

Shallow-draft Boats, Guns, and the Aye-ra-wa-ti

Continuity and Change in Ship Structure and River Warfare in Precolonial Myanma*

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Pierre-Yves Manguin in an insightful article has drawn attention to the sixteenth century disappearance of the Southeast Asian *jong*. This type of vessel, common throughout Southeast Asia, prior to and during the sixteenth century, was designed for overseas (that is, deep-seas) trading.¹ But early modern chronicles and Western accounts indicate the continued existence of large numbers of indigenous-style Myanma vessels, types that I will elaborate upon further below. Why was there a continuity in the use of these types of vessels in light of the disappearance of the Southeast Asian *jong* in the sixteenth century?

On the high seas, sixteenth century (and later) European ships posed an important threat, due to deep-sea vessel structure that emphasized large numbers of cannon, as Carlo Cipolla has described in great detail.² As Cipolla explains:

Exchanging oarsmen for sails and warriors for guns meant essentially the exchange of human energy for inanimate power. By turning wholeheartedly to the gun-carrying sailing ship the Atlantic peoples broke down the bottleneck inherent in the use of human energy and harnessed, to their advantage, far larger quantities of power. It was then that European sails appeared aggressively on the most distant seas.³

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1 Pierre-Yves Manguin, "The Vanishing Jong: Insular Southeast Asian Fleets in Trade and War (Fifteenth to Seventeenth Centuries)," in Anthony Reid (ed.), *Southeast Asia in the Early Modern Era: Trade, Power, and Belief* (Ithaca, New York: Cornell University Press, 1993): 197-213.

2 Carlo Cipolla, *Guns, Sails and Empires: Technological Innovation in the Early Phases of European Expansion 1400-1700* (New York: Pantheon Books, 1965): 122, 138.

3 Carlo Cipolla, *Guns, Sails and Empires*, 81.

But Cipolla only accounts for the impact of European vessels in waters where the galley and other indigenous boats did not continue to have an advantage over deeper-draft boats, such as the Portuguese ships which ravaged the Indian Ocean in the sixteenth century and thereafter. Likewise, Victor Lieberman, in his brief assessment of the Portuguese advantage over indigenous boats,⁴ only comments on the difficulties of introducing cannon into the structures of indigenous oceangoing boats. As Lieberman explains:

The military reputation of the Portuguese rested on the superiority of both their ships and firearms. Lower Burma was itself an important shipbuilding center, but it served the Muslim trading community, and the design of Peguan ocean-going vessels in the early sixteenth century almost certainly followed that of the Muslim mercantile craft in other Indian Ocean ports. These were lightly built ships whose planks were lashed together and which were incapable of supporting heavy armament. By comparison, Portuguese galleons, caravels, and even foists were solid structures, whose planks were nailed together and which normally carried cannon. The only way the Burmese could deal with Portuguese ships was to overwhelm them in harbor with innumerable war canoes and light sailing craft, usually at frightful cost to the attackers, or else to launch firerafts against them from upstream.⁵

Both Lieberman and Cipolla are correct: on the high seas, late fifteenth and sixteenth century Portuguese ships had a distinct advantage over indigenous deep-sea vessels. But I wish to pursue an examination of a different theater of naval activity where the Portuguese ships that dominated much of the Indian Ocean in the sixteenth century were not as effective as indigenous craft: near-coastal waters and major river-systems, such as the Aye-ra-wa-ti (Irrawaddy).⁶ I propose to separate indigenous water-craft into two groups, the deep-sea vessels that both Lieberman and Cipolla have described, where their comments are

4 Admittedly, Lieberman's assessment is incidental to a more focused discussion chiefly of the impact of European firearms on land warfare. It is one of the few commentaries on Myanmar shipping that can be found in recent years, however, as Myanmar, and much of the mainland, with the exception of Thailand, has been ignored in studies of early modern Southeast Asian ships. See, for example, the SPAFA report on Southeast Asian ships that did not once mention Myanmar. *SEAMEO Project in Archaeology and Fine Arts: Final Report, Consultative Workshop on Research on Maritime Shipping and Trade Networks in Southeast Asia*, Cisarua, West Java, Indonesia: November 20–27, 1984.

5 Victor Lieberman, "Europeans, Trade, and the Unification of Burma, c. 1540–1620," *Oriens extremus* 27, no. 2 (1980): 210f.

6 For the romanization of Myanmar proper names, I have followed the conventional system as presented in John Okell, *A Guide to the Romanization of Burmese*, James G. Forlong Fund vol. XXVII (London: The Royal Asiatic Society of Great Britain and Ireland, 1971): 31–45, 66f.

wholly accurate, and shallow-draft boats, used in coastal waters and rivers, which they fail to account for and which will be the focus of this paper.⁷

For river and coastal boats, I have included the following types of Myanmar boats, based on the geographical context in which they operated, as described in the chronicles and elsewhere. First, boat-types that are referred to as *hle* seem to have been used only on rivers and along coasts. The different functions of such river and coastal boats, however, provided for a wide variety of prefixes and suffixes: *rei-hlei* (war boats),⁸ *taik-hlei* (attack boats),⁹ *hkat-hlei*,¹⁰ *hsan-hlei* (up-against-current boats),¹¹ *hle-i-ran* (attending-boats),¹² *reihk-ka-tin-kon-hlei* (supply boats),¹³ *kon-hlei* (trade boats),¹⁴ *hswei-hlei* (draw-boats),¹⁵ *ngin-*

- 7 This oversight is especially surprising as mainland Southeast Asian warfleets seem to have limited the scope of their naval operations to rivers and coastal areas. This was in part due to the need to maintain adequate supplies of fresh water for the numerous crewmen and soldiers on board. As H.G. Quaritch Wales explains in reference to the Chams, for example, "[e]ven though the Chams, unlike other Indochinese peoples, were probably seafarers, they could not venture far from a shore held by friendly forces, because of the need, which restricted the range of all ancient naval warfare, of frequently replenishing fresh water supplies." See H.G. Quaritch-Wales, *Ancient South-East Asian Warfare* (London: Bernard Quaritch, Ltd., 1952): 106.
- 8 U Kula, *Maha-raza-win-kyi*, Saya Pwa, ed., (Yangon: Hanthawaddy Press, 1960): I, 371, 379, 401; II, 12, 44, 47, 49, 81, 112, 438; III, 35, 63; Banya-Dala, "Razadirat Arei-taw-poun," in *Arei-taw-poun (6) Saung Twei-tha Ma-hok Myanma-min-mya Arei-taw-poun* (Reprint, Yangon: Nan-myun-sa-bei, 1970): 280ff., 298, 300f., 303f., 308; Maha-atula-min-kyi, "Nyaung-ran-mintara Arei-taw-poun," in *Areitawpoun (6) Saung Twei-thou Ma-hok Myanma-min-mya Arei-taw-poun*, 416-7; Letwe-nawrahta, "Hanthawati-hsin-hpyu-shin Arei-taw-poun," in *Arei-taw-poun (6) Saung Twei-thou Ma-hok Myanma-min-mya Arei-taw-poun*, 351, 355, 374; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi* (Reprint, Yangon: Hanthawaddy Press, 1968): I, 94, 120, 122, II, 421, 563, 608, III, 2, 8, 10, 230, 572, 609; There appear to have been both large and small varieties, see U Kula, *Maha-raza-win-kyi*, II, 15. Banya-Dala, "Razadirat Arei-taw-poun," 281, 298; see the mythical origins of the name of this boat in *Zei-ya-thin-hka-ya, Shwei-boun-ni-dan* (Yangon: Hanthawaddy Press, 1957): 78.
- 9 U Kula, *Maha-raza-win-kyi*, I, 371; II, 12, 53, 63, 79, 121, 137, 140, 176, 199, 203, 204, 212, 271, 403, 426; III, 10, 24, 35, 193; Maha-atula-min-kyi, "Nyaung-ran-min-tara Arei-taw-poun," 458; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 88, 95, 97, 119, 120, 132, 150, 153, 160, 161, 162, 163, 170, II, 607, III, 9; the larger versions of these attack boats were called *taikhlei-kyi*. See U Kula, *Maha-raza-win-kyi*, II, 140, 292, 426; III, 23, 37, 109, 163.
- 10 This boat probably served a ceremonial function. See the illustration in *Zei-ya-thin-hkaya, Shwei-boun-ni-dan*, 176; references to this boat can be found in U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, II, 469, 563, III, 29, 372, 540, 572, 580, 609, 610.
- 11 U Kula, *Maha-raza-win-kyi*, I, 289.
- 12 U Kula, *Maha-raza-win-kyi*, I, 223; II, 394; III, 10, 255, 389.
- 13 U Kula, *Maha-raza-win-kyi*, II, 15, 49, 65, 81, 121, 137, 140, 203, 212, 268, 271; III, 4, 143; Maha-atula-min-kyi, "Nyaung-ran-min-tara Arei-taw-poun," 439. See the Myanmar attack on Pye forces at Myei-hte in 1607, where Anauk-bet-lun's forces included two hundred such vessels, out of a total of nine hundred ships. That is, providing for a 1:4.5 ratio in comparison to other ships in the expedition. See U Kula, *Maha-raza-win-kyi*, III, 143.
- 14 U Kula, *Maha-raza-win-kyi*, II, 12; III, 245.

hlei (again, draw boats),¹⁶ *than-hlei*,¹⁷ and *than-hlei* (war boats with iron hull-plates, and iron hooks on the stern and the prow).¹⁸ Other river and coastal boats included *hlawka* (barges),¹⁹ *hlawka-than-hlei* (war-barges with iron hull-plates and hooks),²⁰ *hlaw-hlei*,²¹ *ku-rup* (a large warboat),²² *kat-tu* (small, coastal ship),²³ *za-la-ka-pin* (big, box-like boat),²⁴ *thamban* (sampans),²⁵ *baung* (floats/

- 15 Presumably, these were the boats that provided the motive force for the oar-less barges and floats. See references in U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 117, 120.
- 16 These appear to have had the same function as the *hswei-hlei*, previously described. See references in U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 117, 120.
- 17 I have not yet determined the etymology of this term. Despite the mystery of both its origin and its characteristics, it is mentioned frequently in some of the chronicles. References can be found in U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 120, 161, 162, II, 357, 608, III, 6, 8, 9, 19.
- 18 U Kula, *Maha-raza-win-kyi*, I, 346, 370; II, 81, 171, 171f., 438; III, 24, 143, 163; Banyadala, "Razadirat Arei-taw-poun," 295, 300, 308; Letwe Nawrahta, "Hanthawati-Hsin-pyu-shin-Areitaw-poun," 351, 355, 374, 410; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 161.
- 19 For a description, see U Kula, *Maha-raza-win-kyi*, II, 171f.; See also references in U Kula, *Maha-raza-win-kyi*, I, 302, 371; II, 62, 100, 185, 248, 270f., 292, 426; III, 8, 10, 23f., 34f., 37, 143, 274, 322, 389, 393f., 398; Banyadala, "Razadirat Arei-taw-poun," 295, 298, 300, 304, 308. *Nidana Ramadhipati-katha*, 84; Letwe Nawrahta, "Hanthawati-Hsin-pyu-shin-Areitaw-poun," 351, 355, 374, 410; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 117, 120, 161, II, 61, 236, 237, 239, 357, 371, 568, 591, 608, III, 2, 8, 10, 19, 29, 51, 64, 540, 541, 572, 580, 609, 725. See the mythical origins of the name of this boat in *Zei-ya-thin-hka-ya*, *Shwei-boun-ni-dan*, 173, 175. See listing of various names for *hlawkas* in U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 162.
- 20 During the attack on Myei-hte, prior to the assault on Pye in 1607, for example, Anaukbelun's force included three hundred *hlawka-than-hlei*. See U Kula, *Maha-raza-win-kyi*, III, 143. For other references see U Kula, *Maha-raza-win-kyi*, II, 12, 15, 49, 63, 65, 79, 114, 116, 121, 134, 140, 171, 186, 203, 212, 268; III, 116, 143, 163; Maha-atula-min-kyi, "Nyaung-ran-min-tara Areitaw-poun," 417, 439.
- 21 I suspect that this would refer to paddle-boats, or smaller oared vessels. For references see U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, II, 469, 563, III, 29, 372, 540, 572, 580, 609.
- 22 U Kula, *Maha-raza-win-kyi*, I, 371; II, 79, 238, 438; III, 24, 180, 389; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 120, 162. See the mythical origins of the name of this boat in *Zei-ya-thin-hka-ya*, *Shwei-boun-ni-dan*, 78.
- 23 This seems to be the same kind of boat called *catur*, which Duarte Barbosa noted as being used in early sixteenth century India. Duarte Barbosa, *The Book of Duarte Barbosa: An Account of the Countries Bordering on the Indian Ocean and their Inhabitants, Written by Duarte Barbosa, and Completed about the year 1518 A.D.*, vol. II, *Including the Coasts of Malabar, Eastern India, Further India, China and the Indian Archipelago*, translated, edited and annotated by Mansel Longworth Dames (Reprint, Nendeln, Liechtenstein: Kraus Reprint Ltd., 1967): 96. For references to this type of Myanma boat, see U Kula, *Maha-raza-win-kyi*, I, 371; II, 12, 65, 81, 114, 116, 134, 182, 203, 248, 268, 271, 438; III, 10, 24, 35, 37, 109, 110, 116, 143, 389; Maha-atula-min-kyi, "Nyaung-ran-min-tara Arei-taw-poun," 417, 439; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 120, 161, 162, III, 6. See the mythical origins of the name of this boat in *Zei-yathin-hka-ya*, *Shwei-boun-ni-dan*, 80.

rafts),²⁶ *ein-hsaung-hlei-kyi* (houseboats),²⁷ *rekin-laung* (war canoes),²⁸ and *hlei-laung* (general purpose canoes).²⁹ Additionally, there was a myriad of coastal and river boats whose names reflected their legendary origins, or the type animal represented on the prow, such as *hnget-hlei* (all small boats shaped like small birds),³⁰ *thet-ka-dan* (the type of boat said to have been presented by Lord Thakya),³¹ and so on.³² The additional prefix of *shwei* and the suffix *taw*, depending upon whether or not the boat belonged to the king, offered further differentiation between the various river and coastal boats.³³

- 24 See U Kula, *Maha-raza-win-kyi*, II, 171; for a description of this boat see U Kula, *Mahara-za-win-kyi*, II, 171f.; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 120, 162, II, 357.
- 25 U Kula, *Maha-raza-win-kyi*, I, 371; II, 99; III, 24, 97; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 117, 120, 146, 162, II, 357, 378, 421, 464, 563, III, 2, 9, 29, 64, 74, 372, 487, 572, 579, 580, 710. See the mythical origins of the name of this boat in Zei-ya-thin-hka-ya, *Shwei-boun-ni-dan*, 76f.
- 26 Also variously spelled *hpaung* and *paung*. For references see Royal Order, 9 July 1638, in *The Royal Orders of Burma, A. D. 1598-1885, Part One, A. D. 1598-1648*, edited with introduction, notes and summary in English by Than Tun (Kyôto: The Center for Southeast Asian Studies, Kyôto University, 1983): 382f. See also U Kula, *Maha-raza-win-kyi*, III, 23, 34f., 37, 63, 143, 255, 344, 366, 389; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 117, 120, II, 37, 120, 163, 183, 347, 356, 357, 358, 371, 464, 469, 470, 563, 607, 608, III, 6, 10, 19, 64, 74, 487, 541, 579, 580, 622, 710. See illustrations in Zei-ya-thin-hka-ya, *Shwei-boun-ni-dan*, 161, 163, 165, 167, 169, 171; Maha-atula-min-kyi, "Nyaung-ran-min-tara Arei-taw-poun," 417, 437f.; see the mythical origins of the name of this boat in Zei-ya-thin-hka-ya, *Shwei-boun-ni-dan*, 81f.; *Baung* could also be prefixed with the type of animal that the boat may have transported, as in the case of *myin-baung* [horse float] and *hsin-baung* [elephant float]. See references in U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 161, III, 8.
- 27 Royal Order, 11 April, 1638, *The Royal Orders of Burma*, I, 365.
- 28 Royal Order, 30 May 1635, *The Royal Orders of Burma*, I, 230.
- 29 U Kula, *Maha-raza-win-kyi*, III, 233, 303, 393; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, III, 2, 19, 609. Some canoes, of large size, were called *laung-kyi* (great canoes); see Royal Order, 9 July 1638, *The Royal Orders of Burma*, I, 382f.; Letwe-nawrahta, "Hanthawati-Hsin-pyu-shin Arei-taw-poun," 411; see also U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 120, 162, II, 183, 357, 430, 447, III, 147.
- 30 U Kula, *Maha-raza-win-kyi*, II, 185; III, 35, 143, 161; Maha-atula-min-kyi, "Nyaung-ran-min-tara Arei-taw-poun," 439; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 120, 161, 162, II, 357, 608, III, 2, 6, 9, 19.
- 31 Royal Order, 15 October 1638, *The Royal Orders of Burma*, I, 402; U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 120, 162.
- 32 See the classification of Mon boats by the birds or animals their prows-images portray in *Nidana Ramadhipati-katha*, 164f.; examples in U Kula, *Maha-raza-win-kyi*, II, 292. Some boats were also called by names which reflected their mythical origins. See, for example, the discussion of the four boats said to have been made from the branches of a great tree in Hanthawati in Zei-ya-thin-hka-ya, *Shwei-boun-ni-dan*, 65f.; also U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, III, 8, 9, 10.
- 33 See examples in U Kula, *Maha-raza-win-kyi*, II, 185, 394; III, 23f., 34f., 37, 63, 143, 255, 344, 366, 389; Maha-atula-min-kyi, "Nyaung-ran-min-tara Arei-taw-poun," 417; Letwe Nawrahta, "Hanthawati-Hsin-pyu-shin Arei-taw-poun," 410f.

In this paper, I will suggest, using the case study of Myanmar,³⁴ that evidence throughout the early modern period points to the continued viability, and superiority (over European vessels), of the western mainland Southeast Asian coastal and river craft that I have listed above. Further, I will argue that Myanmar's river-networks were impenetrable to European colonial expansion or belligerent activity, except in cases where Europeans forsook their new ocean-going vessels for traditional Mediterranean galleys, the Western equivalent of Asian coastal and river craft, or used indigenous vessels. This was due to two key factors that I will elaborate upon more fully below. First, indigenous coastal and river craft, both being shallow-draft and possessing oars (and often sails too), were well suited to the geographical context in which they operated: shallow coastal and river waters, containing submerged pilings and sandbars, narrow channels where turning was difficult, and ephemeral winds due to surrounding land formations. Second, coastal and riverine craft, unlike deep-sea vessels such as the Southeast Asian *jong*, were not flimsy, lashed boats with flexible hulls, but more solid constructions able to support cannon, albeit limited numbers of them, and were also able to withstand the shock of firing off large firearms. I will also suggest that the superiority of indigenous coastal and river craft was only challenged in the nineteenth century, by the introduction of the steamship, and as a result, the establishment of permanent colonial rule over areas along mainland Southeast Asia's major river-systems. This, of course, means that indigenous vessels designed for use on the coasts and on major river-systems were a continued source of security for Myanmar indigenous rule, and thus served to protect the resources of early modern Myanmar dynasties. There was so little change in river technologies, because the impact of firearms and, later, steam-ships, were the only new factors that affected river boat technologies. Thus after the minor adjustment to river-boat superstructures in order to allow the introduction of cannon, Western technologies were not better suited to riverine traffic than Myanmar technologies, at least until the permanent introduction of steam-ships in the 1840s (although the British used one steam-ship in their invasion of Lower Myanmar in 1825),³⁵ which I will discuss further below.

34 In this paper, I will use the term Myanmar, in the traditional sense as the region, and later the unified political reality that it was after 1784, to refer to western mainland Southeast Asia west of what is now Thailand, rather than focus on individual political entities such as Taung-ngu, Pye, Pei-hku, Rahkaing, etc., that were eventually unified under early modern Myanmar rulers.

35 See H. Lister Maw, *Memoir of the Early Operations of the Burmese War* (London: Smith, Elder, and Co., 1832): 62, 70.

Myanma Coastal and River Craft

Traditional Myanma river and coastal vessels, as I will explain, experienced no change in hull structure, and only minimally in the superstructure, from the fifteenth to nineteenth centuries. These boats, used in the great river fleets and in coastal campaigns, continued to retain the basic features of ship construction, based on the requirements of their function in military campaigns and the geographical context in which they operated. Some of these basic features were often held in common with ship construction of insular Southeast Asia, but it should be stressed that early modern Myanma (and other mainland Southeast Asian) river and coastal ships had special features that gave them an advantage in their relationship with the Europeans, at least until the nineteenth century. I will explain these special features below and, where appropriate, similarities or dissimilarities between Myanma river boats and those of insular Southeast Asia.

a. Continuity: Myanma coastal and river boats in the early modern era

The basic shipbuilding features that I mentioned above, and will describe more fully below, include the following: mainly single-piece, hollowed hulls, with the remainder of the hull built up by adjoining a slight number of planks; the shallow draft nature of these hulls; the long and narrow shape of the hull and mid-section; the symmetrical stern and prow; the occasional use of outriggers; and the prevalent use of oars (and often sails as well). Further below, I will indicate the continuity of these basic shipbuilding features in Myanma river and coastal ships over the five centuries of precolonial evidence which is available regarding Myanma ships. First, however, I will examine the reasons for these basic shipbuilding features in Myanma river and coastal boats.

From the mouth of the Kaladan river in Rahkaing (Arakan) to Ta-nin-thari (Tenasserim), the Myanma mainland, far into the interior, is a maze of rivers and innumerable side channels, all forming a network that formed an elaborate system of transportation, communication, and trade that was accessible to shallow-draft boats.³⁶ Even in and beyond the dry zone, the main channel of the

36 See, for example, H.P. Hewett & J. Clague, comp., *Burma Gazetteer: Bassein District*, vol. A (Rangoon: Office of the Superintendent, Government Printing, Burma, 1916): 3f.; A.J. Page, comp., *Burma Gazetteer: Pegu District*, vol. A (Rangoon: Superintendent, Government Printing, Burma, 1917): 4f.; W.T. Tydd, comp., *Burma Gazetteer: Sandoway District*, vol. A (Rangoon: Superintendent, Government Printing, Burma, 1912): 1-4; J.S. Furnivall & W.S. Morrison, comp., *Burma Gazetteer: Syriam District*, vol. A (1914, Reprint: Rangoon: Superintendent, Government Printing and Stationary, 1963): 4; B.O. Binns, comp., *Burma Gazetteer: Amherst District*, vol. A (Reprint, Rangoon: Superintendent, Government Printing and Stationary, 1962): 7f.; W.S. Morrison, comp., *Burma Gazetteer: Henzada District*, vol. A (Reprint, Rangoon: Superintendent, Government Printing and Stationary, 1963): 4; U Tin Gyi, comp., *Burma Gazetteer: Maubin District*, vol. A (Rangoon: Superintendent, Government Printing and Stationary, 1931): 3-6; R.B. Smart, comp., *Burma Gazetteer: Akyab Di-*

Aye-ra-wa-ti and numerous branches serves to connect the rest of Myanmar into an extended system that extended far to the north of Awa (Ava).³⁷ In the precolonial period, and to a more limited extent today, overland travel was difficult, if possible at all in many areas, due to mountain ranges, dense jungle, rivers that could only be crossed with boats, and, frequently, wild predatory animals.³⁸ Thus, in the precolonial period, travel by river and coastal boats was a central part of the everyday lives of much of Myanmar's population.³⁹

strict, vol.A (Rangoon: Superintendent, Government Printing and Stationary, 1957): 4-6; G.P. Andrew, comp., *Burma Gazetteer: Mergui District*, vol. A (Rangoon: Superintendent, Government Printing and Stationary, 1962): 2f.; N.A., *Burma Gazetteer: Salween District*, vol.A (Reprint, Rangoon: Superintendent, Government Printing and Stationary, 1961): 1f.; U Tin Gyi, comp., *Burma Gazetteer: Thaton District*, vol.A (Rangoon: Superintendent, Government Printing and Stationary, 1931): 4f.

- 37 Probably the best source for this information, and perhaps the clearest tabulation of information regarding Upper Myanmar river-systems, is A. B. Fenton, comp., *Routes in Upper Burma including the Chin Hills and Shan States to which are added a number of routes leading from Lower Burma and Siam into those districts*, 2 vols., 1894, Reprint, Delhi: Cultural Publishing House, 1983. See also Ralph Nield, et. al., comp., *Burma Gazetteer: Kyaukse District*, vol.A (Rangoon: Superintendent, Government Printing and Stationary, Burma, 1925): 2-4; A. Williamson, comp., *Burma Gazetteer: Shwebo District*, vol.A (Reprint, Rangoon: Superintendent, Government Printing and Stationary, 1963): 3-5; G.W. Dawson, comp., *Burma Gazetteer: The Bhamo District* (Reprint, Rangoon: Superintendent, Government Printing and Stationary, 1960): 4-7; E.C.S. George, comp., *Burma Gazetteer: Ruby Mines District*, vol.A. (Reprint, Rangoon: Superintendent, Government Printing and Stationary, 1961): 7; R.S. Wilkie, comp., *Burma Gazetteer: The Yamathin District*, vol.A (Rangoon: Superintendent, Government Printing and Stationary, 1934): 4-6; N. A., *Burma Gazetteer: Tharrawaddy District*, vol.A (Rangoon: Superintendent, Government Printing, 1920): 9-14; G.E.R. Grant Brown, comp., *Burma Gazetteer: Upper Chindwin District*, vol.A (Reprint, Rangoon: Superintendent, Government Printing and Stationary, 1960): 3; B.W. Swithinbank, comp., *Burma Gazetteer: Toungoo District*, vol.A (Rangoon: Superintendent, Government Printing, Burma, 1914): 2f.
- 38 See description of the Ta-nin-tha-ri region in the late seventeenth century in 'Ibn Muhammad Ibrahim (c. 1685), *The Ship of Suleiman*, translated by John O'Kane, (New York: Columbia University Press, 1971): 47. As for wild predatory animals, panthers and tigers roamed the jungles, and just two tigers in the late nineteenth century, for example, killed thirty people. See A.J. Page, *Burma Gazetteer: Pegu District*, vol.A, 6. See also H.P.Hewett & J. Clague, *Burma Gazetteer: Bassein District*, vol.A, 9.
- 39 See descriptions by Western observers of the multitude of small boats used by the local population along rivers in Sebastião Manrique, *The Travels of Sebastien Manrique, 1629-1643*, translated with introduction and notes, by C. Eckford Luard, with assistance from Father H. Hosten, S.J. (Oxford: Hakluyt Society, 1927): I, 134, 205, 208, 382; Ralph Fitch, "The Voyage of Master Ralph Fitch Merchant of London...began in the yeere of our Lord 1583 and ended 1591," in *Hakluytus Posthumus or Purchas His Pilgrimes: Contayning a History of the World in Sea Voyages and Lande Travells by Englishmen and Others* (Reprint, Glasgow: James MacLehose & sons, 1905): X, 185; Hiram Cox, *Journal of A Residence in the Burman Empire, London, 1821*, with an introduction by D.G.E. Hall (Reprint, n.p.: Gregg International Publishers, Ltd., 1971): 49. In the 1680s, visiting Persians described the region between Mergui and Tenasserim thus: "the standard form of transport in that country is boat and indeed this means of travel is very comfortable and inexpensive ... so boats are the mainstay of the populace, the very pivot of these people's lives. Their boats are their

The varying depths, widths, currents, and the climatic context of Myanmar's rivers and coastal waters, however, made travel by precolonial boats very demanding. Storms could beach, overturn, or wreck all river craft.⁴⁰ The tidal flows of Lower Myanmar's rivers often had the same effect, and navigation throughout the Aye-ra-wa-ti could be extremely difficult.⁴¹ Thus, any river craft built to be used on a permanent basis, had to be well-designed and sturdy.

For full use of Myanmar's rivers throughout the year, Myanmar river and coastal boats usually had to be shallow-draft.⁴² Riverbeds, for example, could be of uneven depths, as English naval commanders realized in 1825, when their heavier boats became grounded and could not be dislodged.⁴³ Some rivers, like the coasts, hid submerged pilings and other obstacles that made river travel, even by shallow-draft boats, complicated.⁴⁴ This became a greater problem in

houses as well as their markets. They ride their boats wherever they wish, tie them up alongside one another and do all their buying and selling without going ashore." See 'Ibn Muhammad Ibrahim (c. 1685), *The Ship of Suleiman*: 47; William F.B. Laurie, *The Second Burmese War: A Narrative of the Operations at Rangoon in 1852* (London: Smith, Elder & Co., 1853):121. See also Gasparo Balbi's observation that: "every house hath a Boat to transport their people from one side of the River to the other: there are many houses of poor people made upon great planks with edifices of wood or great canes built on them, which they guide whither they will, to buy and sell any sort of merchandise." Gasparo Balbi, "Gasparo Balbi his Voyage to Pegu, and observations there, gathered out of his owne Italian Relatione," in *Hakluytus Posthumus or Purchas His Pilgrimes: Contayning a History of the World in Sea Voyages and Land Travells by Englishmen and others*, edited by Samuel Purchas (Reprint, Glasgow: James MacLehose & Sons, 1905): X, 163; for the comment "was part of the daily life of much of Myanmar's population," see Victor Lieberman's observation that the majority of the population in mainland Southeast Asia was concentrated along rivers and coasts in Victor Lieberman, "Local Integration and Eurasian Analogies: Structuring Southeast Asian History, c. 1350–c. 1830," *Modern Asian Studies* 27, 3 (1993): 493.

- 40 In 1555, "there was a great storm in which all the boats were lifted up by the wind on to the shore," H.L. Shorto (tr.), unpublished typescript translation of pp.34–44, 61–264 of Phra Candakanto, ed., *Nidana Ramadhipati-katha* (or *Rajawamsa Dhammaceti Mahapitakadhara*), (Pak Lat, Siam, 1921): 88.
- 41 Letter to Fort St. George from David Hunter at Negrais, 20 September 1753, *Records of Fort St. George: Diary and Consultation Book, Military Dept., 1753*, vol.2, 175 [note, hereafter, *Records of Fort St. George*, will be referred to simply as *RFSG*]; Michael Symes, *An Account of an Embassy to the Kingdom of Ava, Sent by the Governor-General of India, in the Year 1795* (1800, Reprint, Westmead, England: Gregg International Publishers, Ltd., 1969): 234f., 237, 277; D.G.E. Hall (ed.), "The Journal of Felix Carey: A New Burma Document," *Journal of the Burma Research Society* 23, pt. III (1933): 124.
- 42 As Chaudhuri explains, in reference to hull design in general: "[t]he shape of the hull below the waterline was a function of the depth and nature of coastal waters and of the frequency of approaching harbours and roadsteads." K.N. Chaudhuri, *Trade and Civilization in the Indian Ocean: An Economic History From the Rise of Islam to 1750*, (Cambridge: Cambridge University Press, 1985): 147.
- 43 Henry Havelock, *Memoir of the Three Campaigns of Major-General Sir Archibald Campbell's Army in Ava, 1828* (Serampore: n. p., 1828): 211.
- 44 As the *Nidana Ramadhipati-katha* records of the numerous light boats that the Myanmar took down against Ayudhya in 1562 from Zimme (Chiengmai): "[t]hey were much held up by shelves of rock lying athwart the stream; there must have been twenty-five such cataracts,

the dry season from January until April, which lowered the level of the Aye-ra-wa-ti considerably, increasing the threat of shoals and sand-banks.⁴⁵ Silting in the Aye-ra-wa-ti delta and numerous sand-bars,⁴⁶ required that vessels crossing frequently from coastal shallows to the river had to be sufficiently shallow-draft to avoid lodging on such submerged obstacles, which was a major problem for ships of deeper draft.⁴⁷ For this reason, despite the dangers and difficulties involved in going against the strong current and flood waters of the rainy season, as I will discuss below, larger Myanma boats, particularly bulk carriers of trade goods, had to gather at Patheingyi in April and wait until the Aye-ra-wa-ti had risen to a sufficient level to make the journey to Upper Myanma.⁴⁸

Of course, during the rainy season, in full strength from June until August, Myanma rivers rise considerably. Even before the onset of the monsoonal rains, the Aye-ra-wa-ti has already begun to rise since melting Himalayan snows swell the Aye-ra-wa-ti in the middle of Myanma's dry season. Thus, until the river begins to fall again in October, the Aye-ra-wa-ti rises in many places from forty

and what with the rough water and the shoals they had trouble enough." *Nidana Ramadhipati-katha*, 104. See also Alister McCrae & Alan Prentice, *Irrawaddy Flotilla*, with a foreword by Bernard Fergusson (London: James Paton, Ltd., 1930): 53, 56; For the difficulties involved in travelling near the coasts, see Fernão Guerreiro's comments in Fernão Guerreiro, *Relação Anual das Coisas que fizeram os Padres da Companhia de Jesus nas suas Missões*, edited and with a preface by Artur Viegas (Reprint, Lisbon: Imprensa Nacional, 1942): III, 78. Further, as Sebastião Manrique described the coasts of Rakhung: it is "dangerous throughout, in spite of a few ports and bays, owing to certain prevailing winds which wreck many ships." See Sebastião Manrique, *The Travels of Sebastien Manrique*, I, 217.

45 Horace Hayman Wilson, *Narrative of the Burmese War in 1824-26* (London: William H. Allen, & Co., 1852): 285, n. 10.

46 As Saunders explained in the mid-eighteenth century, in arguing for an English factory at Negrais: "[It is] with a considerable Risque or Danger that the Port of Syrian is at present, which it seems will in a few years be almost impracticable for large Ships, by the encrease of the Sands in several places, especially before the town." See Governor Saunders, "The Consequence of Settling an European Colony on the Island Negrais," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma* (Rangoon: Superintendent, Government Printing and Stationary, Burma, 1926): 33. As Pires describes early sixteenth century Mokka-ma: "[t]he port of Martaban is dangerous. There are pilots of the bar who guarantee to take you safely in ... They do not go in at full tide nor at low tide; they take it midway for safety." See Tomé Pires, *The Suma Oriental of Tomé Pires*, trans. and ed. by Armando Cortesão (London: Hakluyt Society, 1944): I, 99.

47 Western deep-sea ships "lying on the coast," were thus seen to be in great danger, at least during some seasons. See George Baker, "Captain George Baker's Journal of a Joint Embassy to the King of the Bûrghmahns," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 62; Michael Symes also recorded the disaster that such a situation caused in the case of the *George*: "she went aground and was totally lost on the sands near the Setang River. The crew escaped in their boats, but the vessel and property were irrecoverably lost." See Michael Symes, *Journal of his Second Embassy to the Court of Ava in 1802*, edited with introduction and notes by D.G.E. Hall (London: George Allen & Unwin, 1955): 133.

48 Horace Hayman Wilson, *Narrative of the Burmese War in 1824-26*, 285, n. 10.

to one hundred feet.⁴⁹ Although this would seem to remove the problem of submerged obstacles in the river, these dangers were replaced by increasingly rapid waters, and a swelling of the water over the banks, leaving the edges of the river over shallows that had to be watched out for. Further, rivers flooded their banks, creating great, shallow, inland seas that probably could only be traversed by shallow-draft boats.⁵⁰ During the First Anglo-Myanma War, the English also noted with amazement how Myanma shallow-draft boats could easily make use of the myriad of side creeks and channels in the Delta to move reinforcements around, out-of-the-sight of the British gunboats on the main channels.⁵¹

Myanma boats were thus typically shallow-draft, a feature commonly mentioned by observers from the fifteenth century until the time of the British conquest in the nineteenth century.⁵² This gave early modern indigenous river and coastal vessels, such as the flat-bottomed *thambans*,⁵³ an advantage over Portuguese and other European craft on rivers and along coasts. In response, the Portuguese introduced Mediterranean galleys to insular Southeast Asian waters (and in the case of De Brito, to Myanma coastal and river waters as well), which allowed for coastal navigation and compensation for unstable winds.⁵⁴ Still, Portuguese (and later, Dutch and English) ships were often larger, and always of deeper draft than mainland Southeast Asian ships during this period, and were thus most effective on the open seas, and least so on the rivers. Running on piles could lodge a Portuguese boat and make it subject to effective assaults by My-

49 Alister McCrae and Alan Prentice, *Irrawaddy Flotilla*, 25.

50 See A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 17f.; As Michael Symes observed of the Aye-ra-wa-ti north of Amarapura: "North of Ummerapooa about 5 miles two ranges of hills ... enclose the sides of a valley which to the eye appears to be at least ten miles across. Through this champaign the river Irrawaddy directs its course ... But in the rains the river swells over its banks and inundates almost to the base of the eastern hills ... In the height of the monsoon the river for ten or fifteen days spreads over the entire valley an unbroken sheet of water ..." Michael Symes, *Journal of his Second Embassy to the Court of Ava in 1802*, 139f.

51 H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 83.

52 Ludovico de Varthema, "The Itinerary of Ludovico de Varthema of Bologna in Egypt, in Syria, in Arabia Deserta and Felix, in Persia, in India, and in Ethiopia. The Religion, Mode of Life and Customs of all the aforesaid Provinces, with the Grace and Privilege hereinafter mentioned," in John Winter Jones, trans., *Travelers in Disguise: Narratives of Eastern Travel by Poggio Braccioloni and Ludovico de Varthema*, Revised, with an introduction, by Lincoln Davis Hammond (Cambridge, Massachusetts: Harvard University Press for the Department of Romance Languages and Literatures of Harvard University, 1963): 175; Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 7.

53 Archibald Lewis, "Maritime Skills in the Indian Ocean 1368-1500," *Journal of the Economic and Social History of the Orient* 16, pts. II-III, (December, 1973): 250.

54 Pierre-Yves Manguin, "Of Fortresses and Galleys: The 1568 Acehnese Siege of Melaka, after a Contemporary Bird's-eye View," *Modern Asian Studies* 22, 3 (1988): 621.

anna shallow-draft vessels.⁵⁵ What is clear is that regardless of the scale of the forces involved, the Portuguese often lost a higher percentage of their ships engaged in battles with Myanmas on rivers than at sea.⁵⁶ Further, on the high seas, where the larger and deeper-draft Portuguese ships were able to move more freely without fear of running aground, they could easily run down the smaller shallow-draft Myanma ships.⁵⁷ The shallow-draft feature of Myanma boats thus made being hit broadside by a larger boat the most important concern of Myanma boatmen.⁵⁸ When Rahkaing fleets turned the point at Cape Negrais, they often 'hugged' the shallows along the coasts, where the deeper-draft Portuguese ships could not enter or would be in great danger of running aground.⁵⁹

In addition to making most bodies of water accessible, the shallow-draft construction may have allowed Myanma boatmen to beach these boats and thus dry them at night, as was the case of ships elsewhere in Southeast Asia, but I cannot find any mention of this practice in Myanma in the written evidence. It may have been likely, however, as ship-worms could devour the hull of ship in the tropical environment in less than a year.⁶⁰ Further, we do know that the Myanmas had covered some of their hulls with iron-plates, producing the *than* boats that are mentioned so often in the chronicles.⁶¹

While even the largest of Myanma river and coastal boats drew less than three feet of water,⁶² this did not mean that these boats were necessarily small.

55 Fernão Guerreiro, *Relação Anual das Coisas que fizeram os Padres da Companhia de Jesus nas suas Missões*, III, 79f.

56 While the Portuguese suffered few losses in the battle at sea with Rahkaing forces in 1607, for example, in the river battles that followed, the Portuguese lost many captains and three ships, leading Philip de Brito to pull his ships on shore to protect the fortress and prepare to fight the Rahkaing and Taung-ngu soldiers on land. See Fernão Guerreiro, *Relação Anual das Coisas que fizeram os Padres da Companhia de Jesus nas suas Missões*, III, 81.

57 Fernão Guerreiro, *Relação Anual das Coisas que fizeram os Padres da Companhia de Jesus nas suas Missões*, III, 79.

58 Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320f.

59 Fernão Guerreiro, *Relação Anual das Coisas que fizeram os Padres da Companhia de Jesus nas suas Missões*, III, 78.

60 William H. Scott, *Boat Building and Seamanship in Classic Philippine Society*, Anthropological Papers no. 9 (Manila, Philippines: National Museum, December, 1981): 8. See the comment that the detainment by the King of Pei-hku of foreign ships in Myanma harbors, was often so long that "worms in the river practically ate up the ship," in Hans de Haze at Masulipatam to Jan Pietersz. Coen at Bantam/Jacatra, 5 June 1617, in Om Prakash, *The Dutch Factories in India, 1617-1623: A collection of Dutch East India Company Documents Pertaining to India* (New Delhi: Munishiram Manoharial, 1985): 28.

61 See U An Shwei, *That-poun-abi-dan*, (Yangon: Panya-alin-pya-sa-poun, 1956): 670. I am grateful to my *hsaya*, U Saw Tun, for this reference; The *than* boats were covered with ironplates that helped prevent aging and corrosion, but also had defensive qualities See references in U Kula, *Maha-raza-win-kyi*, I, 346, 370; II, 81, 171, 171f., 438; III, 24, 143, 163; Banya Dala, "Razadirat Arei-taw-poun," 295, 300, 308; Letwe Nawrahta, "Hanthawati-Hsin-hpyu-shin-arei-taw-poun," 351, 355, 374, 410.

62 Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 321.

Consistently, Myanma shipwrights seem to have produced large river vessels throughout the fifteenth-nineteenth century period.⁶³ One mammoth boat, called the *hmaing-thei-thei*, which led Alaung-hpaya's fleet down the Aye-ra-wa-ti against the Mons in 1754, was even said to have been 114 feet long and carried 350 soldiers (presumably in addition to the crew).⁶⁴ Despite the large size of Myanma river and coastal boats, they were generally very narrow. Gasparo Balbi related that the Myanma boat he encountered at Pathein (Bassein) in 1583 was "so narrow that in the middle it seemed to not be above one pace over, at the head and stearne it was as narrow as our Gondolos."⁶⁵ Further, an early seventeenth century Portuguese observer commented that the local Myanma war-boats which came against the Portuguese at Than-lyin were as great (presumably as long) as Portuguese *galés*, but were nonetheless narrower.⁶⁶

Myanma coastal and river boat hulls were usually double-ended, which allowed Myanma boats to row backwards away from an enemy, just as they had rowed towards their opponent.⁶⁷ Further, the larger portion of the hulls of typi-

63 Varthema, in the early sixteenth century, mentions that the boat he took from Pye to Awa was "more than fifteen or sixteen paces long." Ludovico de Varthema, "The Itinerary of Ludovico de Varthema of Bologna," 180. Royal boats built at Dala at the beginning of the fifteenth century were 96 and 102 feet long, see Banya-Dala, "Razadirat Arei-taw-poun," 311. The large boat that Gasparo Balbi encountered at Pathein in 1583, was as long as a foist. Gasparo Balbi, "Gasparo Balbi his Voyage to Pegu," X, 151; some boats built for war campaigns upriver against Awa even included boats that were thirty-three and twenty-seven fathoms in length. *Nidana Ramadhipatikatha*, 88f.; One early seventeenth century Portuguese observer described some local Myanma warboats, called *lagoas*, as being in the style of Portuguese galleys: "quasi da mesma grandesa, ainda que mais estreytas [being of somewhat the same greatness, but much more narrow]," Manuel de Abreu Mousinho, *Breve Discurso em que se Conta a Conquista do Reino do Pegú*, with an introduction by M. Lopes D'Almeida, (Barcelos: Portualense Editora, 1936): 21. The Portuguese, in 1607 at Cape Negrais, encountered among the Rakhaing ships sent against them, seventy-five large galliots "of very large size." Fernão Guerreiro, *Relação Anual das Coisas que Fizeram os Padres da Companhia de Jesus nas suas Missões*, III, 78; Symes, in the late eighteenth century, explains that Myanma river boats could be from eighty to one hundred feet long. Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320; Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 6; One warboat captured by the English in the First Anglo-Myanma War, for example, was eighty-two feet long and seven-and-a-half feet wide. H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 92.

64 U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 94f.; This may have been the same boat that one Englishman estimated was 150 feet long, forty feet wide, and carried three hundred people in addition to servants. See George Baker's comments in the introduction to in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma* (Rangoon: Superintendent, Government Printing and Stationary, Burma, 1926): viii.

65 Gasparo Balbi, "Gasparo Balbi his Voyage to Pegu, and observations there, gathered out of his owne Italian Relatione," X, 151.

66 Manuel de Abreu Mousinho, *Breve Discurso em que se Conta a Conquista do Reino do Pegú*, 21.

67 See Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 321. This was a feature held commonly among Southeast Asian boats, as described by Scott for the Philippi-

cal Myanma river and coastal boats (with the exception of rafts and royal barges) were commonly solid. Such hulls were constructed by excavating the teak log with both fire and axe, although the prow was left solid.⁶⁸ Solid hulls were a continual feature of Myanma river and coastal craft of the early modern era.⁶⁹ The remainder of the hull was constructed up from the solid main-body of the hull, with ribs and strong planking,⁷⁰ producing an extremely strong vessel.⁷¹ Symes in the late eighteenth century, explains that by "artificially extending the sides after the trunk has been hollowed" such a boat could be eight-feet wide.⁷² Some Myanma river boats, however, were flat-bottomed,⁷³ although this still allowed for the same advantages of travelling safely on shallow waters. It should also be noted that royal barges, much wider than typical Myanma boats, and bearing large superstructures resembling miniature palaces or *payas* (temples), followed the tradition of the dug-out hull. In the case of these barges, two such hulls were used and a platform was built on top, bridging the two keel-hulls and thus forming a much wider craft.⁷⁴ Fortunately, while photographs

ne caracao. See William H. Scott, *Boat Building and Seamanship in Classic Philippine Society*, 8.

- 68 Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320. For similar construction of early modern Thai river boats, see keel-hull construction as illustrated in Rachawadi Ngamsanga, *Rua Thai Samai boran: Moradok thang sainam an lamkha khong khonthai tangta samai kon prawattisat/ Rachawadi Ngamsanga khian* (Kruang Thep: Borisat Tono, 1992): 11–43, passim. For the similar construction techniques used in Khmer and Thai boats see also H.G. Quaritch Wales, *Siamese State Ceremonies: Their History and Function* (London: Bernard Quaritch Ltd., 1931): 12–113; canoes of the eastern Indonesian archipelago also seem to have been similarly constructed. See Bronislaw Malinowski, *Argonauts of the Western Pacific: An Account of Native Enterprise and Adventure in the Archipelagoes of Melanesian New Guinea*, preface by Sir James G. Fraser (New York: E.P. Dutton & Co., 1961): 125.
- 69 Ludovico de Varthema, "The Itinerary of Ludovico de Varthema of Bologna," 180; Shihabuddin Talish's (c. 1665) seventeenth-century Persian account, translated by Jadunath Sarkar, "The Feringi Pirates of Chatgaon, 1665 A.D.," *Journal of the Asiatic Society of Bengal* (new Series) 3, no. 6 (June, 1907): 420; Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320; Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320; H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 92; Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 6.
- 70 H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 92; Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 6.
- 71 Jadunath Sarkar (tr.), "The Feringi Pirates of Chatgaon, 1665 A.D.," 420.
- 72 Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320.
- 73 Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 7.
- 74 This was likely true in the case of the Rahkaing warboats that Ta-bin-shwei-hti encountered in 1545 at Than-twei (Sandoway), during his invasion of Rahkaing. *Nidana Ramadhipati-katha*, 47.

taken in the late nineteenth century have preserved a record of the structure of these boats,⁷⁵ detailed descriptions by foreign visitors can also be found.⁷⁶

Some of the larger shallow-draft boats used in coastal areas and on rivers, sometimes required the use of outriggers.⁷⁷ Outriggers, which some observers say was used by all Myanma boats of burden, including smaller warboats,⁷⁸ had a number of functions. First, the narrow construction and shallow-draft nature of Myanma river and coastal vessels meant that in the geographical context I have mentioned above, without outriggers, Myanma boats could easily tip over, or be swamped by the onset of tidal flows. To offset this, the Myanmas attached outriggers made of thin boards or bamboo, forming a long platform six or seven feet away, alongside the boat, which kept the boat steady and prevented it from tipping over, since the boat would right itself as one or the other platform hit the water.⁷⁹ Outrigger platforms also allowed Myanma oarsmen to "ply their oars" or to use the platform as a walkway as they poled boats out of the shallows.⁸⁰ Perhaps, outriggers also served a protective function, as described by Scott for the Philippine *caracao*. Scott explains that at sea, an outrigger received the first strikes on unkind seas, giving the boat time to find safety in a harbor or on shore. This probably worked as well for Myanma coastal shipping, although its use as such is not specifically mentioned by any written source. Crews would also sleep on the outrigger platforms at night, and a tarp stretched from the boat to the outrigger formed a safe shelter from the weather.⁸¹

River travel required a variety of means of propulsion. In terms of their means of propulsion, roughly four sub-categories of Myanma river and coastal boats are evident. The first sub-category included boats that used oars alone. The second, and largest, sub-category included boats that made use of both sails and oars. The third sub-category included craft that were not self-propelled and

75 See, for example, Shwei-kaing-tha (U Thau-bi-ta), *Aknek-taya-pyi Man-ta-lei* (Yangon: Pagan Sa-ok-hsain, 1959): photograph facing page 27.

76 See, for example, the description by Christopher Winter in 1857 of Burman barges engaged in a religious festival: "[t]hese barges are formed by two canoes lashed together, on which is placed a floor of planks, and on this a frame of bamboo is raised, open at the sides, and supporting a roof thatched with the leaves of the water-palm; a most effectual protection from the fierce rays of a tropical sun. Each barge is towed by two canoes full of Burman rowers." Christopher T. Winter, *Six Months in British Burmah: or, India Beyond the Ganges in 1857* (London: Richard Bentley, 1858): 69f..

77 See William H. Scott, *Boat Building and Seamanship in Classic Philippine Society*, 8.

78 Hiram Cox, *Journal of A Residence in the Burman Empire*, 23. The mural in the Temple of Nandamannya, displays smaller Myanma warboats equipped with outriggers. See reproduction of the mural in P.H. Cerre, et. al., *Pagan: L'Univers Bouddhique Chronique du Palais de Cristal* (n.p.: Éditions Findakly, 1987): 52.

79 Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320.

80 Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320; Hiram Cox, *Journal of A Residence in the Burman Empire*, 23.

81 Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320.

had to be pulled by boats of the first two sub-categories. A fourth category consisted of river and coastal boats that operated with sail alone (presumably, however, with poles as well in the shallows). But this last sub-category seems to have formed only a small proportion of Myanma river and coastal boats, as I will explain. These four sub-categories should be kept in mind as I discuss the means of propulsion available to early modern Myanma river and coastal craft.

To some degree, boats of the first three sub-categories that I mentioned above depended upon oar-propulsion: even non-self-propelled floats required oar-propelled boats to pull them. This was necessary, as upriver travel against the current (*hsan*), or travel anywhere during times of unfavorable winds, or no winds at all, required the use of oars. For royal boats, the exhaustion of crews that plied their oars against the current was overcome by changing crews at regular intervals.⁸² As one European passenger on a royal boat going up to Awa explained:

[I]ndeed it must be confessed, that there could scarcely be any other method used to forward the Boat with the Guns, (as she was full manned with Oars and provided with a very large Sail) except that of having People ready (for her Crew was changed at almost every Town) at each stage to go on board her, as soon as she should arrive at it ... they generally sent a light Boat a-head, to get the People ready against she came.⁸³

Observers of English shallow-draft boats that were rowed up the river against Yangon (Rangoon) in the First Anglo-Myanma War, commented on how difficult passage became once the tidal inflow from the Bay of Mokka-ma (Martaban) began to weaken.⁸⁴ Just as oars helped ships go up against the current, however, slipping the moorings and allowing one's boat to be taken back down river by the force of the current was another possibility.⁸⁵ The journey down the Aye-ra-wa-ti could be made in one-half or one-third the time necessary to go upriver.⁸⁶ Further, by taking full advantage of the downriver current and the oars, Myanma boats could be rowed southward at even greater speeds:

82 It also may be possible that the Myanmas may have had special light messenger boats for sending up the river to Awa, for I have found mention in the chronicles of *hsan-hlei* (up-against-current boats), although I can find no specific description of them. See U Kula, *Maha-raza-win-kyi*, I, 289.

83 George Baker, "Captain George Baker's Journal of a Joint Embassy to the King of the Bûraghmahns," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 51.

84 H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 50, 69.

85 *Nidana Ramadhipati-katha*, 70f.

86 This estimate by Victor Lieberman is made from a comparison of dates of travel recorded in English records, and thus may refer only to Western style ships, which were oar-less and probably sacrificed speed for caution as their deeper-draft hulls gave them more reason to fear submerged obstacles than Myanma craft had. For Lieberman's estimate see Victor B. Lieberman, *Burmese Administrative cycles: Anarchy and Conquest, c. 1580-1760* (Princeton, New Jersey: Princeton University Press, 1984): 59.

one Myanma boat was supposedly sent down from Awa to Yangon in forty-eight hours.⁸⁷ Even allowing for the likely exaggeration of this account, the journey downstream compared favorably with the journey upstream, which, in some cases, could take as long as two months.⁸⁸

Again, the use of oars seems to have been a general feature of precolonial mainland Southeast Asian shipping, at least in terms of warboats.⁸⁹ At least some Myanma oars of the early modern period were made of cane, split at the end so that a flat board could be fitted below the waterline and fastened to it by rope.⁹⁰ By the beginning of the early modern period, however, solid wood oars seem to have become standard. Myanma oars could be held freely or could be worked on a spindle.⁹¹ The number of oars used on a Myanma boat depended upon the size of the boat in question,⁹² and varying numbers of oars on warboats and other river and coastal vessels was a common feature of precolonial mainland Southeast Asia.⁹³ The rowing motion of the oars was synchronized by

87 H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 92f.

88 As Symes noted: "Our progress [from Yangon] towards the Capital [Amarapura] will, I fear, be tedious, as the stream of the river is now in full strength, and the southerly winds blow with diminished force. Two months, I am informed, is the shortest space of time in which we can expect to accomplish our journey." See Michael Symes, *Journal of his Second Embassy to the Court of Ava in 1802*, 134.

89 Quaritch Wales, for example, explains that in the river battles fought between the Chams and the Khmers, the warboats used were "exclusively barges propelled by rowers." See H.G. Quaritch-Wales, *Ancient South-East Asian Warfare*, 106.

90 Ludovico de Varthema, "The Itinerary of Ludovico de Varthema of Bologna," 180.

91 See comments of the use of the spindle in Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320. The mural in the Temple of Nandamannya indicates that Myanma oarsmen could operate their oars independently of any fixture to the boat. See the reproduction of the mural in P.H. Cerre, et al., *Pagan: L'Univers Bouddhique Chronique du Palais de Cristal*, 52.

92 In 1583, at Pathein, Gasparo Balbi encountered twenty boats with eight oars each, as well as a larger vessel with one hundred oars. See Gasparo Balbi, "Gasparo Balbi his Voyage to Pegu," 151. The English at Negrais in 1759, saw in the distance fifteen to twenty boats, each rowed by twenty to thirty oars, that came down the river after them. See Captain Alves, "Account of the Settlement at Negrais, being cut off," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 138. Alaung-hpayA's personal warboat was rowed by an estimated one-hundred-and-fifty well-trained oarsmen. See Captain Baker's observations in the introduction to A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, viii. See also Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 4, fig. 1. Michael Symes observed twenty-five boats, whose crews ranged from fifty to seventy men per boat, which likely indicated varying numbers of oarsmen. See Michael Symes, *Journal of his Second Embassy to the Court of Ava in 1802*, 150. For the case of one large warboat captured by the English in 1825, which used fifty-four oars, see H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 92.

93 For numbers of rowers, and thus oars, in classical period naval battles between Chams and Khmers see the tabulation from classical Khmer bas-reliefs in P. Paris, "Les Bateaux des Bas Reliefs Khmers," in *Bulletin de l'école Française D'Extrême-Orient* 41 (1941): Tableau anexe I, pp. 358f.

drummers or, in some cases, trumpeters and drummers.⁹⁴ Varthema claimed that Myanma oared-boats “went with more power than a brigantine,”⁹⁵ and Myanma boats travelled at speeds that still impressed eighteenth and nineteenth century observers.⁹⁶ Despite the length of the trip upriver against the current, such oared boats could, in special circumstances, make the journey from Yangon to Amara-pura in fifteen days,⁹⁷ a tremendous speed when compared with the time required for such a journey as related earlier in this article. The use of oars on ships with prow and stern capable of cutting through the water equally well, meant that on narrow rivers, Myanma boats could change directions at a moment's notice, making them versatile fighting craft in narrow channels and in tight battle situations. For this reason, Myanma boatmen practiced rowing backwards.⁹⁸

As I mentioned above, some Myanma river boats, such as royal floats (used for transporting monks and royalty for ceremonial purposes) and firerafts (used in special combat circumstances) did not include their own means of propulsion, but instead had to be pulled by specialized oar-propelled boats, called *hswei-hlei* and *ngin-hlei*,⁹⁹ or by pairs of canoes.¹⁰⁰ This was done by attaching the floats and firerafts to canoes or oared-barges (*hlawka*) with chains or ropes, which were hooked up underneath the float.¹⁰¹

94 Gasparo Balbi, “Gasparo Balbi his Voyage to Pegu,” X, 151; *Nidana Ramadhipati-Katha*, 31; Symes, however, observed that late eighteenth century Myanma oarsmen regulated the stroke of their oars by singing songs. See Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320. It is also possible that Portuguese traders in 1520 heard singing, drums, or trumpets played for regulation of oar strokes when they commented that “the natives came out to our ships with much music.” See Genevieve Bouchon & Luis Filipe Thomaz, *Voyage Dans Les Deltas du Gange et de L'Irraouaddy: Relation Portugaise Anonyme (1521)*, Ecole des Hautes Etudes en Sciences Sociales Collection du Centre D'Etudes Portugaises no. 1 (Paris: Fondation Calouste Gulbenkian & Centre Culturel Portugais, 1988): 344.

95 Ludovico de Varthema, “The Itinerary of Ludovico de Varthema of Bologna,” 180.

96 See Captain Baker's comments that Alaung-hpaya's personal boat, propelled by oars, was very swift in the introduction to A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791–7 of Portions Relating to Burma*, viii; William F.B. Laurie, *The Second Burmese War*, 1745.

97 See Michael Symes, *Journal of his Second Embassy to the Court of Ava in 1802*, 227.

98 Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 321; Quaritch Wales notes that Cham and Khmer oarsmen of an earlier period, rowed backward and forward as well, as evidenced by bas-reliefs at Banteay Chmar. See H.G. Quaritch-Wales, *Ancient South-East Asian Warfare*, 109.

99 As I have explained earlier in this paper, both of these terms meant, literally, “draw boats.”

100 Christopher T. Winter, *Six Months in British Burmah: or, India Beyond the Ganges in 1857*, 69f.

101 *Nidana Ramadhipati-katha*, 30. See Banya-Dala, “Razadirat Arei-taw-poun,” 311. An Awa period mural in the Temple of Nandamannya, shows Myanma warboats using such ropes to pull something, although it is unclear whether it is a barge or something else. Mural reproduced in P.H. Cerre, et. al., *Pagan: L'Univers Bouddhique Chronique du Palais de Cristal*, 52.

The use of oars, however, required men to row them. Smaller boats used by the general population required only moderate numbers of rowers, and perhaps these could be members of the family that owned the boat. Rich merchants, however, could afford to hire large numbers of men to row their boats. The king could also require men to man his warboats and ceremonial boats,¹⁰² or, in some instances, may have paid them, considering Awa's increasing access to cash revenues throughout the early modern period. But what of traders who needed to take moderate amounts of merchandise up to Awa, but could not afford, or did not want to pay, large numbers of men to row the boat upstream on the Aye-ra-wa-ti?

This is a difficult question to answer, as contemporary accounts are usually vague about such topics. We do know that at least by the nineteenth century, and likely much earlier, there were a few specimens of river and coastal trade-boats using sail only, but are rarely mentioned in the literature.¹⁰³ Such boats still incorporated many of the general features that benefitted other Myanma river and coastal boats, such as shallow-draft hulls and sturdy construction, but lacked oars that would have required more human labor than these merchants perhaps wanted to pay for, or could obtain. As a result, these Myanma sail-only river and coastal boats were not as efficient at moving upriver as other Myanma river boats were, and seem only to have been able to ascend the Aye-ra-wa-ti when there was a good wind,¹⁰⁴ especially during the rainy season when these boats could take advantage of the southwest monsoonal winds.¹⁰⁵

Further, in terms of the hegemony of Myanma warboats on the Aye-ra-wa-ti and elsewhere, the existence of the sub-category of sail-only boats does not detract from my general argument, as I have found no evidence that any Myanma warboat or any other royal boat, lacked oars (or at least, in the case of barges, were attached to oar-propelled boats). Instead, I would speculate that this may indicate that the control of manpower, or the ability to hire large numbers of men, was an influential factor in the continued strength of Myanma warboats until the nineteenth century: Myanma warboats, and other royal boats, required large numbers of men to row the oars,¹⁰⁶ and without such access to manpower, such boats could not be applied to royal control over the Aye-ra-wa-

102 This may be deduced from Michael Symes' general observation on one occasion: "The Royal Island [in the middle of the Irrawaddy near Amarapura] seemed to be quite deserted; his Majesty had drawn in his train every person who could procure a boat or handle an oar; not even a canoe was now to be seen, where so many vessels had plied the day before." Michael Symes, *Journal of his Second Embassy to the Court of Ava in 1802*, 174.

103 See one such specimen in Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 7.

104 Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 7.

105 Horace Hayman Wilson, *Narrative of the Burmese War in 1824-26*, 285, n.10.

106 Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, Fig. 1, p.4.

ti or of the defense of the Aye-ra-wa-ti and its coastal outlets from European threats. It may be that as Myanma's kings were able to increase central control over Myanma's manpower resources, aided by demographic growth throughout the early modern period,¹⁰⁷ Myanma's kings were able to increase the number of warships on Myanma's rivers and along coasts, thereby enhancing central control over the Aye-ra-wa-ti. The topic of the success of Myanma's early modern dynasties in commanding large reserves of manpower, however, is beyond the scope of this paper.¹⁰⁸

Oar-propulsion could also be supplemented by favorable winds, and thus sails were used on some of the larger Myanma river and coastal boats as well. Larger Myanma river and coastal boats typically used both oars and sails for propulsion from the fifteenth to the nineteenth centuries.¹⁰⁹ For the journey up the Aye-ra-wa-ti, sails were necessary to counteract the strength of the downstream current during the rainy season and to take advantage of the winds of the southwest monsoon at the same time.¹¹⁰

Sails could be quite large, and were held up by extremely long yards made of bamboo.¹¹¹ Further, the masts, consisting of two spars lashed together, were tied, and bolted, to wooden posts that projected out of the keel, allowing for easy removal.¹¹² The use of sails offers another justification for the shallow-draft construction of Myanma boats. Insular shallow-draft boats, for example,

107 Victor B. Lieberman, "Local Integration and Eurasian Analogies: Structuring Southeast Asian History, c. 1350–c. 1830," 493.

108 Other works have dealt with this topic in-depth. See Victor Lieberman, *Burmese Administrative Cycles: Anarchy and Conquest, c. 1580–1760*, 48, 50, 52, 237f., 250–254; Victor B. Lieberman, "Provincial Reforms in Taung-ngu Burma," *Bulletin of the School of Oriental and African Studies* 43, 3 (1980): 548–69; see also the useful summary by William Koenig, *The Burmese Polity, 1752–1829: Politics Administration, and Social Organization in the Early Konbaung Period*, 107–118.

109 Varthema's boat, in the early sixteenth century, used both sails and oars. Ludovico de Varthema, "The Itinerary of Ludovico de Varthema of Bologna," 180. The sixteenth-century *Nidana Ramadhipati-katha* also mentions that Mon warboats used both oars and sails. *Nidana Ramadhipati-katha*, 163f. Similarly, the Myanma fleet sent down in the 1545 to fight the Mons at Pye, consisted of four hundred "oar-propelled sailing ships." Fernão Mendes Pinto, *The Travels of Mendes Pinto*, edited and translated by Rebecca D. Catz (Chicago: Chicago University Press, 1989): 333. Early seventeenth-century Portuguese accounts describe some Myanma war-boats, which they called *lagoas*, as being like Portuguese galés. See Manuel de Abreu Mousinho, *Breve Discurso em que se Conta a Conquista do Reino do Pegú*, 21. See George Baker, "Captain George Baker's Journal of a Joint Embassy to the King of the Bû-raghmahns," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791–7 of Portions Relating to Burma*, 51.

110 Horace Hayman Wilson, *Narrative of the Burmese War in 1824–26*, 285, n. 10.

111 Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 7.

112 Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 6. In the footnote, Yule claims that some insular pirates followed the same practice, and, when pursued, the removable masts allowed them to hide unseen in the shallows.

such as the Philippine *caracao* and *barangay*, were almost picked up by the wind, and seemed to glide over the water, making these boats incredibly fast.¹¹³ It is likely that with a good wind on a river as wide as the Aye-ra-wa-ti, the Myanma shallow-draft boats experienced the same effect, although this remains speculative until evidence for Myanma ships, specifically, is found. In shallow places, or difficult areas, pushing the boat with poles was also sometimes necessary.¹¹⁴

European ships of deep-sea design could travel along the Aye-ra-wa-ti, and frequently did so.¹¹⁵ But the captains of European oar-less ships who attempted to make the journey upriver by sail alone were severely disappointed by the excessive time required to do so, prior to the introduction of the steam-ship.¹¹⁶ Further, such deep-draft vessels as the sixteenth century *jong* and Western ocean-going ships, had to be led into river channels by shallow-draft river boats, to prevent running aground on sandbars and on shoals.¹¹⁷ For their entire term on the river, difficulties in turning a European ship at any great speed, the lack of oars in a realm of ephemeral winds, and an adverse river current,¹¹⁸ would leave European deep-sea vessels on rivers vulnerable to indigenous craft. It should be mentioned that both Myanma and insular boats used in coastal transportation and on rivers were so well designed for this purpose,¹¹⁹ that from the beginning of the European presence in Southeast Asia, Portuguese and others adopted the use of indigenous vessels when travelling in coastal areas and on

113 William H. Scott, *Boat Building and Seamanship in Classic Philippine Society*, 9.

114 Michael Symes, *An Account of An Embassy to the Kingdom of Ava*, 278.

115 Anthony Reid, *Southeast Asia in the Age of Commerce 1450-1680*, vol. II, *Expansion and Crisis* (New Haven, Connecticut: Yale University Press, 1993): 54f.

116 As George Baker related: "[h]aving now sufficiently experienced how tedious it was to go up this River [the Irrawaddy], at this Season, and particularly informed ourselves...in how long a time we might perform the residue of our Passage... as by no means left us any reason to think we could return to Negrais, in Season for a Vessel to be dispatched thence to the Coast, and be able to return again before the NE Monsoon." George Baker, "Captain George Baker's Journal of a Joint Embassy to the King of the Bûraghmahns," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 49. See also Robert Lester, "Ensign Lester's Proceedings on an Embassy to the King of Ava, Pegu, & c.," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 112, 114, 124.

117 See the problems that a Portuguese ship had in the early sixteenth century when it tried to enter the harbor of Mokta-ma on its own, and due to its deep-draft hull, became lodged on rocks, in L.F.F.R. Thomaz, *De Malaca a Pegu, Viagens de um Feitor Portugues (1512-1515)*, (Lisbon, 1966): 65. Portuguese ships afterwards, paid pilots who knew where the deep channels were, to lead their boats into the harbor. See L.F.F.R. Thomaz, *De Malaca a Pegu*, 107, 190.

118 L.F.F.R. Thomaz, *De Malaca a Pegu*, 164.

119 English observers in the First Anglo-Myanma War, for example, commented on how well-designed Myanma warboats were for the purposes that they were applied to. See H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 92.

ivers.¹²⁰ Similarly, the Portuguese in Myanma used both indigenous *jalias* as well as ships built on the model of Mediterranean galleys, that were suited to coastal waters and perhaps river waters as well.¹²¹ Their deeper draft, however, still made them vulnerable to running aground or becoming lodged in shallows, as I have explained above.

The rudders of Myanma river and coastal boats were designed for use in shallow waters, and not for deep-sea use, where special circumstances required a sturdier and more complex instrument of direction.¹²² Like Viking and early Mediterranean galleys, the Myanmas used a side rudder. The Myanma side rudder presents an example of simple efficiency, being typically simple, large paddles,¹²³ for, as Lionel Casson has explained in the case of Western ships, the side rudder was not inferior to the stern rudder later adopted in the West.¹²⁴ The Western and Myanma rudders were attached to one side of the boat, the Viking and Mediterranean examples being socketed into the loom,¹²⁵ while the Myanma rudders often were lashed (or even inserted through a clamp) to one side of the boat (although in many smaller boats, it appears that rudders were simply freeheld and could be characterized as a large paddle).¹²⁶ Helmsmen of both Mediterranean galleys and larger Myanma boats steered the rudder with a short tiller that passed over the back bench, and by moving the tiller back or forth, the blade of the rudder turned at an angle which directed the boat.¹²⁷ From the few

120 William H. Scott, *Boat Building and Seamanship in Classic Philippine Society*, 10.

121 Pierre-Yves Manguin, "Of Fortresses and Galleys: The 1568 Acehnese Siege of Melaka, after a Contemporary Bird's-eye View," 621.

122 See Lionel Casson, *Ships and Seamanship in the Ancient World* (Princeton, New Jersey: Princeton University Press, 1971): 226.

123 Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 6, and Fig. 1, p. 4. See Temple mural at Nandamannya, in *Pagan: L'Univers bouddhique Chronique du Palais de Cristal*, 52.

124 Lionel Casson, *Ships and Seamanship in the Ancient World*, 224.

125 Lionel Casson, *Ships and Seamanship in the Ancient World*, 224.

126 See Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 6. See the illustration of a Myanma warboat on which the rudder shaft appears to be stuck through some kind of clamp, shaped as a head, as well as other examples of the rudders on Myanma warboats in George Bruce, *The Burma Wars, 1824-1886* (London: Hart-Davis, 1973): illustrations between pp. 52 & 53. For the temple mural at Nandamannya, see *Pagan: L'Univers bouddhique Chronique du Palais de Cristal*, 52.

127 For the Western side rudder, see Lionel Casson, *Ships and Seamanship in the Ancient World*, 224f. For the Myanma rudder, see description of the rudder in Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 6. Most of the Myanma literature, however, does not refer specifically to the rudder, perhaps indicating its simplicity. In any case, visual aids, such as temple murals and sketches by Western observers serves to indicate a rough continuity in the design of the rudder and its attachment to the ship. I can find little difference for example, between the rudders described in the mid-nineteenth century and those of the Awa period displayed in the mural at the temple of Nandamannya. For European descriptions see Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 6. For temple mural at Nandamannya, see *Pagan: L'Univers bouddhique Chronique du Palais de Cristal*, 52.

examples I can find from the fifteenth century to the mid-nineteenth century, they seem to have gone through little change.¹²⁸

Above deck, of course, changes did occur, such as varying numbers of masts and decks, but this difference was in the superstructure and not in the construction of the hull. Warboats sometimes were supplied with screens, presumably to defend rowers and crew from arrows and musketballs, as was the case of large *Rahkaing* galliots used in the 1607 battle at Cape Negrais against the Portuguese.¹²⁹ The number of people Myanma boats carried also could be increased by multiplying the number of decks.¹³⁰ Traditional Myanma river craft also bore a wide variety of different cabins, sometimes from one end of the boat to the other, for carrying trade goods, as sixteenth observers noted.¹³¹ Further, depending upon the religious status of items carried on a craft, or on the social status of the passenger, a variety of different things could be added above deck, such as special cabins.¹³² The boats of royalty, important ministers, or military commanders were thus immediately identifiable in a battle. Parasols and sails of particular colors were reserved for such prominent persons,¹³³ and it was by these that enemy ships identified the most important ships of the enemy. As the Malays observed of the Myanma flagship, that bore a parasol for the commander: "it stood out like a hut in a rice-field."¹³⁴ Through careful placement of boards, spacious rooms could be formed on the barges for prominent persons.¹³⁵

- 128 Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855*, 6; George Bruce, *The Burma Wars: 1824-1886*, illustrations between pp. 52 & 53. See also Fig. 1, pp. 4. See the temple mural at Nandamannya, in *Pagan: L'Univers bouddhique Chronique du Palais de Cristal*, 52.
- 129 Fernão Guerreiro, *Relação Anual das Coisas que fizeram os Padres da Companhia de Jesus nas suas Missões*, III, 78; In early Cham and Khmer naval battles, defense of the oarsman was afforded by long, lattice shields made of rattan, through a hole of which, these oarsmen stuck their oars. See H. G. Quaritch-Wales, *Ancient South-East Asian Warfare*, 108.
- 130 Some Mon boats used in the sixteenth century against Awa, for example, had two decks. *Nidana Ramadhipati-katha*, 163f.; Varthema, in the early sixteenth century, described some Myanma boats as having prows "before and behind, and they carry two helms and two masts." Ludovico de Varthema, "The Itinerary of Ludovico de Varthema of Bologna," 175.
- 131 "[T]hey have certaine vessels like Galeasses, which have on both sides from head to steme Cabbins with divers merchandises, and in the middle in stead of the Mast there is a house like ours, so that within them they traffique for store of Muske, Benjamin, and divers Jewels." See Gasparo Balbi, "Gasparo Balbi his Voyage to Pegu," X, 152.
- 132 *Nidana Ramadhipati-katha*, 30; Gasparo Balbi, "Gasparo Balbi his Voyage to Pegu," 151.
- 133 Michael Symes observed, for example, that on the Myanma king's royal barge "[t]he different roofs were painted white, a colour that belongs exclusively to the royal family." Michael Symes, *Journal of his Second Embassy to the Court of Ava in 1802*, 174.
- 134 C. Skinner (ed. & trans.), *The Battle for Junk Ceylon: The Syair Sultan Maulana Text, Translation and Notes* (Dordrecht-Holland: Foris Publications, 1985): 151.
- 135 As Michael Symes explains, "[m]y barge was sixty feet in length, and not more than twelve in the widest part; by taking one thwart beam near the stern, laying a floor two feet below the gunwale, and raising an arched roof about seven feet above the floor, a commodious room was formed, fourteen feet long, and ten wide, with a closet behind it ... On each side of the

Similarly, nipa-thatch canopies could be added to provide important persons with shelter from the elements.¹³⁶

Another varying element of the boat superstructure was the symbolic design of the head of the prow. The structure of the prow remained the same, emanating out of the line of the keel, lodged to the hull and protruding almost vertically out of the water, but with a slight sloping outward. The carved images on the prow and the figure-head of the prow, however, differed dramatically from boat to boat depending on the boat's mythological theme. These differences were more pronounced in royal barges, but warboats utilized these themes as well. The best examples of this can be found in Thai royal boats which have been retained for ceremonial use today.¹³⁷ Bas-reliefs, chronicle descriptions, and the sketchings of early modern European visitors to mainland Southeast Asia, also provide supporting evidence. The Myanmas and the Mons both used *Hansa* heads on their boats, as well as *garudas*, and other important figures.¹³⁸ The variety and application of mythological figures on the head of the prow of Myanma warboats seems to have been a common feature of precolonial Southeast Asian and Bengali warboats.¹³⁹ I doubt, however, if the different prow figure-

cabin a small door opened on the platform, and there were three windows which, when raised, admitted a free circulation of air. The roof was made of bamboos, covered with mats, and over all was extended a painted canvass that effectually secured us from the heaviest rain. The inside was neatly lined with matting ..." Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 223f.

- 136 As one nineteenth British observer noted of Myanma royal barges involved in a religious festival: the "roof [is] thatched with the leaves of the water-palm; a most effectual protection from the fierce and penetrating rays of a tropical sun." Christopher T. Winter, *Six Months in British Burmah; or, India Beyond the Ganges in 1857*, 70. See also the reference in the *Nidana Ramadhipati-katha*, 31.
- 137 See, for example, the illustrations in "The Royal Barges in Colour," in *Royal Barges: Poetry in Motion* (Bangkok: Government Public Relations Department, 1988): 35-51. This comparison is important, for, as Quaritch Wales argues, the figureheads of the prows of Thai royal boats seem to have been influenced the Myanma example. Specifically Quaritch Wales points to the use of the *Hansa* figure-head, which is not derived found in classical Khmer boats and must have come from the Mons, with which the Myanma and Mon boats owe a common debt. See Quaritch Wales' argument in H.G. Quaritch Wales, *Siamese State Ceremonies: Their History and Function*, 114f.
- 138 H.G. Quaritch Wales, *Siamese State Ceremonies: Their History and Function*, 114f.
- 139 Paris, for example, discusses the use of mythological creatures as figure-heads on the prows of warboats in the cases of Khmer and Vietnamese warboats in P. Paris, "Les Bateux des Bas-Reliefs Khmers," 336f. See discussion of both the Khmer and Thai examples of such figureheads in H.G. Quaritch Wales, *Siamese State Ceremonies: Their History and Function*, 114f. For Bengal, see the use of prow figure-heads, including peacocks, alligators, makaras, lion-heads and elephant-heads in Radha Kumud Mookerji, *Indian Shipping: A History of the Sea-borne Trade and Maritime Activity of the Indians from the Earliest Times*, with an introduction by Sir Brajendranath Seal (Calcutta: Kitah Mahal Private Ltd., 1962): 152, 158; Some early Mediterranean galleys utilized mythological figure-heads on their prows as well. See Lionel Casson, *Ships and Seamanship in the Ancient World*, 174.

heads *per se* served any function, outside of the symbolism they offered, and a study of such symbolism is beyond the scope of this paper.

Myanma ship-building in the early modern era involved two separate spheres: river and coastal boat-building and deep-sea ship-building. The latter category of ship-building is beyond the scope of this paper, and I will thus limit my comments to the first category, river and coastal boat-building. The first category of boat-building, that of river and shallow-draft coastal boats, was chiefly the preserve of indigenous shipping, although, in some cases, shallow-draft river and coastal boats were built commercially for Western traders involved in the "country trade," mainly in India.¹⁴⁰ The river and coastal boat-building was widespread throughout Myanma, and the technologies required were a common feature of everyday life for much of the indigenous population.¹⁴¹ The technologies required for building shallow-draft river boats, that, by design, could easily be applied to coastal purposes as well, were so common that Alaung-hpaya, when he required a large river fleet to fight the Mons, simply ordered villages along the Aye-ra-wa-ti to build him hundreds of boats. Within a short period of time Aye-ra-wa-ti villagers and townspeople provided Alaung-hpaya's forces with five hundred vessels. As George Baker observed in 1755:

[I]n June, 1755, when finding it necessary to provide himself with more fighting Boats ... and as he passed by every Place, gave orders, for them respectively, to call in the former Inhabitants, and obliged them to build a number of fighting Boats, in proportion to the number of the People; many

140 See the plan to build flat-bottomed boats for English country trade in Letter to James Macrae from Fort St. George, 28 September 1729, *RFSG: Diary and Consultation Book, 1729*, vol. 59, p. 90. See the building of English long boats, in General Letter to Fort St. George, 11 February 1731, *RFSG: Despatches from England, 1730-33*, vol. 32-7, p. 70; on a Madrass galley built at Pei-hku see General Letter to the Company from Fort St. George, 1 October 1733, *RFSG: Despatches to England, 1733-35*, vols. 10-11, p. 2.

141 See the descriptions by Western observers of the multitude of small boats used by the local population along rivers in Sebastião Manrique, *The Travels of Sebastien Manrique*, I, 134, 205, 208, 382; Ralph Fitch, "The Voyage of Master Ralph Fitch Merchant of London," X, 185; Hiram Cox, *Journal of a Residence in the Burmhan Empire*, 49. In the 1680s, visiting Persians described the Ta-nin-tha-ri area thus: "the standard form of transport in that country is boat and indeed this means of travel is very comfortable and inexpensive ... so boats are the mainstay of the populace, the very pivot of these people's lives. Their boats are their houses as well as their markets. They ride their boats wherever they wish, tie them up alongside one another and do all their buying and selling without going ashore." See 'Ibn Muhammad Ibrahim (c. 1685), *The Ship of Suleiman*: 47; William F.B. Laurie, *The Second Burmese War*, 121. See also Gasparo Balbi's observation that: "every house hath a Boat to transport their people from one side of the River to the other: there are many houses of poor people made upon great planks with edifices of wood or great canes built on them, which they guide wither they will, to buy and sell any sort of merchandise." Gasparo Balbi, "Gasparo Balbi his Voyage to Pegu," X, 163. Fernão Lopes Castanheda also claimed that in Lower Burma, at least, "each house has a small parao (prau)." See Fernão Lopes Castanheda, *Historia do Descobrimento e conquista da India Pelos Portugueses*, V, 20.

of which I saw in my way down, and all of which will probably be ready by the time he returns to Dagon, which he purposed to do in November, with, as he said, 1000 Boats ... but by the best Information I can get, his Boats will not exceed 500 ...¹⁴²

By the late eighteenth century, however, the supply of river boats from Aye-ra-wa-ti villages and towns was regularized, as Michael Symes noted in 1795.¹⁴³ River and coastal boats also were built in small villages along rivers in Rahkang, and in the 1630s, Sebastião Manrique bought such a boat from the villagers who built it.¹⁴⁴

Indeed, one of the most salient features of Myanma boat-building, and boat-building in other areas of mainland Southeast Asia and Bengal as well,¹⁴⁵ was the flexibility of the working environment, the adaptability of the carpenters to the environment and variety of building materials, and the spread of ship-building traditions and skills geographically and culturally. As I have mentioned, the building of river boats was common to the villages and towns of the Aye-ra-wa-ti. Not only could boats be built domestically, throughout the kingdom, at a rapid pace, but Myanma armies fighting abroad, in foreign areas, and with different types of wood available (such as using silk-cotton trees), could build rapidly large numbers of boats when required to do so.¹⁴⁶ Late eighteenth century observers, such as Cox and Symes noted the same spread of shipping technologies and geographical location of shipbuilding.¹⁴⁷ Special river boats, such as royal barges, however, required intricate decorations and presumably numerous specifications regarding religious or mythological symbolism, as was

142 George Baker, "A Short Character of the King of the Buragmahns," in A. Dalrymple, *Reprint from Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 70.

143 As Michael Symes explains: "[e]very town of note in the vicinity of the river, is obliged to furnish a certain number of men, and one or more boats, in proportion to the magnitude of the place." Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320.

144 Sebastião Manrique, *The Travels of Sebastien Manrique*, I, 350.

145 Seventeenth century Bengali shipwrights also seem to have been found in many provinces, and were not located simply in the ports. See Kumud Mookerji, *Indian Shipping*, 163.

146 In 1562, for example, when Bayin-naung prepared to attack Ayudhya, he had boats built on the Aye-ra-wa-ti after crossing the mountains. See the *Nidana Ramadhipati-katha*, 102. Later, in 1569, while attacking Lanchang, Bayin-naung "sent his officers to cut timber [in a wood of silkcotton trees] and build boats: hlawgas of 13 or 14 fathoms' length and dugouts. In a week or so this was done and the washstrake fitted, and he set them to work painting them with vermilion and gilding them, ready for launching." *Nidana Ramadhipati-katha*, 138f.

147 Cox noted that, during the period in which weapons and men were being collected for an invasion of Thailand, he saw "twenty-one new boats lying along the bank near Patoune." Hiram Cox, *Journal of a Residence in the Burmhan Empire*, 425.

true of the construction of palaces and temples,¹⁴⁸ and these boats were thus built carefully in certain towns, such as Dala.¹⁴⁹

Traditional Myanma river-war tactics showed remarkable continuity in the early modern era. Some tactics were fostered by the special geographical context of fighting on often narrow rivers. Evidence from other areas of precolonial Southeast Asia suggests that grappling by one ship of another allowed for boarding and a consequent battle on the two ships thus linked together.¹⁵⁰ Boarding of enemy boats to overwhelm the defenders still occurred in the nineteenth century.¹⁵¹ Narrow rivers also provided the possibility of using firerafts to destroy an enemy fleet and sending ships laden with burning straw against enemy ships was a consistent tactic used by Myanma naval strategists throughout the precolonial period.¹⁵² This tactic was particularly successful against large European ships, which lacked the ability to turn quickly and safely on rivers, or to do so with enough speed.¹⁵³ When the English invaded Lower Myanma in 1825, however, they used smaller gun-boats, *sampans*, and steam vessels, all of which seem to have been quicker and more agile than the larger, deeper-draft vessels that Europeans tried to use on the Aye-ra-wa-ti in the eighteenth century and before. It may have been for this reason that firerafts no

148 See entire discussion in Robert Heine-Geldern, *Conceptions of State and Kingship in Southeast Asia*, Cornell University Data Paper, no. 18, 1956, Ithaca, New York: Cornell University Southeast Asia Program, 1956.

149 See Banya Dala, "Razadirat Arei-taw-poun," 311.

150 Quaritch Wales, referring to Cham and Khmer naval battles in an earlier period, noted the following scene displayed on a bas-relief on the Banteay Chmar: "two men have thrown grappling irons from the prow of the Khmer barge, which have taken fast hold of the Cham boat's stern. While these men haul on the rattans the first of the Khmer soldiers springs aboard the enemy craft." See H.G. Quaritch Wales, *Ancient South-East Asian Warfare*, 109.

151 Horace Hayman Wilson, *Narrative of the Burmese War in 1824–26*, 98.

152 See use of firerafts in *Nidana-Ramadhipati*, 70f., 108, 126f. The Burmese used firerafts against the Mon fleet in 1755. See Robert Jackson "English at Dagon, 1755," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791–7 of Portions Relating to Burma*, 103f.; see also Victor B. Lieberman, "Europeans, Trade, and the Unification of Burma, c. 1540–1620," 211; Lister Maw, *Memoir of the Early Operations of the Burmese War* (London: Smith, Elder, and Co., 1832): 19, 46, 50, 53, 95; Major Snodgrass, *The Burmese War: Detailing the Operations of Major-General Sir Archibald Campbell's Army, From Its Landing at Rangoon in May 1824, to the Conclusion of a Treaty of Peace at Yandaboo, in February 1826* (1827, Reprint: Delhi: B.R. Publishing corp., 1985): 105f.; Horace Hayman Wilson, *Narrative of the Burmese War in 1824–26*, 113.

153 See examples in Fernão Lopes Castenheda, *Historia do Descobrimento e conquista da Índia Pelos Portugueses*, II, 475. When three hundred Mon ships, the King of Pei-hku's "Snow", three English ships and one French ship come upriver to attack Alaung-hpaya's Myanmas at Dagoun, the Myanmas "having set fire to a Jungodo [boats fastened together] of Boats, these driving down towards the Fleet, compelled them to weigh and fall down the River, by which means they avoided the danger, though the French Ship very narrowly escaped being burnt ..." See Robert Jackson, "English at Dagon, 1755," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791–7 of Portions Relating to Burma*, 103f.

longer posed a significant threat and were consistently and effectively evaded.¹⁵⁴

Ramming was another tactic that showed continuity in the early modern period. Both galleys and Chinese junks, despite the later introduction of cannon into their superstructures were well-suited for ramming and boarding tactics.¹⁵⁵ Larger boats could easily run down and overturn smaller boats. In a 1666 battle between the Rakhkaing and the Moguls, many of the Rakhkaing ships were "sunk by the fire or ramming of the Mogul fleet."¹⁵⁶

Outside of the port-hole eventually cut to allow the introduction of the cannon barrel, which I will discuss further below, the only functional addition to the prow seems to have been the metal tusks or blades that were fixed on either side of the prow, or jutting out from it. Groslier has suggested that the "curved blades" found attached to the prows of Khmer and Cham boats in classical Cambodian bas-reliefs were not purely ornamental and instead served as important armaments on such warboats.¹⁵⁷ The protruding metal "blades" probably served, in warfare, to dig into the side or the ends of an enemy boat, and thus cause great damage to the enemy boat. Quaritch Wales, in criticizing Groslier's observations regarding these metal blades, suggests that such blades did not serve the same purpose as rams used in early European warfare. The European rams, he argues, were pointed at the waterline of enemy boats, while the blades on Khmer and Cham warboats were turned upwards. Thus Quaritch Wales sees these blades as a vital part of the makara figure-head, and, at most, provoked terror in the enemy.¹⁵⁸

I disagree with Quaritch Wales' argument. Wales made a fundamental error when he assumed that the blades on mainland Southeast Asian war-boats were aimed at too high of an angle to effect damage on enemy craft. His view may be based on the assumption that, when ramming a boat, an attack boat would drive towards the low center of an enemy boat. The situation, however, in which hundreds of boats approached each other from two directions on a narrow river meant that attacking boats would meet each other head-to-head. In other words, one rarely had the opportunity in river battles to maneuver in a position to drive

154 See the use of firerafts by the Myanmas, and their evasion by British shallow-draft vessels in H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 19, 46, 50, 53, 95; Major Snodgrass, *The Burmese War*, 105f.; Horace Hayman Wilson, *Narrative of the Burmese War in 1824-26*, 113.

155 Carlo Cipolla, *Guns, Sails and Empires*, 123f.

156 Jadunath Sarkar (tr.), "The Conquest of Chatgaon, 1666 A.D.," *Journal of the Asiatic Society of Bengal* (New Series) 3, no. 6 (June, 1907): 414.

157 As Groslier explains: "Je suis assez disposé à ne pas voir là un pur ornement qui, exposé en pareil endroit, eût été brisé à chaque abordage, mais, au contraire, de véritables éperons en métal acérés et tranchants." George Groslier, *Recherches sur les Cambodgiens: D'Après Les Textes et les Monuments Depuis les Premiers Siècles de Notre Ère*, (Paris: 1921): 112.

158 See H.G. Quaritch Wales, *Ancient South-East Asian Warfare*, 112.

through the broad-side of an enemy boat and only the tall prows of two opposing boats would hit each other. Keeping this in mind, one should also note that the examples of the blades found in the Cambodian bas-reliefs as provided in sketch form in Groslier, were not all curved up at a great angle, and appear to be potentially damaging to the prows of larger enemy boats. Myanma *than* boats (war-boats with metal blades or hooks) were particularly designed to use their metal-blades as offensive weapons. The Myanma boat-blades had three purposes in battle. First, they were used to damage enemy boats.¹⁵⁹ Second, these blades were used to “cut-up” (*hkwei*) enemy boats.¹⁶⁰ The third application of these blades is even more interesting. By impaling the prows of enemy boats with hooks (*cheikngin*), the enemy boats thus hooked could be captured by dragging (*yu*) them back into one's own group of boats.¹⁶¹ Since one might be attacked from the stern or the prow, the Myanmas equipped their *than* boats with such blades or hooks on both the stern and the prow.¹⁶² It appears again that metal blades or spikes added to the prow of warboats was a common feature of precolonial mainland Southeast Asian river warfare.¹⁶³ I do not mean to suggest, however, that the Southeast Asian rams were the same massive constructions found in early Mediterranean galleys,¹⁶⁴ for they were not. Instead, they indicate the efficiency of Myanma and mainland Southeast Asian war-boat design. Further, the application of the stern and prow blades and hooks for combat purposes does not mean that they did not have a symbolic function as well. Indeed, these blades may have fit well with the mythological theme of the head of the boat,¹⁶⁵ and thus this may again be an example of the ingenious Southeast Asian way of not allowing function to interfere with symbolism.

Continuity is also apparent in strategies in which river boats took advantage of the narrow rivers or the mouth of a river, and the dependence upon river systems for the transport of food to towns and fortresses, to blockade a riverport by cutting off riverine access to such towns. Such boats could be stationed closely to one another, forbidding the passage of enemy supply boats, or could even link themselves together with their oars or ropes and thus again prevent passage by

159 U Kula, *Maha-raza-win-kyi*, II, 171f. I am grateful to U Saw Tun, for this reference.

160 U Kula, *Maha-raza-win-kyi*, II, 171f.

161 U Kula, *Maha-raza-win-kyi*, II, 171f.

162 U Kula, *Maha-raza-win-kyi*, II, 171f.

163 For an example of these blades on Cham and Khmer warboats of the classical era, see the illustrations offered in Figure 72 (C, D, E, G) in George Groslier, *Recherches sur les Cambodgiens*, 110.

164 See the description of the rams in Lionel Casson, *Ships and Seamanship in the Ancient World*, 85.

165 As Quaritch Wales explains, “As tusks they were an essential part of the makara figure-head, and had a function either magical or to inspire fear into the enemy.” See H.G. Quaritch Wales, *Ancient South-East Asian Warfare*, 112.

the enemy.¹⁶⁶ Finally, a traditional tactic of river-warfare was to sweep the enemy's oars, or otherwise deny the enemy oars for their boats, for, given the primacy of oars for propulsion in river warboats, without oars, a boat was defenseless.¹⁶⁷

I have not yet found any evidence to support the view that any pre-firearm tactics were abandoned with the later introduction of firearms. Such a change may have occurred, but I will have to wait until more information is available before I can suggest otherwise. For now, I will turn to the introduction of firearms into Myanmar river-warfare. I will attempt to show that rather than changing the traditional tactics that I have mentioned above, firearms enhanced some of them and added new tactics to an already rich and effective Myanmar tactical repertoire.

b. Harbingers of change: the arrival of firearms and their introduction into Myanmar shipping in the early modern era

The first significant change in Myanmar coastal and river shipping prior to the nineteenth century, came with the introduction of artillery to Myanmar river shipping, not in the basic structure of river and coastal ships, but in both the superstructure and in combat tactics (as I will explain below). The structure of boats below the deck remained generally the same, which was in sharp contrast to hull adaptations by Asian shipping elsewhere, as I will explain below, when I discuss the changing design of Myanmar deep-sea vessels. Unlike the Indo-Arab sewn boats, for example, whose lashings and flexible hull could not stand the emplacement of cannon,¹⁶⁸ the strong, mainly single-piece hulls of Myanmar river and coastal boats made the structure of these boats an ideal base of support for placing cannon. As a mid-seventeenth-century Persian account noted of Rakhaing coastal and river ships, they were "so strongly made of timber with a hard core ... that balls of zumburaks and small cannons cannot pierce them."¹⁶⁹

Early modern Myanmar kings had five basic means at their disposal in order to procure firearms. First, foreign traders probably introduced Myanmar kings to guns in the first instances as gifts, as was the case in other areas of Southeast

¹⁶⁶ U Kula, *Maha-raza-win-kyi*, II, 140f.; U Maung Maung Tin, *Kon-baung-hset Maharaza-win-taw-kyi*, I, 95; For a description of this usage of river and coastal boats in the case of the precolonial Chams and Khmers, see H.G. Quaritch-Wales, *Ancient South-East Asian Warfare*, 113.

¹⁶⁷ Having destroyed several of the warboats of the seven Shan *sawbwaw*s, the Shan boatmen fled ashore at Pye and mixed with the land army. The Shans could not flee Pye by water, as Tabin-shwei-hti, when he had shattered two of their boats, had come out and seized their oars. U Kula, *Maha-raza-win-kyi*, II, 140f.

¹⁶⁸ K.N. Chaudhuri, *Trade and Civilization in the Indian Ocean*, 149–151.

¹⁶⁹ Jadunath Sarkar (tr.), "The Feringi Pirates of Chatgaon, 1665 A.D.," 420.

Asia.¹⁷⁰ Acquisition of firearms as presents from traders, when these gifts are considered together, they probably served as an important supply of firearms for Myanma rulers.¹⁷¹ Second, firearms were often purchased from foreign sources.¹⁷² Third, mercenaries often brought their own weaponry when they were hired. Indian Moslem mercenaries who served Myanma rulers prior to the Portuguese entry into Southeast Asia in the sixteenth century, for example, often brought their own cannon and muskets.¹⁷³ Fourth, weapons acquisition through capture was a significant source of firearms for the Myanmas, and remained so until the end of the Kon-baung dynasty.¹⁷⁴ Fifth, the Myanmas could make their own firearms. Although we have evidence that gun-founding was established in many insular Southeast Asian sultanates in the mid-sixteenth century by Ottoman gunsmiths,¹⁷⁵ sources on Myanma are not rich in detail concerning indigenous gun-founding, perhaps indicating that gunfounding was not as prevalent there as elsewhere. We do know that the Myanmas were able to found at least some firearms, although there is not enough evidence to suggest from whom they received the technologies, or why gunfounding did not expand from the

170 Anthony Reid, *Europe and Southeast Asia: the Military Balance*, Centre for Southeast Asian Studies, Occasional Paper no. 16 (Townsville, Queensland: James Cook University of North Queensland, 1982): 3.

171 See the following gifts of firearms and firearm-related items to Awa kings: a present of gunpowder, shot, muskets, and brass carbines mentioned in George Baker, "Captain George Baker's Journal of a Joint Embassy to the King of the Buragmahns," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 52; a gift of a fowling-piece, powder, and muskets in Captain Jackson, "English at Dagon, 1755," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 82f.; one four-pound gun, one pair of brass-mounted pistol blunderbusses, one "fuzze piece" mounted, one piece of brass field artillery, some gunpowder, and a supply of shot, in Robert Lester, "Ensign Robert Lester's Proceedings on an Embassy to the King of Ava, Pegu, & c.," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 107, 125. In 1738, one present from the English Resident at Than-lyin, for example, which accompanied the request for the release of an Englishman from the Cauza D'Fogo (the prison)," included thirty firearms, a barrel of gunpowder, as well as brimstone. See Letter from Jonathon Smart and Others, Syrian, to the King of Ava, 2 October 1738, *RFSG: Letters to Fort St. George, 1738-39*, vol. 24 (Madras: Superintendent, Government Press, 1932): 9f. Even in the nineteenth century, many of Myanma's firearms were originally provided as presents, including a small Whitworth. R. R. Langham-Carter, "The Burmese Army," *Journal of the Burma Research Society* 36, pt. III (December, 1937): 262.

172 R. R. Langham-Carter, "The Burmese Army," 262.

173 Victor B. Lieberman, "Europeans, Trade, and the Unification of Burma, c. 1540-1620," 207. Also see the case of early-fifteenth-century Indian mercenaries, fighting on behalf of Pei-hku at Pathein, who appear to have come as a complete unit armed with both cannon and muskets, being described as the "amyauk-thei-nat," Banya-Dala, "Razadirat Arei-taw-poun," 328.

174 R. R. Langham-Carter, "The Burmese Army," 262.

175 Anthony Reid, *Europe and Southeast Asia: the Military Balance*, 3.

little exercise to which this technology was put by sixteenth and seventeenth century Myanmas.

The supply of firearms was uneven and thus all guns acquired, whether of good quality or bad, were hoarded, and often applied in warfare. As a result, it is likely that Myanma kings carefully considered the question of how and where they would apply firearms. I would speculate, for I have no direct evidence yet to support this hypothesis, that where Myanma kings applied their firearms (in which groups, in which places, and so on) indicates what Myanma kings thought was important to the security of the kingdom and their position on the throne. This point should be kept in mind as I discuss, below, how firearms were applied to naval warfare. I will suggest that the application of firearms to war-boats indicates that river and coastal boats were seen as an important factor in the defense of the Myanma kingdom and central control, just as enemy cannon-armed boats were seen as an important threat.

Although the Myanmas and Mons possessed firearms and cannon as early as the beginning of the fifteenth century, perhaps earlier, it seems that ordnance, at that time, was not yet introduced into the structure of river-craft, and were merely carried by them.¹⁷⁶ Fifteenth century descriptions of Myanma river craft, for example, reveal that artillery was carried on boats, not for use on them, but most likely for transporting them so that they could be used on land. While early sixteenth century descriptions suggest that the Myanmas tied a cannon to a log, they may or may not have been linked structurally to the vessel.¹⁷⁷

Early sixteenth century ships, however, appear, at least among Mon craft, to have incorporated cannon as a permanent fixture on river craft. Portuguese traders claimed that early sixteenth century Mon ships were "armed" with cannon (as opposed to simply transporting such cannon to be used on land).¹⁷⁸ Certainly, by 1543, some of Ta-bin-shwei-hti's river boats were armed with cannon, for we find large attack boats (*taik-hlei-kyi*) under Bayin-naung's command firing large cannon (*amyauk-kyi-mya-ta-pu*) from their decks during their attack on Pye.¹⁷⁹ Sometime afterwards, even large canoes were armed with cannon as a permanent fixture, for "cannon" was incorporated into the individual name of the boat, such as *amyauk-tin-shwei-laung-kyi* ("great golden canoe with can-

176 In c. 1466, when the King of Hanthawati went to Awa, the Myanma fleet attacked his, the *bayin* of Awa "bade the crews of the dugouts and barges stand by and sent cannon and muskets aboard ..." *Nidana Ramadhipati-katha*, 10.

177 Genevieve Bouchon & Luis Filipe Thomaz, *Voyage Dans Les Deltas du Gange et de L'Irraouaddy*, 343.

178 "I observed this parao for some time and saw that it carried two falcons, a wooden cannon... All the other paraos were armed in the same way, mostly with two or three cannons as well as falcons." See Genevieve Bouchon & Luis Filipe Thomaz, *Voyage Dans Les Deltas du Gange et de L'Irraouaddy: Relation Portugaise Anonyme (1521)*, 343.

179 U Kula, *Maha-raza-win-kyi*, II, 140, 141; 203f.

non").¹⁸⁰ The introduction of cannon into the superstructure of the indigenous coastal and river boats may or may not have been a result of Mediterranean fastening techniques which had been introduced by the Portuguese, and which were in the process of being adopted by Southeast Asian insular warfleets.¹⁸¹ Until more data is available, however, no conclusions can be made, but the coincidence of adaptation in both areas is highly suggestive. Mon river boats used in the mid-eighteenth century river-war against Myanma included both cannon (*amyauk*) and mortars (*sein-pyaung*), at least in the larger war boats,¹⁸² and a portion of Myanma's river boats by 1754 were equipped with "great guns."¹⁸³ By the late eighteenth century, the Myanmas fitted artillery into the structure of the boat by constructing a gun carriage, attached to the boats by means of "lashings to strong bolts on each side, and swivels [were] frequently fired on the curvature of the stern ..."¹⁸⁴

Some helpful information concerning the manner in which cannon were fitted into Myanma river and coastal boats, may be gained by examining Thai royal boats, used for ceremonial purposes today, but still built in the same manner as they were in the sixteenth century. Such a comparison must be made with great caution, however, as Thai boats may or may not have experienced changes in their river craft in the same way as the early modern Myanmas. Early modern descriptions of Thai river boats, however, seem to indicate a rough similarity with early modern Myanma boats.¹⁸⁵ Further, it is probable that boatbuilding

180 This boat was used in a 1638 royal ceremony. See Royal Order, 9 July 1638, *The Royal Orders of Burma*, I, 382f.

181 Pierre-Yves Manguin, "Of Fortresses and Galleys: The 1568 Acehnese Siege of Melaka, after a Contemporary Bird's-eye View," 621.

182 U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 95.

183 English observers claim that out of eighty *balongs* used by the Myanmas at Dagon in 1754, nine had "great guns." See Letter from R. Jackson, John Whitehill, etc., from Dagon river, to the 'Apparaza' of Pei-hku, 12 July 1755, in *RFSG: Country Correspondence, Military Dept., 1754*, vol. 2 (Madras: Superintendent, Government Press, 1912): 17.

184 Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320.

185 The following accounts all seem to confirm that many of the basic features and applications of Myanma river and coastal boats, as I have described, were generally found in Thai river and coastal boats. See *A Relation of the Voyage to Siam: Performed by six Jesuits sent by the French King, to the Indies and China in the year 1685* (1688, Reprint, Bangkok: White Orchid Press, 1981): 187-90; Jeremias van Vliet, in L.F. van Ravenswaay (tr.), "Translation of Jeremias van Vliet's Description of the Kingdom of Siam," *Journal of the Siam Society* 7, pt. 1 (1910): 22, 256, 30; Nicolas Gervaise, *The Natural and Political History of the Kingdom of Siam*, translated, with introduction and notes, by John Villiers (Reprint, Bangkok: White Lotus Co., 1989): 96, 112, 213-5. For the details of the construction of a solid keel and then strong hull in Thai river and coastal boats in the early modern era, see Rachawadi Ngamsanga, *Rua Thai Samai boran: Moradok thang sainam an lamkha khong khonthai tangta samai kon prawattisat/ Rachawadi Ngamsanga khian*, 11-43, passim. See also vague references to royal barges, rowers, and the number of cannon allotted per ship (one) in Prince Vivadhanajaya (trans.), "The Statement of Khun Luang Ha Wat," reprinted in *Siam Society*:

techniques passed back and forth between the Thais and the Myanmas throughout the early modern era.¹⁸⁶ How did the Thais incorporate cannon into their river boats?

Traditional Thai river gunboats, perhaps constructed in the same way as comparable Myanma river and coastal warboats of the early modern era, had a port-hole cut into the prow of the boat, a few feet, and sometimes higher, above the waterline. The barrel of an artillery piece was then placed through this hole, and a good deal of room was provided between the front-rowers and the prow, presumably to allow a gun-crew to load and fire the piece.¹⁸⁷ With low-level projection, such cannon were presumably most useful in firing at other boats or at positions close to shore. In addition to the front-piece of the ordnance, a swivel gun could still be attached to the sides of the bow or stern, as was done in Myanma boats. Although this arrangement of cannon compares favorably with European descriptions of Myanma gunboats, we also know that larger Myanma river boats utilized more cannon, often three pieces. On the other hand, Thai boats had a good deal of deck space, with potential room for other pieces of naval ordnance to fire from the sides of the boats. Further, we know that by the sixteenth century, Thai warboats included, in addition to cannon, mortars,¹⁸⁸ which could have been placed anywhere on the boat, and could send fairly heavy projectiles upwards, out of the boat, for great distances. There is evidence that the Mons, in their mid-eighteenth century revolt, also equipped their boats with mortars, in addition to cannon.¹⁸⁹ Thus, the Thai introduction of cannon into the prow may indicate a similar practice by the Myanmas, but until more specific information is available concerning Myanma river boats and their use of cannon, we can only speculate.

The introduction of cannon to Myanma river and coastal ships had a strong influence on Myanma river-boat tactics, although, again, change was gradual.

Selected Articles from the Siam Society Journal, Vol. VI, *Relationship With Burma-Part 2*, (Bangkok, 1959): 216–220, *passim*.

- 186 During at least one of the Myanma invasions of Ayudhya, Thai royal boatmen were specifically sought out as prisoners and taken back to Myanma, presumably to serve on Myanma royal boats. It is possible that the Myanmas were also able to learn about Thai shipbuilding techniques, if they differed at all from those of the Myanmas. See reference to the special attention given to the capture of Thai royal boatmen, in one case, five hundred of them, by the Myanmas in Prince Vivadhanajaya (trans.), "The Statement of Khun Luang Ha Wat," 187.
- 187 See illustrations of Thai royal warboats in Rachawadi Ngamsanga, *Rua Thai Samai boran: Moradok thang sainam an lamkha khong khonthai tangta samai kon prawattisat/ Rachawadi Ngamsanga khian*, 75–93. See also illustrations of cannon and port-holes in the *Rattanakosin Bicentennial 1982: Special Issue, The Royal Barges* (Bangkok: n.p., 1982): 516, *passim*, and in *Royal Barges: Poetry in Motion*, 35–67. It also seems that early modern Thai boats only were equipped with two men cannon-crews, at least for the front ordnance piece. See Prince Vivadhanajaya (trans.), "The Statement of Khun Luang Ha Wat," 217.
- 188 *Hman-nan maha-raza-win-taw-kyi* (Mandalay: Hanthwaddy Press, 1957): II, 408.
- 189 U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 95.

Traditional tactics did not disappear, as a result of the introduction of artillery to shipping, as I will explain, but instead were enhanced by additional naval and land support tactics made possible only by the application of firearms. The introduction of cannon into the deck super-structure of Myanma ships in the early sixteenth century, was also directly responsible for new tactics in river combat. While Reid believes that Southeast Asians failed to effectively incorporate cannon into the superstructure of insular warboats, this was only a disadvantage against European ships, which Reid suggests were more effectively armed.¹⁹⁰ Often, the introduction of artillery into the superstructure of Myanma river and coastal boats permitted these ships to fire at each other from a distance,¹⁹¹ allowing ship-to-ship battles to be decided even before the ships came into direct contact.¹⁹² In one famous 1543 naval battle at Pye, Ta-bin-shwei-hti's warboats destroyed the Shan fleet with cannon, before the Shan fleet could commit any offensive action. As U Kula relates:

Min-taya-shwei-hti (Ta-bin-shwei-hti) arrived at (Pye) and then, after dawn broke, the water forces (of the seven Shan *sawbwas* on the one hand and that of Ta-bin-shwei-hti on the other) attacked each other. Min-taya-shwei-hti's attack-boats were big. The *sawbwas'* attack-boats were small. The *sawbwas'* boats did not have big cannon (like Ta-bin-shwei-hti did). After Min-taya-shwei-hti fired with big cannon, two of the *sawbwas'* attack boats were broken up and then the (*sawbwas'*) water force was destroyed ... Many soldiers and officers were killed.¹⁹³

Likewise, the Myanma ability to row their boats backwards, always keeping the prow fixed on the enemy as they retreated, allowed the Myanmas to continue to fire at the enemy.¹⁹⁴ Fighting on narrower rivers, however, helped even the balance between a smaller force and a larger boat force, if the smaller force took advantage of the situation. In 1601, for example, the Portuguese blocked a narrow passage (*hum lugar apertado*) of the river with very few boats, from which

190 Anthony Reid, *Europe and Southeast Asia: The Military Balance*, 5.

191 Ta-bin-shwei-hti's river warboats in a 1543 battle near Pye with the famous seven *sawbwas* of Upper Myanma, for example, used their "big" cannon to destroy two enemy warboats, cutting them in-two. See U Kula, *Maha-raza-win-kyi*, II, 140, 141.

192 See the Bayin-naung's assault on Pye forces at Myei-hte in 1543, in which his large warboats were armed with cannon and fired on the Pye boats in U Kula, *Maha-raza-win-kyi*, II, 140f., 203f.; Planning to strike the approaching Myanma ship force on sight, for example, Dalapan in 1754, placed both cannons and mortars into large warboats that he stationed in the middle of the river. U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 95. See also the naval battle on the Aye-ra-wa-ti in 1755 between the Mons and Myanmas near Dagon, in which the ships were not close enough to board, but still the Mons were able to force the Myanmas off of their light craft, while Myanma musket-fire persuaded European vessels that came long with the Mons to pull back and remain a farther distance away. Robert Jackson, "The English at Dagon, 1755," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 87.

193 U Kula, *Maha-raza-win-kyi*, II, 140.

194 Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 321.

they fired on the approaching Myanma ships, causing great damage and forcing them to withdraw.¹⁹⁵

Another new development was an enhanced participation of rivercraft in land operations, when mobile boats and immobile field artillery were brought together. Prior to the sixteenth century, for example, Myanma shipping could only transport troops to land positions,¹⁹⁶ prevent enemy ships from arriving and unloading their own troops, or keep supply boats from saving a besieged city. Further, as Lieberman has explained, artillery used in the field, as opposed to elephants and cavalry, were "relatively immobile," which undermined their effectiveness in determining campaigns against several of the Shan states.¹⁹⁷ When cannon were introduced into river shipping, however, warfare in the lowlands of the Aye-ra-wa-ti basin (and the valleys of other mainland Southeast Asian river-systems) changed as boats, armed with cannon, served as fast, mobile, and effective cannon-batteries, destroying land forces and fortress walls. While boat-based artillery could not aid Myanma forces sent to put down Manipuris and other highland peoples, they could prevent such raiders from devastating major lowland towns located along rivers, and superiority in boats and cannon probably saved Awa from being sacked by the Manipuris in 1739.¹⁹⁸ Mid-sixteenth century land armies also came to rely heavily on the accompanying ships situated on the river.¹⁹⁹ One application of ship-based artillery in support of land operations was to provide effective sheltering fire in support of troops fighting or escaping on shore. In 1568, for example, when the victorious Myanmas chased the survivors of the La-gón-thi-ma *myo-sa's* army back to their boats, the Thai boats provided sheltering fire from their mortars (*sein-byaung*) and great cannon (*mya-ta-pu-kyi*), which caused great destruction among the Myanma troops.²⁰⁰

195 Manuel de Abreu Mousinho, *Breve Discurso em que se Conta a Conquista do Reino do Pegú*, 21.

196 Quaritch Wales explains that this was also a usual responsibility of Cham and Khmer war-boats in the twelfth century. See H.G. Quaritch Wales, *Ancient South-East Asian Warfare*, 112.

197 Lieberman notes, however, that arquebusiers were sometimes placed on castled elephants. See Victor Lieberman, "Europeans, Trade, and the Unification of Burma, c. 1540-1620," 216.

198 Lieberman says that this attack was prevented because the Manipuris lacked boats, the there was a river between them and Awa, and because the Manipuris were intimidated by the Myanma cannon. See Victor Lieberman, *Burmese Administrative Cycles: Anarchy and Conquest, c. 1580-1760*, 210.

199 Later, among the Myanmas who observed the actions of the Mons, the Prince of Tayokhmaw is told by Bayin-naung: "[i]f we wait for them to attack and our fleet gives way before superior numbers, the land party will be sore beset--elephants and horses and all." *Nidana Ramadhipati-katha*, 71.

200 *Hman-nan maha-raza-win-taw-kyi*, II, 408.

The effect of land-based artillery on siege warfare has already been discussed elsewhere. I suspect, however, that Myanma cannon could cause greater damage to Myanma fortress walls than Lieberman has given them credit for.²⁰¹ Most Myanma fortresses, for example, were not composed of the thick stone walls that required huge siege guns in medieval and early modern Europe. While the sixteenth century fortress-walls of Pei-hkó were made of both brick and lime,²⁰² and Mrauk-U was surrounded by 'massive' stone-walls,²⁰³ the walls of other Myanma town-fortresses, from the sixteenth to eighteenth centuries, were consistently made of brick and earth or teak,²⁰⁴ quite different from the stone fortresses of early modern Europe.²⁰⁵ Of the few descriptions we have of stone walls in early modern Myanma, nearly all indicate that these walls were thin and of low height.²⁰⁶ Smaller cannon, then, could have greater destructive effect on Myanma fortress walls, than similar cannon could on European fortress walls. By the time of the first Anglo-Myanma War, many Myanma defensive positions were simply bamboo stockades,²⁰⁷ although I lack sufficient evidence to suggest with any certainty why this was the case. I speculate that these

201 Victor Lieberman, "Europeans, Trade, and the Unification of Burma, c. 1540-1620," 211.

202 For Pei-hku, see Manuel de Abreu Mousinho, *Breve Discurso em que se Conta a Conquista do Reino do Pegú*, 3f.

203 See English descriptions of Mrauk-U's ancient walls in Horace Hayman Wilson, *Narrative of the Burmese War in 1824-26*, 155f.

204 In 1520, Portuguese passing Dagon described its fortifications as follows: "[a]fter dark we stopped in a town called Dagon which was encircled with brick ramparts studded with redoubts and loop-holes which compared favourably with those found in Portugal." See Genevieve Bouchon & Luis Filipe Thomaz, *Voyage Dans les Deltas du Gange et de L'Irraouaddy*, 340. In 1599, the walls of Taung-ngu were not very high, had no gun batteries, and were in very poor shape. See Fernão Guerreiro, *Relação Anual das Coisas que fizeram os Padres da Companhia de Jesus nas suas Missões*, I, 294. In the 1750s, Awa's walls were made of brick and Pye was surrounded by two walls, an ancient wall made of crumbling brick, and an outer wall made of teak timber. See George Baker, "Short Account of the Buragmah Country," in A. Dalrymple, *Reprint from Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 74, 77. In 1825, the English noted that "Meaday" was surrounded by an old brick wall. See Major Snodgrass, *The Burmese War*, 191. When fighting abroad, it seems that the Myanmas tended to build teak wood stockades. See introduction to C. Skinner (ed. & trans.), *The Battle for Junk Ceylon*, 13. The stockade at "Donoobew" was also made of teak, but was backed by brick. See Major Snodgrass, *The Burmese War*, 165.

205 Anthony Reid, *Europe and Southeast Asia: The Military Balance*, 5.

206 As one Portuguese prisoner in Awa observed in 1616, "it is surrounded by a low laterite wall, of no great thickness." See Letter from Father Manoel da Fonseca, at Ava, to the Viceroy of India, 29 December, 1616, in "Father Manoel da Fonseca, S.J., in Ava (Burma) (1613-1652)," Rev. L. Besse, S.J. (trans.) & Rev. H. Hosten, S.J. (Annotated and edited), *Journal of the Asiatic Society of Bengal* (New Series) 21 (1925): 31.

207 See H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 93f. The Myanmas also erected wood stockades during their occupation of Junk Ceylon in 1809. See the introduction to C. Skinner (ed. & trans.), *The Battle for Junk Ceylon*, 13f.; Horace Hayman Wilson, *Narrative of the Burmese War in 1824-26*, 92f.

were temporary defensive positions, erected at a short notice, as they were located outside of the major towns, and along the rivers. This view is supported to a small degree by evidence that the Myanmas went to great lengths in the First Anglo-Myanma War to resurrect any ancient position they could in a short period of time. The old Portuguese fortified factory at Than-lyin (Syriam), presumably Philip de Brito's fortress which A-nauk-bet-lun overcame in 1613, was rapidly returned to a defensible state: "[the Myanmas] having cleared the jungle from its surface, filled up the chasms with palisades, and mounted guns upon the ramparts."²⁰⁸ Until more information is available, however, I can suggest nothing more.

Of course, as I have mentioned, there were a few exceptions. Some defensive redoubts, and temples designed to afford protection to members of the royalty and the *sangha* were built to protect against European cannon, presumably fired from ship. In the case of Rahkaing forts and temples, for example, the strongest walls were built, traditionally, on the north and the east sides, since these were the directions from which the hill peoples and the Myanmas and Mons had usually attacked. With the arrival of the Europeans, the effect of cannon had to be taken into consideration. In the case of temples such as the Shitthaung-para, for example, the whole temple became fortified to withstand European cannon-balls.²⁰⁹

In general, however, Southeast Asian fortress walls were vulnerable to cannon-balls throughout the early modern era. As Anthony Reid has suggested, Europeans in Southeast Asia took the wise step of building their fortresses out of stone, which made them nearly invulnerable to Southeast Asian attacks, but many Southeast Asians never seem to have taken up this practice.²¹⁰ Thus, we find that while cannon had an important effect on Southeast Asian fortifications, numerous sieges of European fortresses such as Melaka and Than-lyin appear to have been futile. Eventually Than-lyin fell in 1613, as Reid points out, not due to Awa guns, but due to a traitor within the fortress who opened the gates to the besiegers.²¹¹ Lieberman has suggested that the failure of Ta-bin-shwei-hti's forces to take Ayudhya or Mrauk-u after excessively long sieges may have been due to the use of Portuguese artificers and cannon by both cities prior to the

208 Horace Hayman Wilson, *Narrative of the Burmese War in 1824-26*, 94; Mrauk-U, the ancient capital of Rahkaing was restored in a similar way, the Myanmas piling wood up to fill in hole in the thick stone walls. Horace Hayman Wilson, *Narrative of the Burmese War in 1824-26*, 155f.

209 As Forchhammer explains, "when Minbin erected the Shitthaungpara the cannons of the Dutch [sic, the mention of the Dutch is an obvious anachronism] and Portuguese had already been heard and felt in the capital of the Mrauk-U dynasty." See his more elaborate description of the fortified pagoda in E. Forchhammer, *Report on the Antiquities of Arakan* (Rangoon: Superintendent, Government Press, 1892): 20.

210 Anthony Reid, *Europe and Southeast Asia: The Military Balance*, 4.

211 Anthony Reid, *Europe and Southeast Asia: The Military Balance*, 5.

First Taung-ngu invasions.²¹² Another possible explanation for the Ta-bin-shwei-hti's difficulties was the failure of the Myanmas, at least in the case of Mrauk-U, of using sufficient boats, and thus boat-artillery. In Mrauk-U, for example, Ta-bin-shwei-hti's forces included a land army under Bayin-naung that had crossed over the Rahkaing Yoma and a land army that Ta-bin-shwei-hti personally led north to Mrauk-U after landing at Than-twei (This was Ta-bin-shwei-hti's third invasion of Rahkaing, the previous two never reaching the Rahkaing capital). Lacking ships, the Myanma besiegers succumbed to flooding when the Rahkaings broke open the dikes that held back huge artificial lakes around the city.²¹³ I speculate that had Ta-bin-shwei-hti brought ships (during this third invasion of Rahkaing) supplied with naval guns, he might have avoided this disaster.

Whatever Ta-bin-shwei-hti's failures at Ayudhya and Mrauk-U, along Myanma's coasts and rivers, he appears to have been the first Myanma ruler to use cannon-armed ships in siege-warfare. In 1540–1541, in the sieges of Mokta-ma and Pye,²¹⁴ and again at Pye in 1543,²¹⁵ for example, Ta-bin-shwei-hti used "great cannon" as well as muskets on many of his boats. Although more evidence is needed before I can say anything conclusive about the effect of ship-based cannon, I think that Ta-bin-shwei-hti's successes in both cases were aided to a significant degree by cannon-armed boats. Descriptions of these two sieges, for example, mainly involve ships and naval bombardment, and I find little mention of the use of land-based artillery by Ta-bin-shwei-hti's forces at either Pye or Mokta-ma.²¹⁶ In any case, for the remainder of the early modern period ships and ship-based artillery were prominent features of Myanma siege-warfare, and played very important roles in victories over coastal and river strongholds. One of the key factors in the 1613 siege of Than-lyin by Anauk-bet-lun, for example, involved the application of his ships south of Than-lyin,²¹⁷ which prevented vital reinforcements and new supplies of gunpowder from

212 See Victor Lieberman, "Europeans, Trade, and the Unification of Burma, c. 1540–1620," 213.

213 See G. E. Harvey, *History of Burma: From the Earliest Times to 10 March 1824 the Beginning of the English Conquest* (London: Frank Cass & co., 1967): 140. Cesare Fedrici seems to have heard about this First Taung-ngu disaster, for he comments: "[The] King of Pegu deviseth night and day how to make this King of Rachim his subject, but by no meanes hee is able to doe it: because the King of Pegue hath no power or armie by Sea. And this King of Rachim may arme two hundreth Gallies or Fusts by Sea, and by land hee hath certaine Sluces with the which when the King of Pegu pretendeth any harme towards him, hee may at his pleasure drowne a great part of the Countrey." See Cesare Fedrici, "Extracts of Master Caesar Frederike his eightene yeeres Indian Observations," X, 138.

214 U Kula, *Maha-raza-win-kyi*, II, 180f., 185f.

215 U Kula, *Maha-raza-win-kyi*, II, 40–141.

216 U Kula, *Maha-raza-win-kyi*, II, 140f.; 180f., 185f.

217 Victor B. Lieberman, "Europeans, Trade, and the Unification of Burma, c. 1540–1620," 219.

reaching the fortress in the last months of the siege. While sixteenth century Myanmar may have lacked large siege guns, Europeans seem to have been impressed with the size of naval ordnance used in sieges of rebel Mon towns in the 1750s.²¹⁸ Ship-based artillery also played an important role in the royal reduction of Awa, held by rebels, in 1760.²¹⁹

Artillery also challenged Myanmar river and coastal boats, as it provided new ways for land-based forces to defend against maritime assaults. One of the first applications of firearms in Myanmar seems to have been to defend the Mon fortress at Patheingyi from a Myanmar flotilla in c. 1404.²²⁰ During naval assaults on land fortresses, great damage on the besieging ships could be done with musket and artillery fire from shore.²²¹ Just as ship-based artillery and muskets could provide sheltering fire to one's soldiers fighting on land, land-based artillery and muskets could provide sheltering fire to one's forces fighting on the river.²²² The threat to land forces from ship-borne artillery, was thus met by the application of firearms to positions which commanded rivers and close coastal seas.²²³ Strong contingents of cannon-armed war-boats guarded major ports on the sea-coast.²²⁴ By at least the eighteenth century, fortified piers, armed with cannon

218 English observers at Dagon in 1754 describe Alaung-hpaya's boat contingent as having eighty "blongs, 9 of which have great guns." See the letter from R. Jackson, John Whitehill, etc., from Dagon river, to the 'Apparaza' of Pei-hku, 12 July 1755, in *RFSG: Country Correspondence, Military Dept., 1754*, vol. 2: 17.

219 This siege, however, was delayed by the use of muskets by the defenders. See Captain Alves, Extracts from the Diary of the Proceedings of Alves' Embassy, 1760, in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 160.

220 Banya Dala, "Razadirat Arei-taw-poun," 328f. See also U Kula, *Maha-raza-win-kyi*, I, 367.

221 The Myanmar soldiers evidently fired cannon at the Portuguese when they first reached Patheingyi, for the Portuguese say that their vessel was cut through by an artillery shell. See Fernão Lopes Castanheda, *Historia do Descobrimento e conquista da India Pelos Portugueses*, II, 475; Alaung-hpaya's soldiers also used guns from their fortress against a British boat at Negrais in 1759. Captain Alves, "Account of the Settlement at Negrais, being cut off," in A. Dalrymple, *Reprint from Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, 133. The Myanmar soldiers also cannonaded English warboats in 1825. See Horace Hayman Wilson, *Narrative of the Burmese War in 1824-26*, 112, 145, 198f.

222 *Nidana Ramadhipati-katha*, 126f.

223 In the 1766 siege of Ayudhya, on 7 September, the Myanmar soldiers: "seized a strong position about a quarter of a league distant from the town, and from this point a park of artillery commanded the shore and thus rendered them masters of the river." Francois Henri Turpin, *History of the Kingdom of Siam*, 163. In the early nineteenth century, the Myanmar soldiers used swivel guns and cannon placed in stockades to hit approaching Malay-Thai boats, during the battle for Junkceylon. C. Skinner (ed. & trans.), *The Battle for Junk Ceylon*, 107.

224 See J.S. Furnivall, ed. & tr., "The History of Syriam-Syriam Yazawin," *Journal of the Burma Research Society* 5, pt.2 (1915): 53; As a mid-seventeenth century Persian account claims, "every year the Rajah of Arracan sends to Chatgaon a hundred ships full of soldiers and artillery munitions, with a new Karamkari ... when the former Karamkari, with ships of the last years, returns to Arracan." See Jadunath Sarkar (tr.), "The Feringi Pirates of Chatgaon," 421. Sebastião Manrique says of that Portuguese captives, using Rakhaing boats

also protected entrances to the rivers,²²⁵ and this practice was still in use when English forces invaded Lower Myanma during the First Anglo-Myanma War.²²⁶ Further, by the nineteenth century (1885), the Myanmas planted mines in the Aye-ra-wa-ti river, presumably to prevent landings by British boats.²²⁷

Muskets also became a common feature among the armaments carried on board river boats, at least from the early sixteenth century. In 1521, a Portuguese observer commented on the numerous arquebuses which he saw on a group of Myanma river boats.²²⁸ Seven large ships were armed with muskets (*pyaung-thei-nat*) during the siege at Mokta-ma in 1540,²²⁹ as were Myanma warboats used against Pye in 1541.²³⁰ On many boats, the number of musketeers outnumbered the bowmen. During the 1581 campaign against Rahkaing, for example, each of the major ships in the invading fleet was assigned musketeers in varying amounts, from ten to thirty on each of the named vessels.²³¹ On some ships the ratio of musketeers to bowmen was as high as three to one, and, on some of the other ships there were musketeers and no bowmen at all. Overall, in this particular campaign, 780 men, out of 6,301 in the crews, were musketeers (and 475 were assigned to the cannon), while bowmen numbered only 190.²³² In 1754, the huge Awa boat (*hlei-taw-kyi*), which the chronicles called the *hmaingthei-thei rei-hlei-taw-kyi*, was armed with one hundred muskets,²³³

guarded Chittagong in the same way in the 1630s. See Sebastião Manrique, *The Travels of Sebastien Manrique*, I, 285.

- 225 See Alaung-hpaya's adoption of this practice in the Letter from R. Jackson, John Whitehill, etc., from Dagon river, to the 'Apparaza' of Pei-hku, 12 July 1755, in *Records of Fort St. George: Country Correspondence, Military Dept., 1754*, vol. 2: 17. Of the early nineteenth century: "[at the entrance to the Rangoon river] is a very good wooden pier, with a crane, and steps for landing goods, & c. Here also is placed the saluting battery, on which is mounted sixteen old iron guns, four or six pounders, which are run out through port-holes, in a wooden breast-work, like a ship's side ..." Hiram Cox, *Journal of a Residence in the Burmahan Empire. London 1821*, with an introduction by D.G.E. Hall (n.p.: Gregg International Publishers, Ltd. 1971): 6.
- 226 See H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 86. See the battery on the king's wharf at Yangon in Horace Hayman Wilson, *Narrative of the Burmese War in 1824-26*, 68.
- 227 Ma Kyan, "Prizes of War, 1885," *Researches in Burmese History*, no. 3 (1979): 133f.
- 228 Genevieve Bouchon & Luis Filipe Thomaz, *Voyage dans les Deltas du Gange et de L'Irraouaddy*, 343.
- 229 U Kula, *Maha-raza-win-kyi*, II, 181.
- 230 U Kula, *Maha-raza-win-kyi*, II, 185.
- 231 *Nidana Ramadhipati-katha*, 164.
- 232 *Nidana Ramadhipati-katha*, 164.
- 233 U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 94f. This may have been the same boat that George Baker estimated at having seventy-five men armed with firelocks and an equal number armed with bows and arrows. See George Baker's observations in the introduction to A. Dalrymple, *Reprint from Dalrymple's Oriental Repertory, 1791-7 of Portions Relating to Burma*, viii.

and the "minister of muskets" (*thei-nat-wun*), was placed in command of the boat's fighting force of 350 men.²³⁴ While Symes noted that Myanma oarsmen were armed only with spears and swords, he also noted the presence on these warboats of thirty soldiers armed with muskets.²³⁵

Muskets were an effective means to scare off exposed oarsmen in enemy boats, which often served to decide naval battles on the Aye-ra-wa-ti, even before the opposing forces had come into physical contact. In the 1755 river battle at Dagon, for example, the Mons were able to scare the Myanmas from their lighter craft, while Myanma musket-fire forced European vessels accompanying the Mon fleet to observe the battle from a greater distance after two Mons on deck were killed.²³⁶ The Myanmas on the ships generally, or snipers in the masts specifically, also picked off the captains or other leaders on the enemy ships. During the Portuguese attack upriver on Mrauk-U in 1615, for example, the admiral of the Goan fleet was killed by two musket-balls, one in his forehead and the other in his left eye.²³⁷ Muskets were also very useful during grappling, when enemy ships were dragged aside one's ships with grappling hooks and ropes.²³⁸ Ships locked together in this way then became miniature battlegrounds in which handheld firearms could play an important role. Likewise, as with the application of artillery, muskets fired from land positions became useful weapons to prevent landings by enemy forces, as the English discovered in the First Anglo-Myanma War.²³⁹

The limited number of cannon that river and coastal boats carried, however, was perhaps the only advantage that European boats had over indigenous boats on rivers. Belligerent European deep-sea vessels had difficulty navigating the Aye-ra-wa-ti alone; if they were guided and protected by large numbers of Myanma river boats, however, they could serve as floating naval batteries. It was for this reason that mid-eighteenth century Mon river fleets, during their war against Alaung-hpaya, brought a few large European vessels with them.²⁴⁰ The

234 U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, I, 94–96, 115, 122.

235 As Michael Symes describes the personal arms of river boatmen: "[t]he rowers are severally provided with a sword and a lance, which are placed by his side whilst he plies the oars. Besides the boatmen, there are usually thirty soldiers on board, who are armed with muskets ..." Michael Symes, *An Account of an Embassy to the Kingdom of Ava*, 320.

236 Robert Jackson, "English at Dagon, 1755," in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791–7 of Portions Relating to Burma*, 87.

237 Manuel de Fariah y Sousa, *The Portugues Asia: Or the History of the Discovery and Conquest of India by the Portugues* (London: C. Brome, 1695): III, 228.

238 For a good description of how mainland Southeast Asian warboats grappled one another, allowing for a on-board battle between two opposing forces, though from a period prior to the introduction of firearms, see H.G. Quaritch-Wales, *Ancient South-East Asian Warfare*, 109.

239 See H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 20, 23, 25.

240 As the English observed a Mon river-fleet preparing to attack the Myanmas: "the whole Fleet was seen coming on; consisting of two large French Ships, and the King of Pegu's

Myanmas also quickly armed the newly-introduced steamers, such as the king's steam-ship, which was supplied with six pieces of artillery.²⁴¹

At this point, several things can be said. First, for over five centuries, there is little evidence that Myanma river and coastal boats underwent any major structural change below deck. The solid structure of Myanma river and coastal boats allowed for the easy introduction of limited numbers of naval ordnance. Further, the introduction of firearms, in the case of coastal and river boats, enhanced, rather than detracted from their performance. Myanma coastal and river boats could still be used to carry trade goods, to transport people, and to serve as war-boats. Additionally, river and coastal boats became more important to Myanma kings with the introduction of artillery, for they could now participate in warfare, at least along rivers and along coasts, in ways that they could not have before. The introduction of artillery then, posed no threat to the position of early modern Myanma's coastal and river boats. Thus, generally, Myanma construction of river and coastal shipping shows a structural consistency and continuity. For now, however, I would like to turn to the nineteenth century introduction of the steam-ship and comment briefly on its impact on Myanma river and coastal shipping.

The effect of the steam-ship on Myanma ships was multifarious, but, for now, I will only examine its implications specifically for Myanma river and coastal craft. In addition to Malay boats, shallow-draft gunboats, and flatboats, including *thambans*, the British also used one small steam-ship for their assaults on Myanma river positions in the First Anglo-Myanma War.²⁴² By the Second Anglo-Myanma War, the large-scale application of steam-ships by the English helped to establish British naval hegemony on Myanma's rivers.²⁴³ British steam-ships were shallow and did not ground like other heavier boats, and were able to push up the Aye-ra-wa-ti while towing other gunboats with them.²⁴⁴

Snow, all manned and armed; and 200 fighting Ballongs ...” See Robert Jackson, “English at Dagon, 1755,” in A. Dalrymple, *Reprint From Dalrymple's Oriental Repertory, 1791–7 of Portions Relating to Burma*, 86f. See also Consultation, Fort St. George, 9 February 1756, in *RFSG Diary & Consultation Book, 1756*, vol. 85, 39.

241 Ma Kyan, “Prizes of War, 1885,” *Researches in Burmese History*, no. 3 (1979): 133.

242 J. S. Furnivall (tr.), “From the Chronicles of Mergui,” *Journal of the Burma Research Society* 12 (1922): 27. See H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 62, 70; Henry Havelock, *Memoir of The Three Campaigns of Major-General Sir Archibald Campbell's Army in Ava*, 287. For a listing of boats, all of which seem to be shallow-draft, used to approach Yangon, see H. Lister Maw, *Memoir of the Early Operations of the Burmese War*, 67.

243 At the beginning of the Second Anglo-Myanma War, the British used a flotilla of four river steamer-ships and numerous “flats (shallow draft barges with covered decks).” Alister McCrae & Alan Prentice, *Irrawaddy Flotilla*, 41.

244 Horace Hayman Wilson, *Narrative of the Burmese War in 1824–26*, 174, 199.

I am tempted to suggest that the steam-ship, in principle, functioned similarly to traditional Myanmar river-warboats. The steam-ship pushed up the Aye-ra-wa-ti by means of paddles, just as many Myanmar river boats were propelled upriver by means of large numbers of oars. I do not yet have sufficient data, however, to compare the relative and cumulative surface-area of steam-ship paddles and Myanmar oars, but I suspect that they would compare favorably. This comparison aside, the generative force of the paddles and oars was quite different, and this is where the chief impact of the introduction of the steam-ship rested. With sufficient fuel, steam-ships could ply a strong, adverse current on a continuous basis and make headway, whereas Myanmar oarsmen would soon tire and would have to be replaced once they reached a royal check-point.²⁴⁵ Further, the lack of oarsmen allowed steam-ships to load higher numbers of troops than Myanmar warboats could, although the steam-engine itself would still take up a considerable amount of space on the ship. Perhaps the steam-engine could supply stronger propulsion than Myanmar riverboats and thus permit wider, bigger ships, with numerous decks that would multiply a steam-ship's loading capacity. I suspect that this was true, and certainly the steam-ships used by the British in the second and third Anglo-Myanmar wars seem to bear this observation out. With more deck-space and greater propulsion, the steam-ship could carry greater numbers of ordnance,²⁴⁶ and larger ordnance, as well as higher numbers of troops. While earlier Western ships plying Myanmar's river waters may have also had a greater carrying capacity for cannon and troops, their deep-draft hulls and dependence on sails alone for propulsion severely limited the scope of activities, as I have explained above.

The Myanmar was thus open to the permanent introduction of the steam-ship, which they called *Mi-thin-baw* (lit. fire-boat), in the 1840s because the British, with their possession of Rahkaing and Ta-nin-tha-ri, had hemmed them in. The Myanmar soon possessed steam-ships that were just as capable, even more so, at plying coastal and riverine waters. The Myanmar was no longer concerned only with acquiring Western cannon, but kept a careful watch on new shipping innovations in Western fleets that could be applied to river and coastal waters, especially Western steam-ships. As opposed to the earlier lack of interest in Western shipping designs for coastal and riverine craft, the Myanmar now sought new Western maritime technologies for application in these shallow wa-

245 This does not mean that steam-ships were immune to the effects of a strong, adverse current. Such currents slowed the progress of steam-ships upriver significantly. What is important, is that steamships could make some progress and maintain their struggle upriver. See Alister McCrae & Alan Prentice, *Irrawaddy Flotilla*, 45.

246 The Myanmar seem to have discovered the greater capacity of steam-ships for ordnance, and on the king's steam-ship, instead of the two-three cannon that was the maximum allotment to a traditional indigenous river or coastal boat, they supplied it with six pieces of artillery. See Ma Kyan, "Prizes of War, 1885," 133.

ters. The impact of the steam-ship left a clear impact on the Myanma psyche.²⁴⁷ And, in 1825, when the English steam-ship succeeded in going upriver without oars, the Myanmas abandoned their boats, for fear that it would cut through them.²⁴⁸ On the other hand, most references to Myanma steam-ships found in the indigenous chronicles simply list steam-ships amidst numerous other river boats, rather than giving them a special and individual importance.²⁴⁹ Whether this accurately reflected Myanma military application of steam-ships requires further research.

The first steam-ship acquired by the Myanmas which I can find mention of in the indigenous sources, was bought in 1844, from a trader who resided in the "city of Bingala [Chittagong?]," for forty thousand *kyats*.²⁵⁰ By 1855, the king had a personal steam-boat, used in one case to ferry important diplomatic representatives to the capital.²⁵¹ Two small steam-ships, presumably used for commercial traffic between Amarapura and Yangon, were in use by the late 1850s.²⁵² Mindon also had three steam-ships built in Italy and brought to Myanma.²⁵³ By 1870, the Myanmas had eight to ten steam-ships,²⁵⁴ and this number was increased by the later arrival of six more.²⁵⁵ And, just prior to the 1885 war with the British, Thibaw purchased a steam-ship from the Irrawaddy Flotilla Company. This last steam-ship became Thibaw's personal warboat, armed with six artillery pieces.²⁵⁶

247 A prophecy was supposed to have been made. "[T]he King of Ava's sages informed him that, when a vessel should proceed up the Irrawaddy without sails or oars, then, and not until then, would his glory begin to depart. The prediction, was partly fulfilled by the *Diana*, and the eventual treaty which was signed ..." William F.B. Laurie, *The Second Burmese War*, 152. This prophecy was commonly talked about in Pye in 1825. See Henry Havelock, *Memoir of the Three Campaigns of Major-General Sir Archibald Campbell's Army in Ava*, 241.

248 Major Snodgrass, *The Burmese War*, 172.

249 See, for example, U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, III, 74, 372.

250 This boat was 72 *tauns* long, and ten *tauns*, one *maik*, and four *thets* wide. It was six *tauns*, one *maik*, and four *thets* deep. It was completely equipped with 'steam-machinery' [a boiler?]. U Maung Maung Tin, *Kon-baung-hset Maha-raza-win-taw-kyi*, III, 41.

251 See Arthur Phayre, "Private Journal of Arthur Phayre," in Henry Yule, *A Narrative of the Mission to the Court of Ava in 1855, together with the Journal of Arthur Phayre Envoy to the Court of Ava*, with an introduction by Hugh Tinker (Kuala Lumpur: Oxford University Press, 1968): xlv.

252 Oliver B. Pollack, *Empires in Collision: Anglo-Burmese Relations in the Mid-Nineteenth Century*, Contributions in Comparative Colonial Studies, no. 1 (Westport, Connecticut: Greenwood Press, 1979): 121.

253 Alister McCrae & Alan Prentice, *Irrawaddy Flotilla*, 65.

254 Oliver B. Pollack, *Empires in Collision*, 121.

255 Alister McCrae & Alan Prentice, *Irrawaddy Flotilla*, 65.

256 Ma Kyan, "Prizes of War, 1885," 133.

Conclusion

I have attempted to show that any analysis of the impact of European ships and guns on early modern Myanmar shipping requires that we divide into separate categories coastal and river craft, on the one hand, and deep-sea vessels, on the other, for the purpose of analysis. The changes brought by western technologies were uneven and experienced differently by each category of boats. Myanmar river and coastal craft, as I have explained, were better suited to the geographical context of Myanmar's river-systems than early European deep-draft boats were, and thus this category of coastal and river boats experienced greater continuity in hull and even super-structural design. The impact of cannon brought minor adjustments in the design of their superstructure, since the basically solid construction of their hulls allowed for the successful introduction of moderate amounts of artillery. Whether the amount of artillery carried by these boats, compared to that carried by European vessels, was favorable or not was often irrelevant – the deeper draft of European vessels and their lack of oars made them more difficult to operate in close coastal shallows and on Myanmar rivers, even if they could get beyond the bars at river entrances. Of course, when Europeans used indigenous craft or Mediterranean galleys, the European and Turkish counterpart to indigenous coastal and river vessels, Europeans proved to be a greater threat. Perhaps the greatest challenge to indigenous river and coastal craft came with the introduction of steam-ships, which could easily ply river waters, and the smaller, shallow-draft versions of which could handle coastal shallows and river systems and were not vulnerable to changing winds. The introduction of the steam-ship, and the British occupation of the South created a severe crisis for Myanmar coastal and river craft as they, for the first time, no longer held a position of superiority over European vessels. This was coupled with the fact that the river was now permanently opened up to numerous and powerful British colonial military forces, whereas, in the past, indigenous vessels designed for use on the coasts and on major river-systems were a continued source of security for Myanmar indigenous rule, and thus generally served to protect the resources of early modern Myanmar dynasties.

In this paper, I have only sought to examine the impact of artillery and Western ships on Myanmar river and coastal boats and to determine why indigenous craft showed such great continuity throughout the early modern period. The points made in this paper, however, lend themselves to several basic observations, concerning long-term political centralization in Myanmar. I must stress, however, that these further points are speculative and must be tested with thorough studies and a careful review of further evidence. I would suggest that the introduction of firearms into river and coastal boats and naval tactics may have enhanced central control over the Aye-ra-wa-ti, and thus over the lowlands. Cannon-armed river boats served as fast, mobile artillery batteries that sup-

ported land armies fighting close to Myanma's rivers and aided central attempts to besiege rebel towns, especially since Myanma's major towns were all located along rivers. Further, cannon-armed river and coastal boats may have provided an effective means of maintaining central control over the river, as Myanma warboats throughout the early modern era guarded river entrances and forced indigenous and foreign trade boats alike to stop at royal checkpoints to pay customs and have their cargoes checked and recorded.²⁵⁷ Perhaps, most importantly, cannon-armed river and coastal boats were a powerful defense against potential European colonial threats prior to the nineteenth century. In short, artillery and river and coastal boats likely made the Aye-ra-wa-ti, for much of the early modern period, an important bastion of central power.

The ability of Myanma river and coastal vessels to prevent hostile foreign access to the Aye-ra-wa-ti may have helped to promote and sustain the political centralization and related trends of demographic growth, growing domestic commerce, growing cultural homogeneity, and the spread of religious orthodoxy that Lieberman has outlined.²⁵⁸ While demonstrating a clear link between these trends and the vitality of indigenous river and coastal shipping technologies requires more research and is, in fact, beyond the scope of this paper, several points may be suggested here. First, the ability of the Myanma royal court to maintain the Aye-ra-wa-ti as a safe and unified transportation and communication system, without the threat of European or other attacks, may have aided (1) the continual movement of centrally-appointed officials, soldiers and travelers from the capital, Buddhist monks, journeys of the faithful to Buddhist temples, indigenous traders, and a host of others, between the core area of the kingdom (the agricultural heartland of Upper Myanma) and outlying provinces (both north and south of the capital) and *vice-versa*, making more fluid the exchange of ideas and the process of cultural homogenization; (2) the safe movement of trade goods, the ability of the state to secure income from trade on the river in the form of customs duties, and the movement of provincial taxes to the center; and (3) the political center's access to an uninterrupted flow of intelligence regarding activities in the provinces and the political center's unhindered ability to react quickly and directly, which likely helped to lessen provincial autonomy and make the prospects for provincial rebellion more difficult. Finally, the prevention of foreign penetration and raids which had periodically depopulated the Aye-ra-wa-ti and left towns and villages destroyed during periods of disunity,

257 See J. S. Furnivall, ed. & tr., "The History of Syriam--Syriam yazawin," *Journal of the Burma Research Society* 5, pt.2 (1915): 53; Jadunath Sarkar (tr.), "The Feringi Pirates of Chatgaon," 421; Sebastião Manrique, *The Travels of Sebastien Manrique*, I, 285, 334. On river customs see Letter from Andrew Glen to Jonathon Smart, Syrian, 17 March 1741, *RFSG: Letters to Fort St. George*, 1741, vol.26, 38f.

258 Victor B Lieberman, "Local Integration and Eurasian Analogies: Structuring Southeast Asian History, c. 1350-c. 1830," 475-572, *passim*.

may have helped foster the conditions necessary for an increased pace of demographic growth and basic capital accumulation necessary for domestic commercial growth, although this remains speculative until reliable data becomes available.

In the end, however, steam-ships, and the use by the British of heavily armed river and coastal boats helped destroy central hegemony on the Aye-ra-wa-ti. Indigenous river and coastal craft, armed with cannon or not, lost their military and transportation hegemony on the Aye-ra-wa-ti. The most dramatic blow may have been the loss of the coast altogether, which ended central hopes of maintaining the Aye-ra-wa-ti as an internal system of transportation, trade, communication, and defense. With the loss of complete control of the Aye-ra-wa-ti, Mindon desperately sought to at least maintain full Myanma access to the river, going so far as to consider having the Aye-ra-wa-ti declared an international river,²⁵⁹ in the hopes that this would reduce British control over Myanma's connections with the outside world, trade-oriented and otherwise. The Aye-ra-wa-ti would only be resurrected as the integrated system it once was under full British colonial control of Myanma decades later.

²⁵⁹ See Oliver B. Pollack, *Empires in Collision*, 121.