the Chinese Ming Dynasty, are found in earlier periods within inland and underwater shipwreck sites dated between the late fourteenth to the first half of the eighteenth centuries (Harrisson 1970; Brown 2000; 2009a; 2009b; Miksic 2009).

Other monochrome glazed and unglazed ceramics of unidentified origin recovered from *Diana*, *Tek Sing*, the Desaru and Tha Krai wrecks represent traditional Chinese ceramic production: forms of jarlets, vases, saucers, large oval dishes, bowls, ewers with a cylinder handles on the side of body, curved spouts and lids, large ewers with curved handles on the top of the mouths, curved spout and applied dragon designs on the shoulder, tall jars, jars with handles, jars with lids and handles of lids in the form of bird figurines, candlesticks, round stoppers of bottles with incised flower designs, a cylinder cooking stove with impressed Chinese marks with a square or oval hole on the lower part for allowing air to flow into the oven and a grate between lower and upper parts for placing fuel, and three stands on top for holding the cooking utensils. There are also figurines in the forms of a lion, a Chinese god or goddess and a flower. Most of these were decorated in brown or green glaze but are in a poor condition due to damage by seawater, making it hard to identify the origins of ceramic production, although they are possibly Chinese, dating to the Qing Dynasty and ROC/PRC period.

Armorial or Heraldic Ceramics

Around 183 oval-shaped plates, each with an overglaze enamelled coat of arms of the British East India Company in yellow, brown and olive-green, were recovered from *Diana*'s cargo. The motto '*AUSPICIO REGIS ET SENATUS ANGLIA*,' in Latin means 'By the authority of the King and Parliament of England.' The coat of arms is surrounded by a border and unglazed base. The British Museum calls these "Armorial or Heraldic Porcelains",

and those from *Diana* are a good example of the type from an original archaeological context (Christies 1995: 66–69; Trustees of the British Museum 1995). However, the function of these plates is unclear. They are possibly for on-board domestic use as an official dinner service or a product for sale. Because of the quality of raw white glazed porcelain wares, the colours of overglaze enamel, overglaze enamelling technique and some elements of decorative patterns, most of armorial or heraldic wares are believed to have been produced on commission by the British East India Company and even other Europeans families or companies in Portugal, Britain, the Netherlands, France, or Belgium, and for instance, at the Jingdezhen kilns in Jiangxi during the Chinese Qing Dynasty in the eighteenth to nineteenth centuries. They are usually preserved in museums and private collections in Europe and North America (Nilsson 2000a; Trustees of the British Museum 2020).

Bencharong Ceramics

Around less than 1000 round-shaped saucers with overglaze enamel and decorative patterns of a lotus blossom design on the centre were found only on *Tek Sing* (Pickford, Hatcher and Freedman 2000: 265). Re-identification suggests these overglaze enamelled saucers and bowls are similar to Jingdezhen overglaze enamelled bowls, and as previously mentioned, is one type of Chinese ceramics found in the *Diana* and *Tek Sing*'s cargoes. It has the same characteristics of those usually found in archaeological sites around the former Siamese capital of Ayutthaya (c. 1350–1767). Hence, they can be identified as “*Bencharong*” wares, whose first phase of production dates to between 1709 and 1720.

The origin of the term “*Bencharong*” in Thai derives from the Sanskrit “*Pancharanga*”, meaning ‘five colours’, which is a characteristic influenced by the Chinese five-colour overglaze enamelled wares according to the enamel decorative palettes of “*Famille Verte*” (a French term for hard or foreign colours, called “*Yungcai*” in Chinese) and “*Famille Rose*” (a French term used for soft colours or “*Fencai*” in Chinese). Recent research indicates that Bencharong wares were produced on commission by the Siamese royal court at the Jingdezhen kilns in Jiangxi, China, and were imported to Siam from the Late Ayutthaya period (c. 1630–1767) to the Early Rattanakosin period (c. 1782–1910). The “*Lai Nam Thong*”, which was from the same kilns, included a reference to the addition of gold enamel on the ‘blue and white’ or five-colour overglaze enamelled wares and was imported only in the last half of the Early Rattanakosin period between the nineteenth and early twentieth centuries. There are seven phases or divisions in the production and importation: the first phase from 1709 to 1720, the second phase from 1720 to 1767, the third phase from 1767 to 1800, the fourth phase from 1800 to 1824, the fifth phase from 1824 to 1851, the sixth phase from 1851 to 1868, and the final and seventh phase from 1868 to 1910. Both Bencharong and *Lai Nam Thong* wares are made of the ‘blue and white’ and overglaze enamelled wares in the forms of jarlets, boxes, round-shaped saucers, round-shaped dishes with foliate rims and tall pedestals, round-shaped deep bowls with lids, jars with lids and spittoons as well as some pieces that still have blue painted Chinese marks on the bases and are decorated with an overglaze enamel. The decoration is hand-painted overglaze enamel with the five colours of black, red, green, yellow and white and the common designs comprise mythical human and animal figures, floral designs, geometric designs and episodes inspired from Thai literature, such as the *Ramayana* (an epic Indian tale) and *Phra Aphai Mani* (written by Thailand’s best-known poet, Sunthorn Phu (Thai writer, 1786–1855)) (Håbu and Rooney 2013: 31–67).

European Ceramics

There are only two groups of ceramics from these six shipwrecks that have been identified as European. The first group includes five brown glazed stoneware cylindrical noggin flasks with impressed flower and an applied loop handle on the shoulder recovered from *Diana*. They are similar to a brown glazed stoneware cylindrical noggin flask with an applied loop handle recovered from the Desaru wreck but there is no decoration on the shoulder of those from *Diana*. The glaze of these flasks was damaged by seawater, but some areas of glaze showed that they were decorated with a salt acrid brown glazing technique. However, these salt acrid brown glazed flasks have no manufacturer's mark, which means their dating and origin are unidentified, but the salt acrid brown glazing technique and the form of flask suggests that these were made in Europe.

Another European ceramic type is a white glazed ashtray recovered from the Tha Krai wreck. On the base of ashtray are red transfer-printed manufacturer marks of the initials 'C. and P.' in an oval at the centre of the trapezoid frame with the words 'CHARLIONAIS et PANASSIER, TOULOUSE, LYON, LIMOGES', written on the border of trapezoid frame. This trademark is dated between 1921 and 1943. Hence, it can be identified as produced by the Charlionais and Panassier Company, better-known as J. Charlionais, L. Pourailly and Co. (1911–1950), which specialised in art nouveau style porcelain, crystal, glassware and jewellery manufacture for interior decorations of bars, cafés, restaurants and hotels in France. The company had a factory located in Limoges and resale stores located in Lyon and Toulouse, France (Anon. 2007).

Discussion: Ceramics in Context

Based on the ceramic group characteristics found in the shipwrecks, presented above, Chinese ceramics, including those with decoration, form the largest group by ceramic type, followed by armorial or heraldic wares, Bencharong and European wares. However, these are just some examples of ceramics found in the most recent excavations of shipwrecks in Southeast Asian waters that date from the last half of the eighteenth to the early twentieth centuries. Certainly, other shipwrecks including their ceramic and other assemblage types await to be found in future underwater archaeological works.

Based on the quantity of ceramics found on these shipwrecks, approximate amounts of recovered ceramics can be used to differentiate between cargo and passenger ships and even the functions of ceramics found on the shipwrecks. The characteristic of cargoes is that the ceramic finds number in the hundreds or thousands of pieces of the same ceramic type from each place of origin. In wrecks of passenger vessels, characteristically the finds consist of a couple pieces of each ceramic types from each place of origin (Tables 2 and 3; Fig. 3). Some wrecks with a couple pieces of ceramics finds from each place of origins can also be identified to be the cargo vessels carried other products as their main cargoes, sometimes also carried the passengers in the same time with a shipment, which represent the ceramics are possibly the utensils for on-board living, or the remnants of earlier shipments in this case. However, ship structures and other associated finds should be interpreted together with the result of ceramic study and the records related to the wrecks are the best historical evidence to confirm the ship types and the functions of ceramics.

The Samed Ngam shipwreck is assumed to be a Chinese junk that was left in dry dock during the discharge of Burmese troops to the region after the Second Burmese–Ayutthaya War (c. 1765–1767). Recovery of a couple of ceramics, identified as produced from the same origin, led to the interpretation that all were utensils for on-board domestic use.

The wrecks of *Diana*, *Tek Sing*, and the Desaru represent cargo ships owned by shipping companies during the early nineteenth century. A large variety and approximately more than 100 pieces of each ceramic type and origin were found on these ships. This confirms that the ceramics on-board were products for sale at their destinations. They were part of a one-way supply chain that specifically and directly linked ceramic manufacturers from Jiangsu, Jiangxi, Fujian, Zhejiang and Guangdong. A second more complex network also connects ports of origin in Fujian or Guangdong in southern China and even other ports in Europe to destination ports in Southeast Asia, South Asia, or Europe. The vessels and their ceramic cargoes were firmly part of a larger global maritime trading network.

The voyage of *Tek Sing* was extraordinary as it carried a cargo including ceramics for sale, perhaps even by the ship's crew members, and also carried passengers who were Chinese migrants to Southeast Asia. The ship's narrative is one of labour migration as much as it is about cargo movements. However, the Samed Ngam wreck, *Diana*, *Tek Sing*, and the Desaru wreck also represent traditions of Chinese, and slightly later, European wooden-hulled sailing ships present in Southeast Asia from the late fourteenth to the first half of the eighteenth centuries that continued until the nineteenth century (Tables 2 and 3; Fig. 3).

Around the early twentieth century, European-style screw-propelled steamers with iron hulls and single or multiple decks were introduced to Southeast Asia. Passenger liners were also created by shipping companies to connect multiple destinations along domestic and intentional routes and *Francis-Garnier* and the Tha Krai shipwrecks were operated particularly for passenger conveyance in, or to, French Indochina and Siam or even across countries via the South China Sea and the major rivers of the region. The ceramics found on these two shipwrecks are small in variety and quantity, suggesting they are personal belongings of the crew or passengers for daily life on-board.

Chinese ceramics seem to be the best indicator for dating in every archaeological context because they were produced and exported to Southeast Asia from the first until the twentieth centuries and the characteristics of these ceramics' form and decoration are unique. The indicators for dating shipwrecks from the last half of the eighteenth to the early twentieth centuries are Chinese Qing (1644–1911) and post-dynastic (i.e. either Republic of China (ROC; 1912–1949) and after 1949 People's Republic of China (PRC)) ceramics, especially blue and white, monochrome glazed and overglaze enamelled wares, as the same ceramic patterns were found in both shipwrecks and port cities throughout Southeast Asia. However, previously imported Chinese ceramics appear to become a prototype for ceramic production especially in Japan and Southeast Asia from the fourteenth or the fifteenth centuries and afterwards by Europe from the seventeenth century. But there was also European-influenced Chinese ceramic production for both European and Asian markets that began in the nineteenth century.

Based on the ceramic cargoes of *Diana* and *Tek Sing*, the European-influenced Chinese ceramics, the commissioned armorial or heraldic ware and the Bencharong ceramics can be considered as specific elite wares. To this we can add the “*Blue de Hué*”, which were ‘blue and white’ wares commissioned by the Vietnamese imperial court at Hue, the capital during the Nguyen Dynasty (1802–1945) (Stevenson and Guy 1997: 396–401) and a set named “King Chulalongkorn's Initials Style”, which were ‘blue and white’ wares commissioned by the Siamese royal court during the reign of King Chulalongkorn (or Rama V, c.

1868–1910) during the Rattanakosin period, which all were produced at the Jingdezhen kilns in Jiangxi, China, in the nineteenth century (Pinsri et al. 1992: 227–229). These elite wares represent the regional power of the Siamese royal court and the Vietnamese imperial court which sustained close relations with the Chinese imperial court. It must be noted that armorial wares had existed in Europe prior to their arrival in Asia, and that Spain and Portugal had started the fashion for specifically commissioned wares from China. The era of company trade in the seventeenth century extended these elite wares to the British East India Company (1600–1874) and the Dutch East India Company (V.O.C.; 1602–1799), which produced their own mercantile elites in Asia and Europe. From the seventeenth century, commissioned armorial ceramics with ‘blue and white’ and overglaze enamel came especially from the Jingdezhen kilns in Jiangxi along with elite European dining wares. Another trend was the commissioning of ceramics from European factories, especially the spittoons with designs of the Chakri Maha Prasat Throne-hall in Bangkok’s Grand Palace, called “Chakri Style” and produced at the Sèvres factory in France and commissioned by the Siamese royal court during the reign of King Chulalongkorn in the nineteenth century as well (Pinsri et al. 1992: 227–229).

Few European ceramics such as the French Charlionais et Panassier white glazed ashtray found in the Tha Krai wreck were recovered in the above-mentioned shipwreck sites. However, different brands and types of European ceramics have been found at terrestrial sites, especially in the capitals and important port cities of Southeast Asia. European ceramic production is represented at these terrestrial archaeological sites by a salt brown glazed ware with its glassy coating of sodium silicate, transfer-printed (inking), sponge-dabbed (hand-painting or dabbing) and flow blue (blurred blue transfer-print) ceramics with decorative designs and inking or the impressing of English, included Latinised Chinese, Japanese or Malay trademarks on the base. All of these European influences most likely date to the nineteenth or twentieth centuries as well, and these ceramics are good indicator of modern period around the world (Kowalsky and Kowalsky 1999; Nilsson 2000b; Sukkham and Chelao 2006; Barry 2007).

British ceramics were produced in the London factories of Atkins Filter Engineering and Water Softening and Doulton. But the largest British group were the Staffordshire potteries of A. J. Wilkinson, Grimwade Bros, J. and G. Meakin, Edward Challinor, J. F. Wileman, John Ridgway, William Ridgway, J. and W. Pratt, W. Adams, W. T. Copeland, W. and T. Adams, Wedgewood, Wood and Sons, and Johnson Bros. The two Derbyshire potteries of Joseph Bourne and Son and Lipscombe, the Birmingham companies of F. and C. Osler, and the famous Royal Worcester complete the origin of English ceramic finds but there are also ceramics produced by the two Scottish firms of Cochran and J. and M. P. Bell. Dutch ceramic finds are represented by the Maastricht firms of *Petrus Regout* or *Sphinx* and *Société Céramique*. Finds in the region also come from the two Belgian ceramic firms of *Mouzin Lecat* of Nimy and *Boch Frères Keramis* of Louviere. There are ceramic finds produced by the German companies of *Kaendler* of Dresden, *Rhineland* pottery of Westwald and the famous *Villeroy and Boch* of Mettlach. The presence of French colonies in Southeast Asia provided a colonial market for *Opaque de Sarreguemines*, *Sèvres*, *Utzscheider/Sarreguemines* and the mentioned *Charlionais et Panassier*. Even Italy, who had no colonies in Asia, exported ceramics from the *Cantagali* factory. The technological, economic and military rise of Japan is evident in the finds of ceramics produced by the *Arita* or *Imari*, *Nippon Koshitsu Toki*, *Matsumura* and *Nagoya Seitoshō* factories which usually appeared with European-influenced decoration techniques. One Southeast Asian manufacturer is included, *Goh Ban Huat*, established in the 1890s in Johor, Malaysia, and there also appeared European-influenced decoration techniques on them. Some Late Qing and

post-dynasty (i.e. either Republic of China (1912–1949) and after 1949 People's Republic of China) wares were decorated by transfer-printed techniques and some of them had Chinese trademarks in Latin letters painted on the base, especially at the Jingdezhen kilns in Jiangxi province (Harrisson 1995; Nagatake 2003; Miksic and Low 2005; Kelly 2006; Barry 2000; 2007; National Library of the Netherlands 2012; Rogers 2015a, 2015b; Sukkham 2016; Suteerattanapirom 2020; Shahidan 2019). The English, Scottish, French, Belgian and Italian even Japanese, Malaysian and Chinese ceramics with European-influenced decoration techniques represent the rise of the ceramic production and trade associated with both the European industrial revolution and European global expansion.

However, these European ceramics and even Japanese, Malaysian and Chinese ceramics with modern European decoration techniques, always found in the terrestrial sites around the south and in Southeast Asia specifically at Calcutta and Madras in India, Kyaukpju, Mandalay and Rangoon in Burma, Kuala Lumpur, Johore and Sarawak in Malaysia, Palembang and Tuban in Indonesia, Singapore, and Thalang or Phuket, Yala, Pattanai, Nalathiwat, Songkhla, Nakhon Si Thammarat, Chumphon, Yi San or Samut Songkham, Bangkok, Ayutthaya, Singburi, Nakhon Sawan and Chonburi in Thailand (Harrisson 1995; Nagatake 2003; Miksic and Low 2005; Kelly 2006; Barry 2000; 2007; National Library of the Netherlands 2012; Piemmettawat 2015; Rogers 2015a, 2015b; Bautze 2016; Sukkham 2016; Phonchai 2016; Kitchener and Kustiarsih 2019; Otte 2019a; 2019b; Shahidan 2019), were not found on the six investigated shipwrecks discussed here. This fact suggests that most ceramics with modern European decoration techniques arrived safely at terrestrial sites mentioned above, which are identified as the capitals and ports of European colonies or independent states along the crowded maritime trading networks in the north-eastern Indian Ocean and the South China Sea. Additionally, European ceramics have never been found on the southern China coast.

Conclusion

The six shipwrecks discussed here, the Samed Ngam wreck (1767–1782), *Diana* (c. 1817), *Tek Sing* (c. 1822), the Desaru wreck (1830–1840), *Francis-Garnier* (formerly known as Man Nok or Rueva Mail; c. 1921) and the Tha Krai wreck (1942–1945), can be considered the most recently dated archaeologically excavated sites in Southeast Asia and belong to a period of maritime transport from the last half of the eighteenth to the early twentieth centuries. They provide information on the identification of ceramics, maritime activities and cultural patterns and therefore can assist in research agendas for future shipwrecks exploration in Southeast Asia and associated regions (Tables 2 and 3).

The ceramic evidence of the Samed Ngam wreck suggests that its ceramics were utensils for on-board domestic use during the reign of King Taksin the Great (c. 1767–1782) in the Thai Thonburi period. However, the comparison of ceramic finds and ship technology in this article confirm that a new period is evident in the ceramic finds of Chinese and European wooden sailing ships in the early nineteenth century, as confirmed by the dated wrecks of *Diana* (c. 1817) and *Tek Sing* (c. 1822), and even the Desaru wreck, which coincides with the arrival of long-distance steam vessels in Asia in the early twentieth century as seen in *Francis-Garnier* (Man Nok or Rueva Mail, c. 1921) and the Tha Krai wreck (c. 1942–1945).

The presence of Chinese Qing and post-dynastic ceramics, and even the introduction of European-manufactured elite wares, and the demise of Southeast Asian ceramic

assemblages attests to the growing dominance of European colonisation and Chinese mass migration to Southeast Asia. Traditional Chinese ceramics were shipped together with commissioned armorial/heraldic elite wares and elite European dining wares with specific European tastes. This coincided with a fashion for chinoiserie including the Bencharong wares commissioned by Southeast Asian elites.

The Chinese, Chinese-made armorial, Chinese-made Bencharong and European ceramics found in these wrecks represent the different use of ceramics. The large amounts of ceramics were clearly the product for sale at the destinations and may include a few remains of earlier shipments mixed with the smaller amounts of ceramic utensils for crew or passenger domestic use in the same ship. This pattern suggests they are cargo ships which possibly allowed for the crews' daily living activities and even the carrying of some passengers. In some shipwrecks, the ceramics were small amounts as they were exclusively the utensils for on-board use in a passenger ship. However, the characteristics of the ceramics suggests that they represent cross-cultural exchange and knowledge exchange in production. Each type of wreck assemblage demonstrates a diversity of ceramic forms and decorative pattern traded across distant and local regions and even manufactured on commission for fashion trends at destination markets. The records of cargo manifests, item pricing, shipping costs in all of these six examples remain unknown. In some cases, the records clearly mentioned the destinations. Terrestrial and often inland sites suggest that most of ceramics arrived safely at their port of destination and were transported to these sites.

The six Southeast Asian-area shipwrecks from the South China Sea and the Strait of Malacca, dating from the last half of the eighteenth to the early twentieth centuries, represent ceramic assemblages defined by several ceramic styles, selections and functions on board. Diverse maritime activities and technological improvements in the contexts of a transition from cargo shipments in last half of eighteenth century to passenger transport including mass migration since the early nineteenth until the early twentieth centuries can be observed. This is reflected in construction techniques of traditional Chinese, European, or hybrid between Sino-European wooden sailing vessels during the last half of the eighteenth to nineteenth centuries. The latter were continuously improved from the earlier period of trade in ceramics, to include metal hulls with screw-propelled steamers from the early twentieth century onward. Improved vessel construction led to better ships, while there were improvements in navigational aids, especially colonial maps, charts, lighthouses and buoys (Rooney 1991; Suárez 1999; Lavery 2004; Miksic and Low 2005). This extends to the evidence between ceramics found at terrestrial and shipwreck sites. These changes could mean that most of the ships and their cargoes arrived safely at their destinations compared to earlier periods. Of course, the wrecks of the six vessels outlined above are exceptions to this trend. We can conclude that the European industrial revolution that resulted in a change in ship technology from sail to steam was coupled with the rise of improved European ceramic manufacturing and colonial expansion to produce European rivals to the Chinese and Southeast Asian ceramic production and trade. This article therefore concludes that based on the evidence provided from these shipwrecks, riverine wrecks and terrestrial excavations, the termination of Southeast Asian ceramics as an export commodity occurred concurrent to rising European commercial and colonial expansion between 1700 and 1750.

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Declaration

Conflict of Interest The authors declare that they have no conflict of interest.

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