The International Journal of
NAUTICAL ARCHAEOLOGY

The International Journal of Nautical Archaeology (2017) **46**.1: 108–131
doi: 10.1111/1095-9270.12213

Ships and Maritime Activities in the North-eastern Indian Ocean: re-analysis of rock art of Tham Phrayanaga (Viking Cave), southern Thailand

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Tham Phrayananga is a limestone cave on Phi Phi Le Island in the Andaman Sea, off south-west Thailand. A 2010 survey recorded 80 painted figures on the cave wall, in three different panels. They include nine identifiable ship types, other unidentified ships, non-marine images and a Jawi script. They are monochrome (black, red-brown, or dark-brown), or bichrome (dark-brown with yellow-brown, or red-brown with black). The vessels portrayed can be compared with local and overseas ships from China, Europe and Indonesia. Whether local or from distant ports, all were involved in the Southeast Asian maritime trade and voyages of the 15th–20th centuries.

Key words: Rock art, paintings, ships, Phrayanaga Cave, Viking Cave, southern Thailand.

The rock art of Southeast Asia has steadily been receiving increased attention through a series of linked research projects, institutional partnerships and research networks extending across Southeast Asia to Australia, Europe and beyond (see for example Mokhtar *et al.*, 2008; Taçon and Tan, 2012; Taçon *et al.*, 2014; Tan, 2014; Scott and Tan, 2016). One of the major research initiatives involves rock-art imagery produced following contact between different cultural and linguistic groups. The arrival of Europeans in Southeast Asia and Australia had a profound effect on the indigenous peoples, kingdoms, cities, states and nations of the region, but maritime trade between different peoples within Southeast Asia, as well as from China, India, Oman and elsewhere, also initiated change that was sometimes reflected at rock-art sites. In the Lenggong Valley of Perak, Malaysia, for instance, the Semang recorded the arrival of the British and Malays to their traditional lands from the late 1800s onward, as well as the modes of transport that brought the new peoples—horses, motorized vehicles, bicycles, etc.—and some of the changes that resulted (see for example Mokhtar and Taçon, 2011). At many rock-shelter sites in northern Australia the arrival of both Asians and Europeans was also set in and on stone, with the new arrivals and modes of transport popular subjects for painting since the 1600s (see for example May *et al.*, 2010; Taçon *et al.*, 2010).

Tham Phrayanaga, on the west coast of southern Thailand, also known as 'Viking Cave', is an

Figure 1. Map of southern Thailand with Tham Phrayanaga indicated. (Atthasit Sukkham)

outstanding example of a site with contact-inspired imagery (Fig. 1). It gives us a rare visual record of a period of great cultural interaction and accelerating cultural change, with the watercraft of numerous cultural groups depicted. Furthermore, it contains a greater number of depictions of watercraft and greater diversity than any other rock-art site in greater Southeast Asia, Australia and North America (see for example Chaloupka, 1996; Bradley *et al.*, 2002; Ballard *et al.*, 2003; Roberts, 2004; Turner, 2006; Bigourdan and McCarthy, 2007; Lape *et al.*, 2007; Tan and Walker-Vadillo, 2015). In this paper, the images are described and the ways in which the site informs us about maritime activity and the history of cross-cultural contact in the Andaman Sea as part of the Indian Ocean are explored.

A brief history of Southeast Asia

The history of Southeast Asia from the 13th to 20th centuries is usually drawn from local and foreign chronicles recorded by the royal courts, ambassadors, explorers or journalists who lived in Siam and Southeast Asian states. Moreover, the early history, of the 1st to 13th centuries, is provided by art historical, ethnological and archaeological research, with only few historical records. The word 'Siam' was used for Thailand, especially during the Late Ayutthaya (1630–1767), Thonburi (1767–1782) and Early Rattanakosin (1782–*c.*1910) periods (Promboon, 1982: 85; Cushman, 1985: 13–34; Rooney, 1991; Breazeale, 1999: 67–79; Rungruchi *et al.*, 1999a: 25–78; 1999b: 56–78; 1999c: 40–109; Tarling *et al.*, 1999a: 168–173; 1999b: 1–51; 1999c: 42–49; 1999d: 109–117; Gernier, 2004: 22–38).

The west coast of southern Thailand is a part of the Malay Peninsula, lying with the Gulf of Thailand and the South China Sea to the east and the Andaman Sea and Indian Ocean to the west. Based on the ancient chronicles, ancient maps and archaeological evidence, the west coast of the peninsula was a gateway for Arabic, Indian and Sri Lankan merchants and explorers, while Chinese vessels usually arrived at the east coast of the peninsula and central Thailand from the 1st century BC until the 14th century AD. Southeast Asian states developed under Indian influence and early Chinese exploration of diplomatic and trade relations in this period, while the Chinese tributary system, trade and ceramic production became widespread in the following centuries (Rungruchi *et al.*, 1999a: 25–78; 1999b: 56–78; 1999c: 40–109; Tarling *et al.*, 1999a: 185; Srisuchat, 2005: 203–204).

During the 14th–18th centuries, the Ayutthaya kingdom expanded rapidly, accompanied by local administration reformation of its dependent cities and the official establishment of trade and diplomatic relations with China, Japan and Europe. The kings of Ayutthaya permitted the Chinese, who had a close tributary relationship with the royal court of Ayutthaya, to settle in south-western Ayutthaya. Portuguese traders were noted as the first Europeans

to arrive in Ayutthaya in 1511, followed by Japanese in 1563, Dutch in 1605 or 1620, English in 1612 and French in 1683. The Portuguese, Dutch and Japanese obtained permission to settle, as seen in the construction of the Portuguese Christ church, the *Vereenigde Oost-Indische Compagnie* trade station, and Japanese occupation in the south of Ayutthaya along the Chao Phraya River. This provided a great opportunity for them to exchange products, such as aromatic woods, spices, deerskins or weapons, and for the Portuguese priests' evangelism (Promboon, 1982: 85–143; Gernier, 2004: 67–134). The locations of the English and French occupations in Ayutthaya, however, are not now known.

At the same time, unofficial relations with Burma (now Myanmar), Malaysia, Indonesia, Vietnam, the Philippines and even China, Japan and Europe were also established so that products, specifically gold ornaments, ivories, rice, areca nuts and ceramics—from Ming and Qing Dynasties, Bang Pun, San Kamphaeng, Sukhothai, Si Satchanalai, Bang Rachan (Mae Nam Noi), Vietnam, Burma and Arita (via Imari port)—could be traded. Knowledge of this trade is supported by archaeological evidence both recovered from wrecks of ships that had been heading for Thai ports and the products found distributed to in-land cities (Green *et al.*, 1987: 2–34; Goddio, 1988: 43–114; Intakosi and Charoenwongsa, 1988: 51–72; Breazeale, 1999: 16–22; Brown and Sjostrand, 2001: 15–21; Goddio, *et al.*, 2002: 14–42; Brown, 2009: 38–67; Green, 2011: 348–350; Wade and Laichen, 2013: 307–404).

Various versions of maps of Southeast Asia began to be made by the Portuguese in the early 1510s, followed by the Dutch and then the French in the mid 1600s, to aid exploration and navigation. The English were the last to contribute several versions of maps in the mid 1820s (Rooney, 1991; Suárez, 1999: 252–262; Tarling *et al.*, 1999b: 2–28; 1999c: 1–74; Gernier, 2004: 67–134). Wars between Ayutthaya and Burma, and even the Kingdom of Lanna, had begun in the 16th century. Ayutthaya was attacked and the city razed by the Burmese army in 1767, which forced the inhabitants to abandon it. The city was never rebuilt (Gernier, 2004: 135–140), and the capital was relocated in Thonburi (1767–1782) and Rattanakosin (1782–present), before being moved to Bangkok along the Chao Phraya River (Promboon, 1982: 144–167; Cushman, 1985: 113–119; Gernier, 2004: 30–32).

From the 18th century, a large number of Chinese merchants and people migrated to various important ports around Southeast Asia, such as Singapore, Penang, Phuket, and Bangkok. Trade relations between Siam and China also grew rapidly until the 20th century, both within the imperial Chinese tributary system and the private sector. Chinese silk, tea, hand fans, Qing ceramics and other products were important exports from the ports in Southern China to Southeast Asian, Indian and European markets. Products from Siam, including salt, sugar, rice, aromatic woods, dried fish, tobacco and others, were shipped to Singapore and South China (Skinner, 1959: 137–140; Cushman, 1985: 55–96; Tarling *et al.*, 1999c: 133–136; Hussin, 2007: 1–34; Nasution, 2009: 81–83).

Especially during the 19th and early 20th century, European colonial regimes spread throughout Southeast Asia, such as British Burma (now Myanmar), British Malaya (now Malaysia), the Dutch East Indies in the Indonesian Archipelago (now Indonesia), French Indochina (now Vietnam) and Spain in the Philippines. European and Chinese private companies were allowed to share in a segmented market. Steamships were also launched for regional passenger and cargo transport, especially between Rangoon (now Yangon), Phuket, Penang, Singapore, and as far as Hong Kong, Swatow (now Guangdong), and Amoy (now Xiamen). Orders for European glassware, ceramics (originating from England, Scotland, the Netherlands, and France), Indian cotton, Chinese tea and other products were usually placed in Singapore, Indonesia, Malaysia and Siam (Cushman, 1985: 35–51; Harrisson, 1995: 82–102; Tarling, *et al.*, 1999c: 1–76; Kelly, 2006: 100–111; Barry, 2007: 65–76; Leng, 2009: 25–27; Win and Leng, 2009: 70–73; Floor and Otte, 2013; Miksic, 2013: 405–444; Sukkham, 2016: 1–3). A few companies had both the abilities and facilities to launch their own fleets of cargo ships and built their trade stations in Southeast Asia, especially in Burma, Indonesia, Malaysia and Singapore, to collect aromatic woods, spices, timber and other products for sale in their homelands. These centres were also used to distribute European products within these regions (Cushman, 1985: 35–51; Kelly, 2006: 70–71; Leng, 2009: 28–35; Win and Leng, 2009: 70–73). Moreover, international and domestic passenger transport between Europe, India, and Southeast Asia, or Southeast Asia and East Asia, had become easier and regularly scheduled. Most of the passenger and cargo ships cruising between Europe and Southeast Asia travelled via the Mediterranean Sea to the Red Sea and Indian Ocean via the Suez Canal after it officially open in 1869. Others arrived via the Atlantic Ocean, Pacific Ocean and South China Sea, although these voyages were more dangerous (Wallace, 1908: 171–174; Fowler *et al.*, 2007: 15–62; Win and Leng, 2009: 70–73; Lavery, 2010: 190; Anon., 2016).

Regional maritime activities, especially trade, fishing and migration across the waters of the Southeast Asian states, seem to have lacked international maritime law, especially in the open-seas, until the mid 20th century. The coastal state jurisdiction over maritime space rarely extended more than three nautical miles offshore. Delimitation of maritime boundaries between states was generally uncontroversial being restricted to a narrow section of inshore waters (Gibson-Hill, 1949: 106–108; 1950: 108; Fowler *et al.*, 2007: 9; Davenport, 2012: 4; Clark and May, 2013: 1–18). The Southeast Asian economies, including maritime contact and activities, were suddenly reduced after the

Second World War in Southeast Asia from 1941 to 1945 (Tarling *et al.*, 1999d: 1–8; Nasution, 2009: 108). Afterwards, Southeast Asian states began to make expansive claims to seabed and superjacent waters from the 1960s to the 1980s. The complex geography of Southeast Asia, however, has meant that all Southeast Asian waters are delimited either as territorial seas, exclusive economic zones, or archipelagic waters (Davenport, 2012: 4). The Second World War and maritime delimitations are an important turning point bringing Southeast Asia to a new age of maritime activities, materialized in the widespread use of motorized and iron-hulled boats.

In southern Thailand, the central west coast of the peninsula, where Tham Phrayanaga is located, is in the present-day provinces of Krabi and Phuket. This area has a long history dating to the 1st century BC, but it is mentioned particularly in chronicles from Nakhon Si Thammarat, where a city was founded on the east coast in the 12th–13th century. The chronicles mention that Nakhon Si Thammarat governed another 12 cities, known as the 'Twelve Zodiacs': Sai Buri (now a district in Pattani, Thailand), Pattani (now a province in Thailand), Kelantan (now a state in Malaysia), Pahang (now a state in Malaysia), Syburi (now Kedah, Malaysia), Phatthalung (now a province in Thailand), Trang (now a province in Thailand), Chumphon (now a province in Thailand), Sa-u Lao (now a sub-district in Surat Thani), Takua Pa (now a district in Phang-nga, Thailand), Kra Buri (now a district in Ranong, Thailand), and Ban Thai Samo that Thai historians believe to be Krabi. In 1280, King Ram Khamhaeng of the Sukhothai Kingdom expanded his territory to the south, including Nakhon Si Thammarat, and also established religious relations with Sri Lanka via the city (Rungruchi *et al.*, 1999a: 30–31; 1999b: 56–78).

In 1350, the kingdom of Ayutthaya overpowered Sukhothai and its territories. Nakhon Si Thammarat was reformed as a chief primary-rank city under Ayutthayan control along with the quaternary-rank cities of Phatthalung, Chaiya (now a district in Surat Thani), Chumpon and especially Thalang. Chronicles of the Ayutthaya royal court record 'Thalang' or 'Thalang Island', which Thai historians and archaeologists believe to be Phuket Island. Ming and Qing ceramics have been found in this district of Phuket (Ueasaman, 2014). On the other hand, a few maps drawn by French explorers, such as the '*Carte Du Royaume De Siam et des Pays circonvoisins*' published in Alexandre de Chaumont's *Description du Royaume de Siam* (1686) (Fig. 2) and '*Siam*' in Simon de La Loubère's *Du Royaume de Siam* (1693), which name the island 'Joncelang' or 'Jonsalam'. Chinese, Portuguese, Dutch, French and English merchants arrived at Thalang and they built their own trade stations to amass minerals, forest supplies, and marine resources, such as tin, ambergris and pearls, and distribute their home products (Promboon, 1982: 119–123; Rungruchi *et al.*, 1999c: 41–42; Tarling *et al.*, 1999b: 9–17; Leng, 2009: 30). Unfortunately, other cities in this region are not mentioned in historical records of the period, but they were probably controlled by Nakhon Si Thammarat.

Figure 2. '*Carte Du Royaume De Siam et des Pays circonvoisins*', drawing by Père Placide published in Alexandre to Chaumont's *Description du Royaume de Siam* 1686, showing the French ships *L'Oiseau* and *La Maligne* and their route to Ayutthaya. (Collection d'Anville, 07077 b, Bibliothèque Nationale de France, http://gallica.bnf.fr/ark:/12148/btv1b59629179)

Between 1771 and 1776, following successfully fending off the Burmese invasion of the Thonburi period (1767–1782), Thalang was formally renamed 'Phuket'. A royal representative had nominated a local rich tin merchant, the son of a military leader active in defending against the Burmese invasion, to King Taksin the Great (1767–1782) of Thonburi Kingdom, and the king promoted him as governor of Phuket (Rungruchi *et al.*, 1999c: 40–109). Between 1777 and 1782, the tin trade grew rapidly in Phuket, especially for Chinese, Japanese and Southeast Asian markets. An English merchant, Captain Francis Light, had been promoted to royal representative of King Taksin the Great, and was permitted to exchange tin for German cannons and Indian cotton for the Siam royal court. However, by

Figure 3. The east-facing cave entrance now has basic docking facilities to enable bird-nest harvesting. (Paul S. C. Taçon)

1786, Captain Light had left Phuket to found Penang on behalf of the British East India Company (Fielding, 1955: 37–38; Rungruchi *et al.*, 1999c: 62–63; Leng, 2009: 25, 27).

Krabi appears in historical records again in the Early Rattnakosin period, especially around 1812–1815, as the governor of Nakhon Si Thammarat had great success in rounding up elephants by building elephant corrals in Krabi and Nakhon Si Thammarat. Elephants were exported to Indian markets via the port in Trang.

Krabi was reformed and formally established as a province by King Chulalongkorn (Rama V; 1868–1910) of the Chakri Dynasty around 1872, who also relocated the town to a new area at the mouth of Krabi River, which became an important port, together with Phuket, used to export tin and other products (Rungruchi *et al.*, 1999a: 52–54; Leng, 2009: 28–35; Nasution, 2009: 81–83).

Tham Phrayanaga

Tham Phrayanaga (meaning 'Big Snake Cave' because of a large snake-like stalactite that is officially designated by the Fine Arts Department of Thailand) is located in the north-eastern corner of Phi Phi Le Island (Fig. 1). Another rock-art site named Tham Wang Long is located on nearby Phi Phi Don Island. Phi Phi Don Island is located around 21 nautical miles from Krabi, and around 23 nautical miles from Phuket, and is one of nine islands in Noppharat Thara Beach-Phi Phi Islands National Park. All of the islands in the national park, including Phi Phi Don and Phi Phi Le, are limestone with sheer cliffs rising from the sea. Some have caves accessible by sea, sinkholes, and short sand beaches in shallow bays.

Tham Phrayanaga is a large limestone cave consisting of an oval-shaped dome with a high ceiling that is accessible by sea only. The 90 m-wide entrance faces east (Figs 3–4). The floor varies 3–6 m above sea-level while the cave measures 132 m wide, 95 m deep and has a maximum ceiling height of more than 20 m. The cave is home to hundreds of barn swallows that nest on the cave walls, including on top of the rock art. Nests are harvested year-round and sold as a local delicacy. It is unfortunate that no information about the beginning of nest harvesting in this cave is recorded. The site is now managed by a private commercial enterprise so tourists are no longer allowed to enter the cave. As well as obtaining special permission, we had to document the site during harvesting so as to minimize disturbing the birds.

Despite long being known by locals, the earliest record of the site was in 1972, during a visit by the reigning King Bhumibol Adulyadej (Rama XI; 1946–2016) of the Chakri Dynasty. In 1988, the Fine Arts Department (FAD) of Thailand embarked on a systematic recording of the cave's rock art (Chaimongkon and Pigpien, 1990: 21–35). Warren Blake (1996) discovered a similar site with maritime rock art in a cave named Tham Wang Long located on the south-western corner of Phi Phi Don Island, close to Wang Long Bay, and published some details

Figure 4. Plan of Tham Phrayanaga. (Atthasit Sukkham)

of both sites (Blake, 1996). In October 2009, this data was updated as part of MA thesis fieldwork (Sukkham, 2010), with follow-up research conducted on site at Tham Phrayanaga in May 2010 by three of us (AS, PT, NT). In 2016, the interpretation of a script painted in the Tham Phrayanaga cave entrance was completed by Asyaari bin Muhamad.

Methodology

Site recording took place in 2009 and 2010 as a collaboration between the Greater Mekong Sub-region and Malay Peninsula Research Project and Griffith University's Picturing Change research programme. Photography was used to record the paintings, which were edited using a decorrelation stretch technique (dStretch). Some of the ship paintings were analysed and drawn. Both seasons of site recording checked the condition of the paintings and used the same identification numbers for each painting as published by FAD in 1988. However, new paintings were also found and given new numbers. Analysis was based on paint colours, techniques, styles, and superimposition. The stylistic analysis is also used to classify the ships portrayed and suggest dates for them. Finally, with the help of historical records, the range of images is interpreted within the context of the ship types that voyaged in this region and their various maritime activities.

Tham Phrayanaga script

Five rows of script in monochrome black were written on the left side of the entrance, from inside the cave looking out to sea, in part of panel A. The script consists of letters from the ancient Jawi alphabet. The letter form is suggestive of a handwriting style typically dated to the 13th–20th centuries. Jawi is an Arabic alphabet used for writing the Bahasa Melayu, Acehnese, Banjarese, Minangkabau, Tausug and several other languages of Muslim countries in Southeast Asia. The Jawi script direction is right-to-left and top-to-bottom. At Tham Phrayanaga the beginning of each row is aligned with the ceiling and floor of the cave (Fig. 5). The Jawi script can be translated into Bahasa Melayu (Malay language), modern Malay and English (Table 1). It can be interpreted that a Muslim named Abdullah, a writer and interpreter of poetry, arrived in this cave and wrote this script on the cave wall in 1318. However, 1318 is possibly a year in the Hijri Islamic calendar, a lunar calendar consisting of 12 months in a year of 354 or 355 days. The calendar began in AD 622 when Muhammad travelled from Mecca to Medina, known as the Hegira. Hence, 1318 likely refers to AD 1900.

Tham Phrayanaga rock art

The surviving rock art of Tham Phrayanaga consists mostly of monochrome paintings in black, red-brown

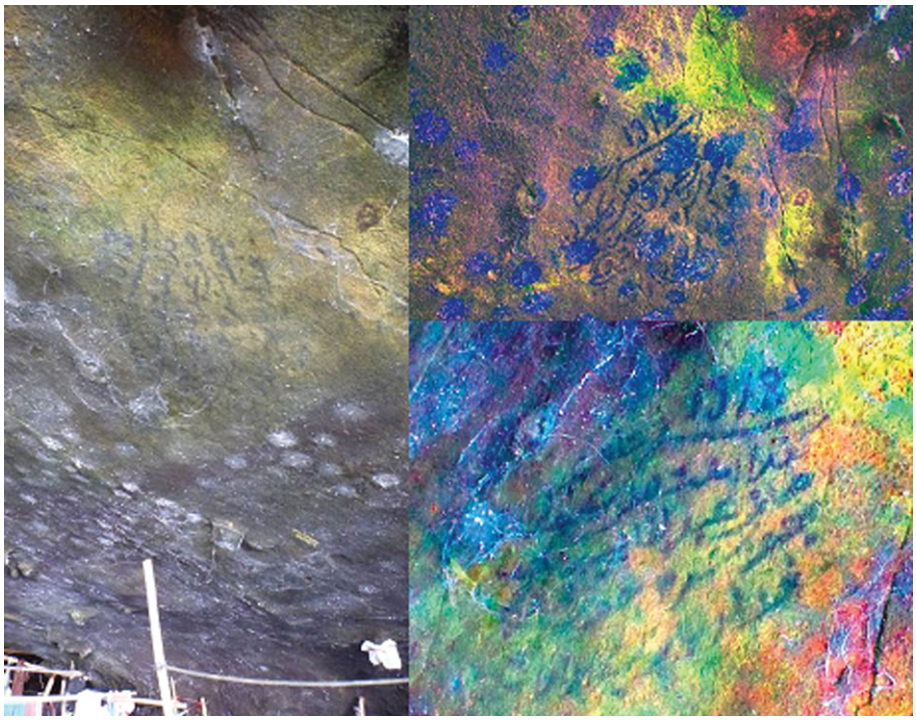

Figure 5. Ancient Jawi script in original photograph and editing using dStretch. (Atthasit Sukkham and Noel Hidalgo Tan)

Table 1. *Translations of Jawi text found out Tham Phrayanaga*

Line	Jawi	Malay	English
1	1318	1318	1318
2	كفد يغتهو	*Kepada Yang Tahu*	For those who know
3	هي فرا عبد الله بين	*Hai Para Abdullah (Hamba Allah) bin*	Hey Abdullah servant of God
4	جور شعره جدي شعره	*Juru Syair Jadi Syair*	Interpreter of poetry into poetry
5	فد كرب	*Pada Karbi*	In Krabi

and dark-brown. There are bichromes in dark-brown and yellow-brown, some red-brown paintings highlighted or partially repainted with black, a small number of charcoal drawings, and a few engravings. Superposed figures are rare but the few that do overlap suggest most red-brown paintings are early in the sequence, followed by the dark-brown/yellow-brown bichrome, dark-brown and black paintings, charcoal drawings and engravings. During the 1988 study, 73 figures were recorded in three panels: on the east wall, south wall and in the south-western corner of the cave (Chaimongkon and Pigpien, 1990: 22–35). In 2010, we recorded 80 figures, 75 of which are depictions of watercraft, even though three of the paintings in the small chamber have been lost to erosion and algal growth. Some of the additional figures appear to have been made since 1988, possibly by tourists or bird-nest harvesters, as they do not appear in the FAD report (Chaimongkon and Pigpien, 1990) (Table 2). Most art is concentrated on panel A, to the left of the entrance if one is looking out to sea, where there is also small number of engraved graffiti and the Jawi script (Fig. 6 Table 1).

Panel A (Figs 4 and 6) contains most of the art, possibly both because it has a long flat surface amenable to adornment and because it is located near the cave entrance, which commands an excellent view of the sea. The panel stretches across the east wall of the cave, the paintings facing west and south-west. It is 39.5 m long. Most of the rock art is located 0.2–2 m above the floor, with the highest painting about 3 m above ground level. There are 63 paintings, six drawings and three engravings of ships and boats, as well as three drawn human figures and a horse. Some paintings have recently added engraved features or highlights. Depictions of watercraft show various styles of identifiable features, such as bowsprit, head, hull, rail, porthole, mast, braces, stay, sail, stern, cabin or deckhouse and rudder; a few also have oars and there is one depiction with a paddle wheel. Of the 75 ship graffiti, 39 ships can be classified by type.

Table 2. *Comparison of the numbers of each type of painting at Tham Phrayanaga recording between 1988 and 2010*

Types of painting	Numbers of painting in each panel					
	Recorded in 1988			Recorded in 2010		
	A	B	C	A	B	C
I. Chinese junk	11	1	–	11	1	–
II. European two- or three-masted sailing ship	12	–	1	12	–	–
III. European four-masted sailing ship	1	–	–	1	–	–
IV. European- or American-style paddle stemer ?	1	–	–	1	–	–
V. Indonesian *perahu pangajava*, *paqteripang* or *padewakang*	1	–	–	1	–	–
VI. Indonesian *perahu palari* or *pinisiq*	1	–	–	1	–	–
VII. Indonesian *lambo* ?	7	–	–	7	–	–
VIII. Urak Lawoi *praus* or *plajak*	3	–	–	3	–	–
IX. Moken *kabang* ?	1	–	–	1	–	–
Unidentified ship painting (new painting, unclear painting)	23	1	2	36	–	–
Non-marine image (script, human and animal)	5	–	2	5	–	–
Total	**66**	**2**	**5**	**79**	**1**	**0**

Figure 6. The densest part of the panel A with numerous paintings of watercraft. (Noel Hidalgo Tan)

There are four depictions of large square-rigged ships, two monochrome (Fig. 7) and two bichrome (Fig. 8), in linear outline or as partial silhouettes. Bichrome square-rigged ships appear to have been purposely made this way and did not result from later re-marking. All four have clearly illustrated and decorated bows, hulls and rudders. Three masts for foresails, mainsails and aftermost sails are usually depicted, supported with braces and sheets. Three (Figs 7 and 8) have distinctive curved bows, sterns and layered rectangular sail structures. Other ships with single square sails were also noted (Fig. 9).

Five ships with square and triangle-rigged sails are depicted in monochrome as linear outlines or silhouette figures. The bow and hull of this type of ship differs from the first type because they are undecorated and usually show a bowsprit with one or two triangular jib sails. These ships typically have portholes, and two to four masts that are rarely connected at the top and are supported by many braces and sheets for fore staysails, mainsails and mizzen staysails. The stern of some also have higher quarterdecks or cabins and rudders (for example Figs 10, 11 and 12).

There is only one depiction of a paddle-wheeled ship, monochrome and shown as a silhouette, located on the far left of panel A, deep in the cave, in a dark area. The paddle wheel consists of a crossed-circle design in the middle of the ship, and there are a silhouette human-like stick figures, a funnel, and two similar crossed-circles on the upper deck. Handrails are found toward the bow of this ship while the stern contains a silhouette square shape (Fig. 13).

There are 24 monochrome triangle-rigged ships, in either linear outline or as silhouettes, and three shown as bichrome silhouettes. One of the latter has a human figure standing on the rear of the deck. All three of the bichrome ships appear to have been originally red-brown with black added later, and two subsequently were highlighted with engraved lines. The bow of the triangle-rigged ships has a bowsprit that uses only one triangular foresail, which, in some figures, is connected with braces. Along the sides of some of these ships

Figure 7. The largest painting, a monochrome Chinese or Thai junk (A-18), measures 1.6 m wide by 1.25 m high. (Paul S. C. Taçon)

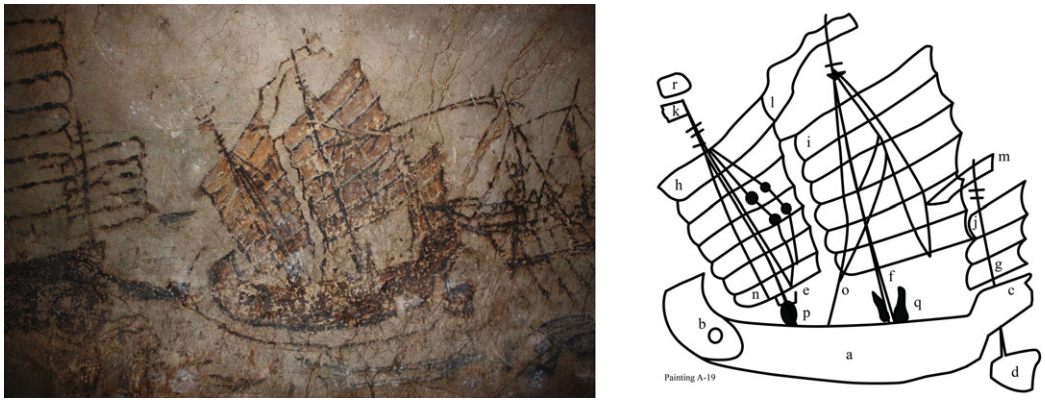

Figure 8. One of two bichrome Chinese or Thai junks at Tham Phrayanaga (A-19), 1.05 m wide by 0.70 m high. a. curved sheer, b. eye-like design on the head of the hull, c. high stern, d. stern rudder, e. foremast, f. mainmast, g. aftermost mast, h. square batten sail, i. square batten sail, j. square batten sail, k. flag, l. flag, m. flag?, n. halyard, o. halyard, p. one person, q. two persons, r. unknown (not a part of the ship). (Paul S. C. Taçon and Atthasit Sukkham)

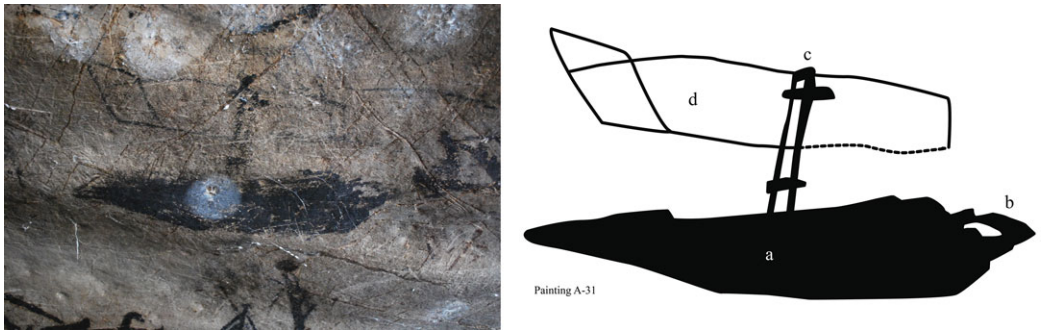

Figure 9. A depiction of an early 20th-century Makassarese *perahu* (traditional wooden sailing ship) (A-31), measures 0.80 m wide by 0.20 high. a. rectangular hull, b. stern platform?, c. bi- or tripod mast, d. square-rigged mainsail. (Atthasit Sukkham)

Figure 10. A possible depiction of a European three-masted ship (A-25), measures 1.02 m wide by 0.74 m high. a. rectangular hull, b. bowsprit, c. dolphin striker, d. dolphin striker, e. rowing deck, f. quarterdeck porthole, g. quarterdeck, h. stern rudder, i. foremast, j. mainmast, k. mizzenmast, l. triangle-rigged staysail, m. square-rigged fore staysail, n. square-rigged mainsail, o. square-rigged mizzen staysail, p. forestay and backstay, q. forestay and backstay, r. forestay and backstay. (Paul S. C. Taçon and Atthasit Sukkham)

Figure 11. A possible depiction of a 20th-century European four-masted ship (A-23), measures 1.0 m wide by 0.40 m high. a. rectangular hull, b. bowsprit, c. deckhouse?, d. stern rudder, e. rails?, f. foremast, g. mainmast, h. mizzenmast, i. jiggermast, j. triangle-rigged flying jib sail, k. triangle-rigged inner jib sail, l. square-rigged fore staysail, m. square-rigged mainsail, n. square-rigged mizzen staysail, o. spanker gaff sail, p. backstay, q. stays, r. stays. (Atthasit Sukkham)

Figure 12. A painting of an early 20th-century Indonesian *perahu palari* or *pinisiq* (cargo sailing ship) (A-24), measures 1.30 m wide by 0.70 m high. a. rectangular hull, b. bowsprit, c. anchor cable? or dolphin striker?, d. stern rudder, e. foremast, f. mainmast, g. boom, h. foremast gaff, i. mainmast gaff, j. halyards, k. halyards, l. triangle-rigged jib sail, m. triangle-rigged forestay sail, n. square-rigged foresail, o. square-rigged mainsail, p. ladder, q. two flags, r. one flag. (Paul S. C. Taçon and Atthasit Sukkham)

are depictions of square holes that look like rails or portholes; depictions of cabins and rudders are rare (Fig. 14).

Three rigged-and-oared ships and one oared watercraft are depicted in monochrome linear outline. Braces support the masts, but not every mast has a sail and they lack bowsprits. Further differentiating them from the types described above are the oars. One oared ship has three human figures standing on the deck with raised arms bent at the elbows, together with

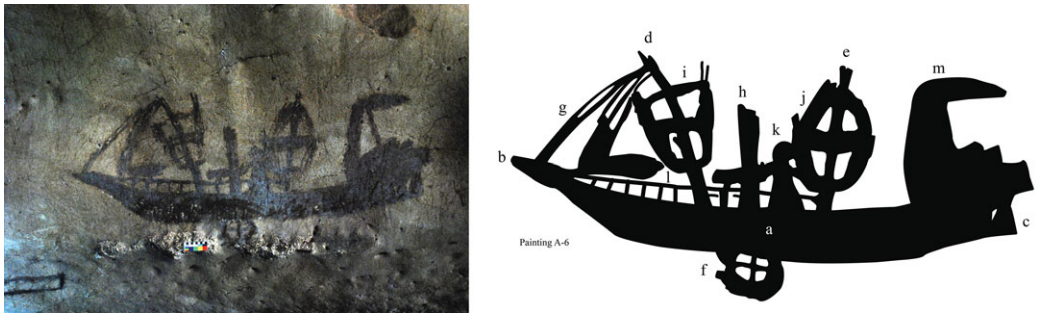

Figure 13. Possible two-masted paddle-wheeled ship (A-6), measures 1.54 m wide by 0.54 m high. a. rectangular hull, b. bow, c. stern rudder, d. foremast, e. mainmast, f. paddle wheel, g. forestays, h. funnel, i. square-rigged foresail, j. square-rigged mainsail, k. one person, l. rail, m. wheelhouse?. (Atthasit Sukkham)

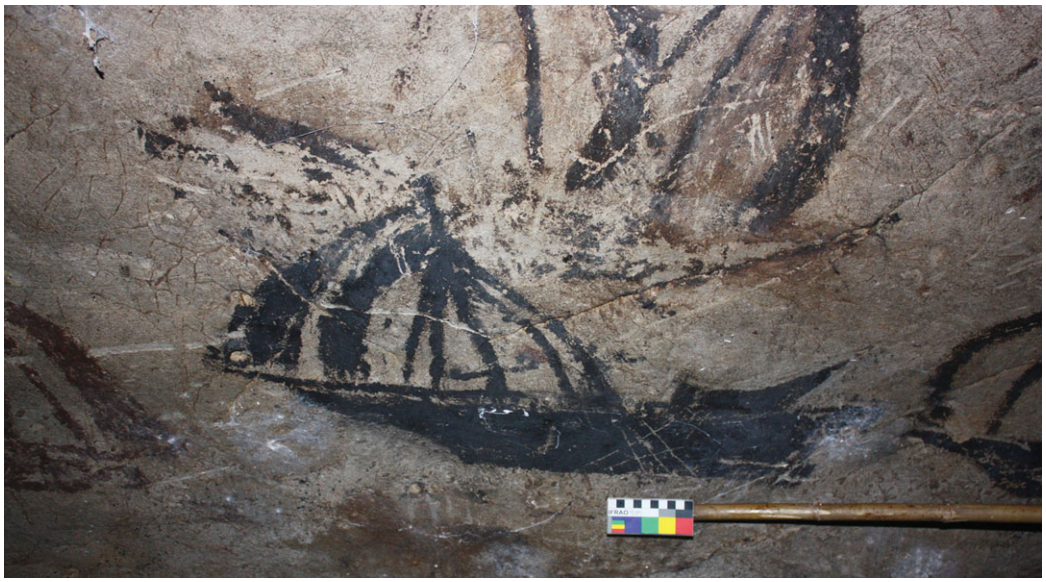

Figure 14. A depiction of a possible 20th-century Indonesian *lambo* (trading ship), (A-28) measures 0.72 m wide by 0.40 m high. (Paul S. C. Taçon)

a rectangular flag at the stern. Another has human figures shown both on deck and in the hull, along with other aspects of the ship's interior (Figs 15–16). The oared watercraft is simple, with no masts, bowsprits and sails but oars clearly shown. A straight line drawn on the bow probably depicts a handrail, and the stern appears to have a cabin.

The unidentified ships are less detailed, irregular, or damaged, making classification difficult. All are monochrome, in outline or silhouette, and many are small, without sails or oars.

The surviving non-marine images, located near the Jawi script on the ceiling next to the cave entrance, consist of drawings, three black human-like stick figures and an outline horse with a head in silhouette. Two of the human figures appear to be interacting and each has a hand on one of its hips. One figure carries a long weapon-like object directed toward the other. The third figure is depicted facing, and as if running toward the horse. It holds something resembling a lasso while the horse is shown as if galloping away.

A second panel (Fig. 4, panel B), containing two paintings of ships, is located on the south wall of the cave. The first ship is a monochrome light-red-brown silhouette. It has two masts, two square-rigged mainsails and a bowsprit with one triangle-rigged jib sail. The stern includes a square silhouette that probably depicts the cabin. The second ship is similar but smaller and is without sails.

A third panel in the southern part of the cave was recorded in 1988 (Fig. 4, panel C). It includes three ships and two elephants, one with a *mahout* seated on its neck. Unfortunately, the elephants and one of the ships have since been destroyed by algal growth, which also obscures the two remaining ships, a triangle-rigged watercraft and one that lacks rigging.

Ship typology and historical background

The depictions of watercraft can be classified by their shape, fittings and rigging. As mentioned above, 39 ship paintings from three panels can be classified into

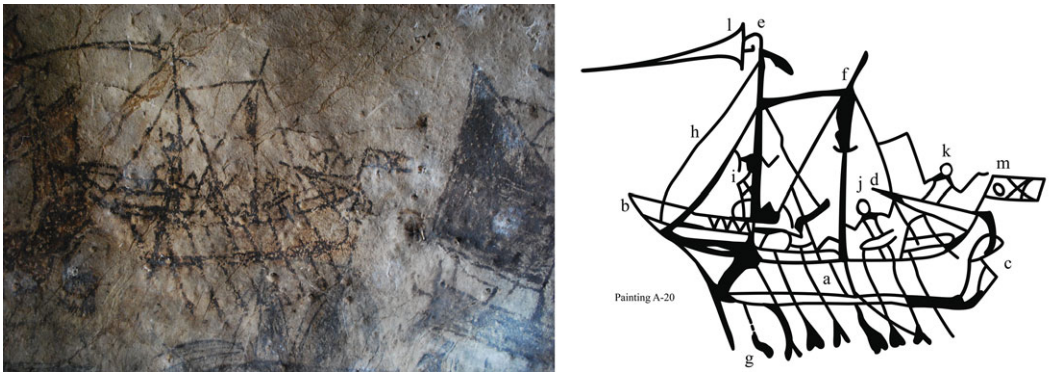

Figure 15. A depiction of a possible Urak Lawoi *praus* or *plajak* (A-20), measures 0.85 m wide by 0.50 m high. a. rectangular hull, b. sharp bow, c. narrow stern, d. steering oar?, e. foremast, f. mainmast, g. nine oars, h. forestays, i. one person, j. one person, k. one person, l. flag?, m. flag. (Atthasit Sukkham)

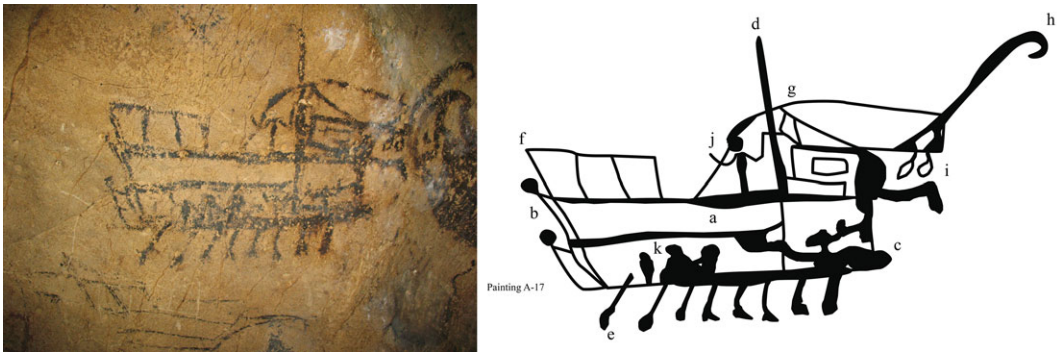

Figure 16. Oared ship with human figures showed inside the hull as possible a Moken *kabang* (A-7), measures 0.72 m wide by 0.46 m high. a. rectangular hull, b. sharply tapering bulb?, c. stern rudder?, d. mainmast, e. eight oars, f. rail?, g. awning, h. fishhook?, i. hanging, stuff?, j. one person, k. three persons. (Paul S.C. Taçon and Atthasit Sukkham)

seven types: square-rigged, square and triangle-rigged, triangle-rigged, rigged and rowed, rowed, paddle-wheeled, and rectangular sail on tripod mast. These can also be compared with ship types developed by various nations and used in the region over a long period of history as follows:

Ship type I: Chinese or Thai junk

The depictions of square-rigged ships in panels A and B can be classified as Chinese or Thai junks as they feature curved sheers, egg-shaped eye-like designs on the bow, high sterns, stern rudders, two or three masts all with square battened sails, and flags. Some crew were also depicted (Figs 7–8). Traditional Chinese junks usually had square battened sails, in which about one-third of the sail area is set forward of the mast. They had three sails, with the foremast rigged forward. They are distinguished by their flaring bow and tall, curved stern (Donnelly and Powell, 2008: 1–22; Lavery, 2010: 64–65; Kimura, 2016: 44–102).

The square-rigged ships mentioned above are decorated with an eye-like design, or *oculus*, on the bow. This is characteristic of Chinese junks that first appeared in the Ming (1368–1644) and Qing (1644–1911) Dynasties, as illustrated in a Ming woodblock print in *Tianfei Jing* around 1420 (Blomfield and Tam, 2005: 6–7). Painted circular eye-like designs with a very small black iris are generally attributed to the Chinese superstition that they helped the ship see where it was going. The egg-shaped designs have been identified on Chinese junks built particularly in Zhejiang, Fujian and Guangdong in South China (Donnelly, 1926: 339; Donnelly and Powell, 2008: 95–130). Underwater excavations and surveys in the South China Sea have revealed many shipwrecks with two different traditions of shipbuilding representing Chinese and South China Sea traditions. Wrecks are often associated with rich Ming, Qing and Southeast Asian cargoes, such as Chinese metal mirrors, Chinese coins, Chinese ceramics, and Southeast Asian ceramics. These ships have been identified as merchant junks that traded around what is now South China and Southeast Asian states from the late 14th to early 19th century. It is unfortunate that the excavations have not as yet found wooden parts of the bow with painted eye-like designs as seen in the cave art (Green *et al.*, 1986: 108–116; Green *et al.*, 1987: 39–48; Intakosi and Charoenwongsa, 1988: 77–120; Brown and Sjostrand, 2001: 50–51; L'Hour, 2001: 32–33; Goddio, *et al.*, 2002: 14–26; Brown, 2009: 171–181; Green, 2011: 345–350).

Figure 17. Mural painting of Chinese or Thai junks with various types of watercraft in a river setting, depicting part of the legend of the Sihing Buddha image being brought from Sri Lanka to be enshrined in Nakhon Si Thammarat, 1851–1868, western wall of the great ordination hall of Bowon Sathan Sutthawat Temple. (Atthasit Sukkham)

In Thailand, only one ancient shipyard, Samed Ngam, has been located on the coast of the Gulf of Thailand, in Chanthaburi Province, eastern Thailand, along with a nearby shipwreck. It was used to prepare vessels in the reign of King Taksin the Great (1767–1782) of Thonburi kingdom to battle against the Burmese army in Ayutthaya. Research at this site support the contention that Chinese-style junks were built in Thailand but, again, the wooden parts of the bow that might have a painted eye-like design were not found on this site (Prishanchit, 1990).

The only evidence of Chinese-style junk with an egg-shaped eye-like design in Thailand comes from murals in the ordination halls of Buddhist temples in central and southern Thailand dated to around the 19th century. In Bangkok, the capital during the Rattanakosin period (1782–present), murals were painted in multiple colours and gold on the walls of the ordination hall of Bowon Sathan Sutthawat Temple, or the well-known Wat Phra Kaew Wang Na, which used to be the royal temple beside the grand palace especially in the reign of King Mongkut (Rama IV; 1851–1868) of the Chakri Dynasty (Fig. 17). Other temples in Bangkok with similar painted murals include the ordination hall of Rakhang and Kasattrathirat Temples, for instance. In southern Thailand, murals with painted Chinese-style junks with egg-shaped eye-like design also appear in the ordination hall of the Viharnberg Temple in Phatthalung Province and the Matchimawat Temple in Songkhla Province. Based on stylistic analysis, all of these murals may have been painted by the same group of artists. The depictions of Chinese-style junks with crew, various types of watercraft in the sea or river, local and European people, Thai-style goddesses and angels, various Thai-style buildings and forest are all similar. Most of the temples cited were built in the same period from the reign of King Mongkut onwards. These are argued to represent the best of cultural and social conditions around Thailand at the time (Chinprasert, 1983: 12–59; Rojnanont, 2010: 6–50; Inkam, 2014: 11–25).

From the 19th century, Chinese junks were developed in a number of very different ways around the East China Sea and South China Sea. For instance, the 'sampan' was made and used for river and coastal cruising in China, Indonesia, Malaysia and Vietnam where it continues to be used today, while the 'Portuguese lorcha' was a junk with a Western-style

hull and Chinese sails first built in Macao (Gibson-Hill, 1949: 108–109; Worcester, 1971: 365; Donnelly and Powell, 2008: 63–68; Lavery, 2010: 66).

Types II and III: European sailing ships

The depictions of square and triangle-rigged ships are similar to at least two types of European sailing ship. The first is European two- or three-masted ships of the 15th to 18th century, with paintings of this type found in panels A and C. The depictions have a rectangular hull, bowsprit, dolphin striker, rowing deck, portholes or gun-ports, stern rudder, two or three masts, jib sails, fore staysail, mainsail and mizzen staysail (Fig. 10). Although they are similar to European ships of the 15th to 19th they cannot be identified as any particular vessel. However, a dolphin striker, also known as martingale boom, martingale, or striker, illustrated on the bow of these paintings support the theory that are 19th-century European ships, as the dolphin strikers first appeared on English ships in the 1810s and has had widespread use since (Lees, 1984: 32).

European contact with Southeast Asia began with the Portuguese in the early 1510s, followed soon after by the Dutch and then the French in the mid 1600s. The English were the last to establish relations across the region, especially with Ayutthaya and the Indonesian archipelago (Tarling *et al.*, 1999b: 9–17; Gernier, 2004: 67–134). According to historical records, paintings and shipwrecks related to the maritime history of this period, several types of European sailing ship were built by various European nations during the age of European expansion and colonization of the 16th to 17th century, such as the Portuguese carrack, Spanish naos, Spanish galleon, English warships and English merchant ships, for example (Lavery, 2010: 80–81).

European voyages in sailing ships to Southeast Asia are documented in several versions of maps, chronicles and accounts, which depict many places of contact and trade, as well as the sailing ships they used (Fig. 2). European trade stations were established in many important trade centres around Southeast Asia to improve diplomatic and trade relations, and especially to collect spices—Southeast Asian pepper, cloves, nutmeg, and mace—tin, and forest supplies. The major ports usually recorded on maps, and in chronicles and accounts of European trading companies, especially in Batavia (now Jakarta), Banda Islands, and the Maluku Islands in the Indonesian archipelago, Melaka (now Malacca) in Malaysia, and Thalang or Joncelang (now Phuket), Pattani, Songkhla, Phatthalung, Nakhon Si Thammarat or Ligor, and Ayutthaya in Thailand (Promboon, 1982: 85–143; Rungruchi *et al.*, 1999a: 25–78; 1999b: 56–78; 1999c: 40–109; Suárez, 1999: 200–231; Tarling *et al.*, 1999b: 132–139; Hussin, 2007: 1–34) (Figs 1 and 2).

The second type of European sailing ship is a four-masted ship of the 19th to 20th century, which is seen in only one painting of panel A. The depiction of the four-masted ship includes a rectangular hull, bowsprit, stern rudder, four masts, square-rigged sails on all masts, or barque-rigged, with fore-and-aft sails on the aftermost mast, known as the jigger. The deckhouse and rails on the deck also were also depicted (Fig. 11).

One way of increasing the sail area of a ship without necessarily using larger sails, which were difficult for a small crew to handle, was to add more masts. Four-masted ships became common in the last two decades of the 19th century to carry passengers or cargo in fast ocean-going sailing vessels. They were mostly built in English yards and spread around other Western European countries in the following decade, especially in Scotland and Germany (Lavery, 2010: 244–245) (Fig. 18).

During the late 19th to early 20th century, many four-masted barque and barquentine ships, among other types of sailing ships, were launched for shipping the large quantities of timber, ceramics, grain or other products between Europe, North America, South America, Australia and especially South Asia and Southeast Asia via the Atlantic Ocean, the South Pacific Ocean and the Indian Ocean (Anon., 1897: 6; Apollonio, 2000: 42–64; Stark, 2003: 120–153; Kelly, 2006: 70–71; Fowler *et al.*, 2007: 15–62; Anon., 2013). Unfortunately, no historical records about the European four-masted ships appear in Southeast Asia specifically, but it is likely that they visited ports in this region given the volume of trade in a wide range of products at the time (Kelly, 2006: 70–71; Anon., 2016).

Type IV: paddle steamer

In the 19th century, European- or American-style two-masted paddle steamers, similar to one depicted at Tham Phrayanaga in panel A, were introduced to southern Thailand and some parts of Southeast Asia. These were documented in royal photographs from the reign of King Chulalongkorn (Rama V; 1868–1910) of the Chakri Dynasty, newspapers, such as the *Illustrated London News*, and even personal travel diaries and company accounts (Kirby, 1865: 561–562; Wallace, 1908: 171–174; Marchant, 1916: 45–47; Lim, 2009: 97–100; Win and Leng, 2009: 70–73). The depiction of a two-masted paddle steamer in panel A shows the bow of the ship, stern rudder, and a paddle wheel depicted lower than the hull, funnel and rail. However, there are two features drawn as crossed-circles with straight lines on the upper deck. These are features are not easily identified, but may represent two masts with square-rigged sails with the artist perhaps unfamiliar with the schematics of this new type of ship (Fig. 13).

In the early period of its development in Europe and America, around the late 18th to early 19th century, steam power was used in two contexts: in sheltered rivers, estuaries, lakes, and coastal voyages and in the open sea as an auxiliary to sail. Based on the evidence in Southeast Asia in the mid 19th century, paddle steamers had masts and sails and were used in ocean-going voyages across the region. The use of steam power meant that sailing ships did not have to be

Figure 18. The German four-masted barque *Petschili* in the English Channel. The *Petschili* was built in Hamburg in 1903 and beached in 1919 in Valparaiso, Chile and was a sister ship of the *Pamir* and *Passat*. (Image H99.220/4096, State Library Victoria. Image H99.220/4096. http://handle.slv.vic.gov.au/10381/15237)

kept short to allow them to make short tacks into harbour in unfavourable winds. Ships could be moved forward by steam power across the open sea until they entered an area with favourable winds where they would switch to using sail thus saving fuel (Lavery, 2010: 170–177).

According to Alfred Russel Wallace's travel diary (Wallace, 1854; Marchant, 1916), John Lawrence Kirby's article (1865), and the accounts of a Chinese steamship company in Rangoon (now Yangon) named Seang Line of Steamer (Win and Leng, 2009: 70–73), two-masted paddle steamers spread rapidly around South Asia and Southeast Asia in the mid 19th century. They were owned by some native royalties and were commercially used as passenger or cargo ships (Fig. 19). Wallace stated that 'I landed at Singapore on the 20th of April (1854), after a 46 days' passage from England without any incident out of the common' (Wallace, 1854: 4395). He travelled on the P & O paddle steamer *Euxine*. From Suez he took the *Bengal* as far as Ceylon (now Sri Lanka) before transferring to a smaller paddle steamer, *Pottinger*. This supports the argument that paddle steamers passed Tham Phrayanaga on the way to Singapore and other ports in Southeast Asia (Kirby, 1865; Wallace, 1908: 171–174; Marchant, 1916: 45–47; Win and Leng, 2009: 70–82).

Types V–VII: Indonesian sailing ships

Some Tham Phrayanaga paintings resemble wooden multi-sailed Indonesian *perahu* (*prau*, *prahu*, *proa*, *prow*, or *parao*) with planked hulls and square or gaff-rigged sails, used from around the 17th century to this day for fishing and transport. The gaff sail became more common from around the mid 18th century, first in Europe.

This group can be divided into three types. They include 17th to early 20th century Indonesian *perahu pangajava*, *perahu paqteripang* or *perahu padewakang* (sailing ships with bi- or tripod masts and generally square sails, although some also have a jib sail) (Fig. 9), an Indonesian *perahu palari* or *perahu pinisiq*—a specific type of sailing ship partly modelled on European wooden hull with gaff sails (Fig. 12) (see for example Dick, 1975a; 1975b; MacKnight, 1980: 117–121; Horridge, 1986; Salam and Katsuya, 2008: 214–215), and a possible Indonesian *lambo* (cargo ship) with *kapal layer mesin* or *motor* (motor sailor with wooden or iron hull known as a KLM; Fig. 14) (Dick, 1975b: 94–95; MacKnight, 1980: 125; Salam and Katsuya, 2008: 216).

The best-known *perahu* of the archipelago during the 18th–20th centuries are those of South and Southeast Sulawesi. These not only sailed to virtually all parts of the region, but, with the outward spread of Buginese, Makassarese, Butungese and other ethnic groups, variations are now built and based far from Sulawesi. The archetypal *perahu* built by members of the Makassar ethnic group have curving sternposts on a rather broad hull. The mast consists of a tripod, which can easily be lowered by releasing the front leg so that the other two legs can pivot on pins between the bitts that provide the main footing. The

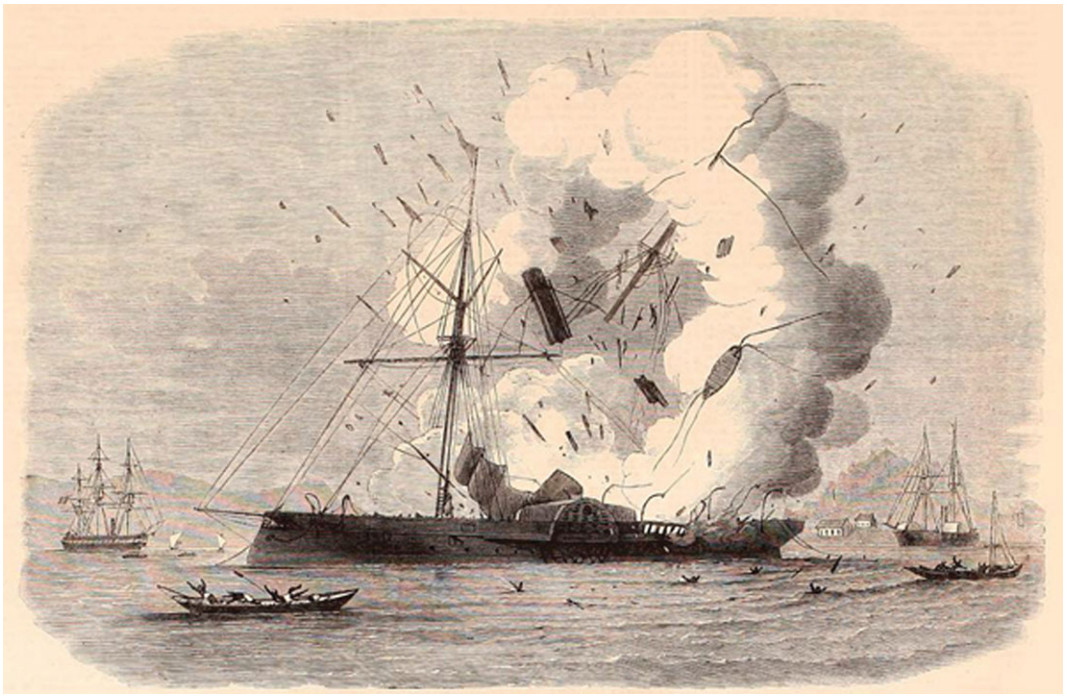

Figure 19. 'Blowing-Up of the Johore, Iron Paddle-Steamer, Off Singapore' from the correspondent at Singapore, Mr John Lawrence Kirby, *Illustrated London News* June 10, 1865.

Figure 20. *Hati Marege*, meaning 'Heart of Arnhem Land', Makassan *perahu padewakang* built traditionally by the *Kanjo* boatbuilders of Tana Baru on the south-eastern part of Sulawesi, Indonesia for the Australian Bicentennial celebrations in 1988, and was sailed to Darwin, Australia, now on permanent display at the Museum and Art Gallery of the Northern Territory. (Reproduced by permission of the Museum and Art Gallery of the Northern Territory)

sail is rectangular and slung at an angle (MacKnight, 1980: 123–124) (Fig. 20). Based on the study of the development of this shipbuilding tradition, this *perahu* with one or two bi- or tripod masts and square sails, some with an additional jib sail, were transitional from *perahu pangajava* (used for overseas trade), *perahu paqteripang* (used for distant fishing) to *perahu padewakang* (used for overseas trade) and were developed especially in Makassar from the 17th to early 20th century (Salam and Katsuya, 2008: 215–216).

Makassarese contact between Southeast Asia and Australia occurred from at least the mid 18th century until 1906, as the Australia's Immigration Restriction Act of 1901 was effective (Taçon *et al.*, 2010: 8; Clark and May, 2013: 47–48), with Makassareses (or Makassans as most of Australian researchers call them) making seasonal visits to northern Australia

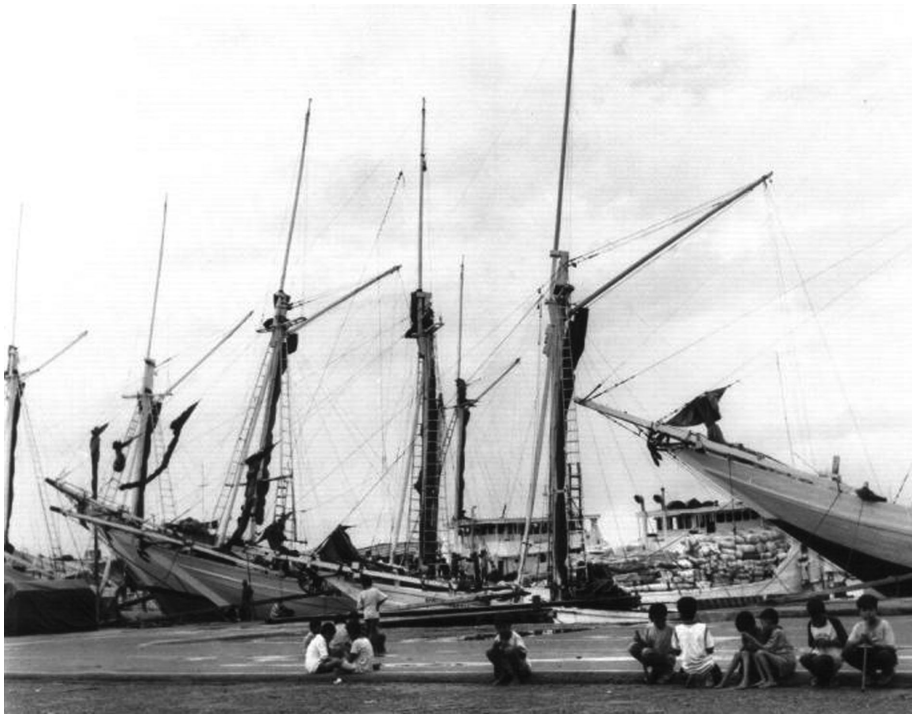

Figure 21. Modern *perahu pinisiq* in the port of Paotere in Makassar, South Sulawesi, Indonesia, taken in 1994. (Obrowski, M., photo taken in 6×6 BW format in 1994 by Marc Obrowski. https://en.wikipedia.org/wiki/Pinisi#/media/File:Taopere.jpg)

to harvest trepang (sea cucumber, *Holothuroidea*) and to trade with Aboriginal groups for goods such as turtle shell, ironwood, pearls and pearl shell. In return, they provided Aboriginal people with food, tobacco, alcohol, cloth, axes and knives. These visits also provided artists with new subjects to paint, with *perahu* a particularly popular topic at north Australian rock-art sites. For instance, detailed paintings of *perahu* at sites such as Djulirri in north-west Arnhem Land show an intimate familiarity with Makassarese fleets (May *et al.*, 2010: 61). At many northern Australian sites, key features are shown, such as a characteristic tripod mast, deck structures, and a flat bottom, which suggests they are *perahu padewakang* (Burningham, 1987: 103; 1994: 140; Clark and May, 2013: 134). This practice in Australia is similar to that seen in Tham Phrayanaga and suggests Makassarese *perahu* possibly headed north to the Andaman Sea as well.

The basic *perahu* design is clearly discernible, but some have elaborate superstructures, more than one mast, oars and a variety of sails. The shipbuilders were beginning to adapt some features, inspired by European vessels, but the process had not yet gone very far. The best example is the use of jib sails. Illustrations from before 1830 never show jibs or even a bowsprit. By about 1840 a bowsprit and sometimes one jib can be seen. Around the turn of the century, a fore-and-aft rig completely replaced rectangular sails except on small boats. A change seen in 1860 or so is a deck that runs in one unbroken curve from stern to bow, rather than the older step down just forward of the main mast. This development is probably associated with a new need to carry timber cargo on the deck of the large *perahu*, which today is called *perahu palari* or *perahu pinisiq* (or *pinisi* or *pinis*) in Indonesian (MacKnight, 1980: 123–124; Obrowski, 1994; Salam and Katsuya, 2008: 215–217) (Fig. 21). The hull of the trading *palari* was enlarged by adding to the height of the sides with additional planking and adopting a European fore-and-aft rig. The main deck is much higher than the stern of the ship. The *pinisiq* is bigger than the *palari.* The problem of the aft construction is solved by extending the additional side planks until the stem, thus eliminating the splashboard. In the 1970s, the *pinisiq* was only built and sailed by Bugineses and Makassareses from South Sulawesi to serve the domestic timber trade. The *pinisiq* shipping routes depended on the will of the traders who hired them. Regular shipping routes included Banjarmasin (Borneo) to Jakarta (West Java), or from Banjarmasin to Surabaya (East Java), for instance (Dick, 1975b: 82–91; Salam and Katsuya, 2008: 216).

It was believed that *perahu palari* also sailed to Singapore and southern Malaysia, as scholars identified them as within the *palari* shipbuilding tradition of Celebes and Flores Seas near Sulawesi, Indonesia. Around the 1940s, the *palari* that appeared in Singapore and southern Malaysia were termed 'Makassar traders' as they were sailed by Makassareses for seasonal trades. Moreover, other types of Indonesian boats were also

seen in this region, especially boats from Madura (East Java) and Bonerate (Flores Sea), for example. The two-masted *palari* steered with two paddles that reached Singapore and Malaysia appear to have been roughly similar to each other. It is actually a small boat, but the lavish sail plan, long bowsprit and overhanging stern exaggerate its size considerably. The boats are mostly 16–22 m overall, with a waterline length lightly laden of 10–13 m. With the north-east monsoon behind them, the reckon to run from Makassar to Singapore, a distance of about 1042 nautical miles, in eight or nine days with a complement of seven or eight crew members, including the master (Gibson-Hill, 1950: 113). Around June, they sailed west, making for Makassar or one of the Javanese ports. After that they made one or two shorter voyages, running up the east side of Borneo, on to Singapore, or beating east part of the way along the Lesser Sunda Islands. Then, generally sometime in November, they turned back for southern Celebes Island to return home with the beginning of the south-west monsoon (Gibson-Hill, 1950: 111–112; Anon., 2006).

Other transformations of *perahu* began in the 20th century when the *lambo* (or *lumbo, lambok*) cargo ship gradually replaced the vanishing *perahu palari* and *pinisiq* in Sulawesi. The stagnant economic situation meant merchants were only able to afford to build *lambo* with its smaller size compared to *perahu pinisiq*. *Lambo* were built at many points on the islands of Java and Borneo eastwards to Bonerate, and probably as far as Timor (Gibson-Hill, 1950: 113; Horridge, 1979; MacKnight, 1980: 124). The *lambo* has a long and slender hull with a straight stern, one mast, and a triangular mainsail and jib, similar to one of the vessels depicted at Tham Phrayanaga in panel A. Since 1970, the *lambo* has been built with an imposing stern structure for the rudder and the propeller of an auxiliary motor. This type of vessel can be identified as *kapal layer mesin* or *motor* (KLM) in Indonesian. Some *lambo* had a deckhouse-like structure placed on the stern to use for steering or accommodation, as seen in the ship paintings at Tham Phrayanaga. From around 1990 the *lambo* was used in the domestic timber trade between the islands of Java, Lombok, Sabutung, Kulambing and Laiya until the present (Horridge, 1979; MacKnight, 1980: 124–125; Salam and Katsuya, 2008: 220). Additionally, the Dutch East Indies government introduced motors to use in *perahu* in the 1940s. They defined an auxiliary *perahu* (*perahu layar motor*; PLM) as a motor vessel of less than 100 cubic metres and 35 horsepower. Larger vessels of up to 500 cubic metres were defined as motor ships (*kapal layar motor*; KLM). Both KLM and PLM were further developed between the 1980s and the 1990s and are still used (Dick, 1975b: 94–95; Salam and Katsuya, 2008: 215).

In Singapore and southern Malaysia, the *perahu palari* were also replaced by *lambo,* as in their homeland, as *lambo* can be managed with a smaller crew and can make a better course. In 1947, a number of the ship's masters reaching Singapore said that they would not get rid of their *palari*, but that if they did have to a new boat they would buy a *lambo* as the famous *lambo* shipbuilding villages were located on the island of Bonerate, and because *perahu palari* were unwieldy with the concomitant difficulty of making passage to windward (Gibson-Hill, 1950: 113). The double-masted *lambo* seen in Singapore and Malaysia was ketch-rigged and developed from both European- and the traditional *perahu*-style. It usually set a single headsail. They range *c.*13–16 m along the waterline, have a sail area of *c.*185 m^2 and carry more than 42 tonnes (or around 17 cubic metres) of cargo. The total complement was just six or seven men, which was the same number as a *palari* carrying only 30 tonnes (or around 13 cubic metres) (Gibson-Hill, 1950: 112–113).

Types VIII and IX: Chaole boats

The rigged-and-oared boats are similar to those used by the Chaole or local Sea People. These include miniature models called *plajak*, used by the Urak Lawoi people in ritual offerings to the sea. They also resemble Urak Lawoi *praus* and Moken *kabang* (Figs 15–16), vessels used in living and fishing. Both the Urak Lawoi and Moken people moved around the South Andaman Sea in the past, but today they are permanently settled on islands in the South Andaman Sea, near to Tham Phrayanaga (Wongbusarakum, 2007: 8, 10, 41–42; Arunothai *et al.*, 2014: 35–44).

Urak Lawoi *plajak* are models used in the *plajak* festival, one of the ceremonies focused on ridding the community of bad luck that was performed when many people fell ill. The festival is believed to have originated on Lanta Island off the coast of Krabi Province, although this is not certain. The festival takes place twice per year for three days and nights, on the full moon of the fifth and eleventh lunar months. The Urak Lawoi pray to their ancestors and symbolically float away misfortune on a miniature ceremonial boat or *plajak* constructed for this purpose, made of the soft wood of the zalacca palm (*Salacca wallichiana*) and blackboard tree (*Alstonia scholaris*) (Fig. 22). It is believed that the boat will float back to their ancestral home at Gunung Jerai, a mountain in the present-day area of Kedah, Malaysia.

The Urak Lawoi and Moken traditional boats are similar from a shipbuilding point of view and characterized as a rigged-and-oared boat with a plank-extended logboat hull, two oars or more, one steering oar and a mainmast with a rectangular mainsail made of pandanus leaf or unbleached textile. Boats of both groups were used for living, refuge and fishing; however, the Urak Lawoi and Moken boats have different names, as Urak Lawoi called theirs *praus*, while the Moken called theirs *kabang* (Fig. 23). The Urak Lawoi method of building *praus* has disappeared, today they use the modern long-tail boats for fishing and build their houses on the beach in permanent settlements. The tradition of Moken *kabang* shipbuilding continues,

Figure 22. The precession of Urak Lawoi *plajak* (boat floating) festival in Phuket Province. (Reproduced by permission of Princess Maha Chakri Sirindhorn Anthropology Centre)

however, with some still living at sea while others have settled on the beach as well (Wongbusarakum, 2007: 49; Arunothai *et al.*, 2014: 41).

Results

Based on these interpretations, the types of ship painting and the numbers of each type including non-marine images and unidentified ship paintings recorded in 1988 (Chaimongkon and Pigpien, 1990: 22–35) and 2009–2010 are summarized in Table 2.

Who made the paintings?

A key question for the Tham Phrayanaga paintings is their authorship. Following Blake (1996) and a new review of historic and ethnographic literature, we suggest the most likely possibility is the Chaole or local Sea People, overseas seafarers, or overseas traders.

The Chaole people can be divided into three ethnic groups, the Urak Lawoi, Moken and Moklen, and they now live on small Andaman Sea islands along the west coast of Thailand, especially in Phuket Bay, Phang-nga Bay and Krabi Bay, and the adjacent Surin, Similan and Adang-Rawi Archipelagos (Wongbusarakum, 2007: 8–10; Arunothai *et al.*, 2014: 35). They speak a Malay dialect but there are various theories as to their origins. The Urak Lawoi and Moken appear to have been the first of the three groups to travel to and inhabit the islands in the South Andaman Sea where Tham Phrayanaga is located (Wongbusarakum, 2007: 10; Arunothai *et al.*, 2014: 35), and 'the Urak Lawoi could have been the first people living on the Lanta Yai Island (around 17 nautical miles to Phi Phi Islands) and their history there would date back more than 500 years' (Wongbusarakum, 2007: 9). Traditionally, each family lived permanently at sea in a boat complete with cabin, sleeping areas and cooking facilities.

Sarikabutara (1987) studied the rock art of several sites in southern Thailand in relation to Chaole traditional beliefs. She argues:

> 'that the beliefs of the Chaole and those of the Sea People as a whole are consistent with the cave paintings. Taking the motifs depicted on these paintings, we find similar symbols of birds, fishes, men with birds or with bird-feathers, and boats that are in accord with beliefs expressed by the Chaole' (1987: 152).

She did not include Tham Phrayanaga in her study, but for the sites studied contends 'the paintings are probably the products of the Sea People, or the ancient Chaole' but notes 'there is no evidence of a painting tradition among the Chaole' (Sarikabutara, 1987: 152). By this she means painting on other media, but perhaps the rock art itself is the Chaole painting tradition. Certainly there is ample evidence the Chaole were capable of figurative carving and that they made model boats (Sarikabutara, 1987: 151–152; Wongbusarakum, 2007: 43–47). Land-based indigenous groups, known to have produced rock art, such as the Semang of northern Malaysia, did not have the boatbuilding capacity to take them to Tham Phrayanaga, whereas the Chaole did. The Chaole used oared sailing ships (Wongbusarakum, 2007: 22; Arunothai *et al.*, 2014: 44) (Fig. 23) as well as *praus* in the 1890s (Warington Smyth, 1999: 312), virtually identical to some of the depictions in the cave, that appear to be especially detailed Moken *kabang* and Urak Lawoi *praus* or *plajak* paintings (Figs 15–16).

Elsewhere, early encounters with Europeans produced changes in the type of art produced by many

Figure 23. Three types of modern Chaole boat; Moken *kabang,* photo taken in Surin Island (top), Moklen *mad,* photo taken in Phang-nga Province (middle), and Urak Lawoi *praus*, photo taken in Lanta Island (below). (Reproduced by permission of Princess Maha Chakri Sirindhorn Anthropology Centre)

indigenous groups. Among the Semang of Lenggong, Perak, Malaysia, for instance, rock art and designs on objects were often non-figurative in traditional times but after contact much figurative rock art was produced, with a focus on the new people, their modes of transport and some of the things they introduced (Mokhtar and Taçon, 2011: 459). The same is true of Aboriginal Australians of central Australia, such as the Arrernte (Taçon *et al.*, 2012: 207–214). The sudden shift from non-figurative to figurative art needs to be investigated in other parts of the world and for previous periods of the past as it may give us insight into reasons for change in rock-art styles in much more ancient times. Perhaps for the Chaole, Tham Phrayanaga was chosen as a purposeful place to document change, with new types of rock-art imagery, rather than adding to traditional rock-art sites elsewhere.

Alternatively, the artists could have been of various backgrounds aboard different sailing vessels that anchored at Tham Phrayanaga to shelter from bad weather. They could also have been overseas or local people who travelled to the cave for other purposes, such as exploration or harvesting nests. If this is the case then the earliest paintings may have inspired subsequent visitors to add their own detailed depictions of Chinese junks (Figs 7–8), European sailing ships (Figs 10–11) and the Jawi script (Fig. 5) to a growing gallery of watercraft and non-watercraft images. As the cave has not been excavated, the nature of occupation of and visitations to Tham Phrayanaga when the rock art was produced cannot be ascertained.

Conclusions

The majority of the rock paintings of Tham Phrayanaga represent at least nine types of watercraft that travelled through the Andaman Sea in this part of the north-eastern Indian Ocean rim in the past few hundred years. There are no Viking ships or other watercraft older than the 15th century depicted, despite suggestions from tourist companies, and most are not European (*contra* Sangwan, 1987: 126). This was a period of accelerated maritime contact and trade between various parts of Thailand, Asia and Europe, fuelled by the lucrative spice trade, diplomacy, evangelism and conquest. Indeed, the main panel of ships (Fig. 6) is reminiscent of an 1861 lithograph of the Singapore Waterfront by artist W. Gray and engraver A. Arnst with ships ranging from 'Bugis *perahu*, Chinese junks and European square-rigged, to steamships' (Frost and Balasingamchow, 2009: 85).

At Tham Phrayanaga there is a more general focus on depicting modes of transport—not just ships and boats but also elephants and a horse. This is similar

to contact-period rock art elsewhere in Southeast Asia (see for example Malaysia, Mokhtar and Taçon, 2011; southern Thailand, Sukkham, 2010; 2011), Australia (Burningham, 1994; Taçon *et al.*, 2012; Wesley *et al.*, 2012) and many other parts of the world. Indigenous people in general appear to have been fascinated by the means by which new people arrived in their lands. Of the three human figures, two are shown with one hand on a hip. At the Semang rock-art sites of Perak, Malaysia and Aboriginal sites of various parts of Australia it was common to depict Europeans with one or both of their hands on their hips (see for example Mokhtar and Taçon, 2011; Taçon *et al.*, 2012). Thus the scene likely shows Europeans with the horse, rather than Thais, Malays or indigenous people of the region.

By comparing the rock paintings of Tham Phrayanaga with depictions and descriptions of ships in historic documents it can be concluded that the art was probably made between the 15th and 20th century, a period of increased trade and contact between various European peoples, Thais, Malays, Chinese and indigenous peoples of the region. This is also the period in which the *Chaole* occupied the islands around Tham Phrayanaga. It is this group therefore that most likely made much of the rock art. Two of the oared ships, typical of the Chaole, at Tham Phrayanaga were painted right next to the two main polychrome paintings of Chinese or Thai junks. Their placement appears purposeful, perhaps to illustrate important stories of close contact. One can also imagine the Chaole using Tham Phrayanaga as a guide for instructing how to identify common watercraft of the region, or as a way of recording changing shipping during a period of increased traffic of culturally diverse watercraft.

Acknowledgements

This article is dedicated to the memory of King Bhumibol Adulyadej (1927–2016), the king of the Chakri Dynasty, Thailand. Research took place in 2009 and 2010 as part of a collaborative *Greater Mekong Sub-region and Malay Peninsula Research Project*, led by Colonel Assist. Prof. Surat Lertlum of the Chulachomklao Royal Military Academy and Assoc. Prof. Stephen Chia from Universiti Sains Malaysia, as well as Griffith University's *Picturing Change* research program led by Prof. Paul S.C. Taçon (ARC Discovery Grant DP0877463). The Thailand Research Fund, the Universiti Sains Malaysia Short Term Grant, the Fine Arts Department of Thailand and Silpakorn University also supported field-survey.

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