

Ensuring Safe Passage to and from the Prince of Wales' Island: An Historical Perspective

'English Penang', 1786-1846

Professor Dr Vivian Louis Forbes

*Know that the basic qualities required by the navigator are intellect and much experience.
When a man possesses both experience and intellect then he will be accurate and reliable.*
Sulaimān al-Mahrī, ca. 11th century

*It is often of the utmost benefit, and always very satisfactory, to Navigators to be possessed of particular plans of the
Places whereto they may, by chance or accident, be carried, as well in as out of the common tracks.*
Alexander Dalrymple, 1777

The evils of having no sound administration of the colonial lights were early foreseen.
Alexander Gordon, 1845

SYNOPSIS

Mariners who are equipped with accurate marine information, who maintain an effective seamanship at all times, and, who can rely on efficient aids to navigation are confident in delivering the cargoes that they are consigned to carry on ships. The early development of Penang's maritime trade can be traced from 1786. The natural harbour of Penang, in an historical context, was an attraction to mariners and shippers. The hydrographical surveying and charting undertaken by the English East India Company and establishment of aids to navigation in the Malacca Strait were major contributions to the enhancement and development of Penang harbour over the past centuries. This study alludes to the principal organisations and individuals that were instrumental in this development.

INTRODUCTION

This study begins with a short introduction of the historical links of trade on land and sea created by, and for, those people along the littoral of the Indian Ocean, its hinterland and indeed, by traders outside the basin. It is followed by a brief discussion on the role of the English East India Company (EIC) in establishing Penang Island as a major port and then alludes to the operations of certain persons, who with exceptional foresight, ensured the safety of navigation to and from the ports of Southeast Asia by means of undertaking hydrographical surveys, producing nautical charts and establishing and maintaining lighthouses and light beacons at specific locations for the benefit and safety of mariners.

The lives and experiences of the people who used the Indian Ocean from prehistoric to modern times were participants in a rich and vibrant history which has helped shape the modern world. The Indian Ocean basin has provided a marine highway linking a variety of cultures, economies and peoples over many centuries. It was the geographical stage setting whereon conflicts were witnessed and spheres of influence established. Many nations among the littoral States, and indeed, further afield historically had, and still have, access to the sea lanes and trade routes that criss-cross the vast expanse of this ocean. The sea routes were linked, in turn, to overland trade routes which have connected land and sea operations in a

tight economic relationship, in which the patterns of the seasonal monsoons interacted with the rhythms of agricultural life to set the pace of maritime activity.

Seaborne trade across the Indian Ocean was primarily determined by what Braudel referred to as the *longue durée* or long-term rhythms of the natural and human environment. Whereas, the major rhythms were established in the long term by climate and agriculture which determined basic social attitudes towards architecture, clothes, cultures, food and trade, the random political and natural events affected the rhythms of human activity.

The cultures and economies of the Indian Ocean nations before the arrival of the European colonisers and administrators (pre-1480s) were essentially self sufficient within the geographic confines of the Indian Ocean basin, and were only marginally determined in the *longue durée* by influences from outside the region. The human and economic terms was a porous frontier hence the social limits were in constant flux which was in response to changing patterns of human activity on land and at sea.

Navigation in the Indian Ocean which was based on 'pilot-guides' had reached a perfection almost equivalent to that of the 15th century navigators, even to the possible compilation of navigational literature. However, as trading expanded within the basin and European maritime powers entered the Indian Ocean to monopolise the spice trade in particular, there was a realisation for the need to prepare maps of the lands and charts for enhancing the sea routes and ports within the Indian Ocean basin. The quotations of three practitioners alluded to above highlight their concerns for safety to navigation through awareness of nautical knowledge and for the security in delivering cargo transported by ships regardless of the size of the vessels and the port of destiny.

PENANG HARBOUR

The harbour of Penang is located between the island of Penang (also spelled Pinang) and the mainland of the west coast of Peninsular Malaya. Penang is separated by a strait nearly 15 nautical miles in length and varying in width from 1.5 to seven nm. This natural marine feature and major deep-water commercial port was ideally sited for commercial trade at the northern approaches of the Malacca Strait (Selat Melaka). Indeed, it has remained a commercial port and was never intended as a naval base. It can be considered to be the eastern gateway of the Indian Ocean basin. The surface area of the island is about 290 km² (or 110 mi²) off the north-west coast of Malaya; together with a strip of land on the adjoining mainland it forms the state also called Pulau Pinang or simply Penang. In earlier times it was also called Prince of Wales' Island. The island was ceded to Britain by the Sultan of Kedah on 11 August 1786 and was the first British base on the Malay Peninsula.

The EIC was convinced that Penang's location was ideal for trade and a better substitute for Benkulen (Bencoolen), Sumatra Island, which was perceived as being too far from the major trading route. For example, in the first year of its opening in 1786, a total of 85 ships and *prahus* visited the port. By 1802, the number of ships trading at Penang increased to 3,569. Penang was a frontier settlement, as it was the first English colony in Southeast Asia and the furthest of the EIC's outposts in Asia. It was not considered a vital settlement; administration was effected from EIC headquarters in Calcutta which in essence resulted in minimal financial support for infrastructure development. By the end of the 18th century, the China tea trade was important to the EIC and the need for a transshipment point between China and

India became paramount to the EIC. The harbour was transformed into an important port at the northern approaches to the Malacca Strait and the north-western extremity of the Malay archipelago and peninsula – sometimes referred to as the East Indies – a region renowned as a source of abundant and varied commodities, especially spices – cloves, nutmeg and pepper, forest products and tin.

George Town and the Port of Penang were first built on swampy lands that had to be reclaimed to be habitable. Captain Francis Light founded the town for the EIC in 1786 to be a base for trade with the Malay States. Penang was opened as a free port to rival Dutch Melaka (Malacca). The Sultan of Kedah allowed Captain Light to build Fort Cornwallis on the northeast corner of the island. The fort soon became the centre of a busy trading port, and by 1804, the population of the island was about 12,000. The Port of Penang was an integral part of George Town from its beginning. Port of Penang warehouses and godowns were constructed from Beach Street to the ocean. By the late-19th century, a new waterfront quay had to be created for the Port of Penang due to much land reclamation activity.

In 1826, Malacca and Penang, the two British settlements in Malay Peninsula, together with Singapore became the Straits Settlements, under the control of the Government of British India. By 1830, Penang was a thriving port with a steady trading pattern. Singapore became the centre of government for the three areas in 1832. Under the jurisdiction of Colonial Office in London, the Straits Settlements became a Crown Colony on 1 April 1867.

GEOGRAPHICAL DESCRIPTION

The location of Penang and the Malacca Strait were known to the Arabian navigators and mercantile traders as inferred in the pilot-guide. It is opportune to offer here, an example of prose, relating to the topography (geography) of a section of the northwest coast of Peninsular Malaya in the navigational description offered by Ahmad b Majid al-Najdi. For example, he stated (as translated by Tibbetts, 1971):

... The directions given here are quite accurate and the details of the route across the sands near Selangor are very explicit.

Latitudes were measured from the Pole Star (P.S.) and not from the star al-Juday (which is also called al-Sumayya and al-Jāh in Persian).

At 1° is [are] Qedah and Pulau Penang and seawards to the west, Pulau Tanburak, and seawards of this, to the west, Pulau Perak. (As translated by Tibbetts, 1971: p.188)

Further details in the pilot-guide offer the following indication:

Lakāwi placed at 1° P.S. by Sulaimān represents Langkawi Islands. Keda at 1° P.S. and is the Malay state of Kedah and Pulau Pinang is Penang I. off its coast...Pulau Perak is the island bearing the same name about 90 miles off the north-west cape of Penang. (As translated by Tibbetts, 1971: 483)

NAUTICAL KNOWLEDGE FROM ARAB NAVIGATORS

During earlier centuries, and in the absence of nautical charts, as used in the contemporary era, the experiences and knowledge of mariners were recorded in the form of sailing directions as poems and prose. Ahmad ibn Majid who wrote the treatise, *Kitab al-fawa-id fi*

usul al-bahr wa'l-qawa'id translated by Tibbetts (1971) was a *mu'allum* (pilot) sailing mainly in the Red Sea and the Arabian Sea. The crew of the Indian Ocean ship at the time of Ibn Majid had clearly defined duties and seem to have been divided into several ranks for the purpose of carrying out these duties. The actual duties of the *mu'allim* besides navigating a ship were numerous. Once the contract had been signed to carry the cargo from one port to another port, the pilot seemed to have taken charge and began that section of the navigator's art which Ibn Majid called *siyasat*. His contract only ended when he returned the ship to its home port laden with cargo for the opposite end of his journey. The first *fa'ida* (set of instructions) referred to the preparation of the ship for sailing. The second and eight *fa'idas* dealt with those aspects of the navigator's tasks; its importance is stressed in the eight *fa'ida*. These duties differed from those of the *rubban* – the Red Sea pilots.

The 11th century Arab navigators had left an excellent reputation for their skilled seamanship and navigational knowledge. Indeed, there was nothing odd in the fact that Vasco da Gama was able to obtain the services of a *mu'allim* for the crossing of the Indian Ocean from Malindi on the east coast of Africa to Gujerat, on the west coast of India. Sulaimān al-Mahrī in his final summing up in the *Tuhfat al fuhūl* (MS 2559 f.9v, l. 11-10r, l. 10) suggested that mariners:

Know that the basic qualities required by the navigator are intellect and much experience. When a man possesses both experience and intellect then he will be accurate and reliable. If a man has one of these qualities but not the other, he may still be accurate but not in the relationship to the man who has both. It is said concerning intellect and experience, 'which of the two makes for necessary?' the answer is that some things require one and some the other. Thus knowing the routes (diyar) and following the right seasons (mawāsim) are matters for experience; but knowing the form of the stars in the heaven (taṣwir al-kawakib) the elements of calculation (qawa'id al-hisab), calculating longitude from the stars (ighzar wa irqāq) and similar things are a matter of intellect. Measuring latitudes (qiyāsāt) and distances (masāfāt) are matters of both intellect and experience. As for taking calculated bearings to reach fixed ports, that is, the making of correct landfalls; the basis of these are latitude measurements and distances. So that if these are accurate, the landfalls will be accurate and if these are faulty the landfall will be faulty.

Know that if the knowledge of any place is taken from the people who dwell there it will be more accurate than if taken from others unless those others are really experienced in that place. The native is therefore the man to take one's information from. But if the others are established in science and the native obviously knows little, the established man will be more accurate. For in God is all success and on him shall be all reliance. There is no power and no might save in God, the High, the Mighty.

The navigators from Arabia had a method of measuring distance travelled north and south – *qiyas* – and from this, using *tirfa* valuations they could attempt to make oblique measurements, and by using the 'departures' (*zam* between the rhumbs) they could measure a distance east and west. By using the geographical coordinates of *qiyas* and *akhnan* (rhumbs), they could actually produce charts and plot upon them the ship's position without the necessity of using longitude. Ibn Majid refers in his treatise to the charts utilised by mariners of the Mediterranean Sea.

Mariners from Malaya and the eastern archipelago must have exchanged geographical and nautical knowledge with their counterparts from Arabia and elsewhere. The Malay mapmakers acquired a number of European maps and were able to compile from them an original work at more or less a uniform scale, choosing from their diverse sources those features they were familiar with while rejecting other portions. A potential source of these maps was a certain British navigator, Captain Thomas Forrest, who spent many years in the

employ of the East India Company. He was generous in handing out his charts and maps to not only the Bugis, but to other groups he came in contact with. King (Sultan or Rajah) Pahareddin of Maghindano (an old name for Mindanao) presented Captain Forrest with several navigation charts written in Maghindano.

PORTOLAN AND CONVENTIONAL CHARTS

The *Periplus of the Erythraean Sea*, compiled by the Greeks during the first century A.D. was a mercantile mariners' guide to the western Indian Ocean. It commented upon the coastal trading network along the Red Sea and the Arabian Peninsula and east African coastline. These sailors possessed a sense of navigational science as they travelled for many weeks at a time without sighting land. Classical Arabic authors such as Mas'ūdi and texts like the '*Ajā'ib al-Hind*' offer an insight of this science. Portuguese mariners of the 15th and 16th centuries who travelled to India and points further east mention aspects of this science, their instruments and their accurate navigational charts. This last was the only notice we had that these navigators of the Indian Ocean placed their seamanship lore on paper or parchment for future reference.

During the 14th century, *portulant* (or *portalani*) charts, which were drawn on vellum in Genoa and Venice, were used by mariners on ships plying the trade routes of the Mediterranean Sea. The word *portolano* (literally, 'portbook') had been used for some time to refer to an earlier form of written pilot or seafarer's guide, as noted above, and thus *portulan* chart has been used by historians of cartography to differentiate between the written guides and the drawn chart; the latter are also sometimes called 'compass charts'; as the concept of the compass had been set down on a plane chart. These pilot books were also called rutters from the French word *routier*. The medieval seafarer's guide can be traced back to the *peripli* of antiquity. Although only a few fragments of their *peripli* (seaman's guides) have survived, these suggest that nautical knowledge in antiquity was considerable.

An interesting step between the *portolano* and the *portulan* chart is the Italian *isolaria*, or island guide, which included written, and sometime poetic, directions for navigation, together with crudely drawn coastlines along the route between Italy and Constantinople (present-day Istanbul, Turkey). Charts which were of a distinctive Catalan style, employed map scales of *portulan miles* that approximated to the Catalan league of about 6,000 metres.

The conventional nautical chart containing hydrographical survey data in a generalised format, dependant on map scale and map projection with text, symbology and the occasional coastal view, is a much-loved, well-treasured document which is held in high esteem by mariners, map curators and those persons who collect maps as a hobby or for commercial gain. The nautical chart, designed to international standards, is more importantly a tool to aid marine navigation and at the same time it is also a legal document. Commercial as well as military-designated ships are required to carry on board a set of charts that will offer adequate coverage for a ship to navigate across the seas and oceans. Hydrographical surveys and the compilation of nautical charts were undertaken generally in the interests of defence and trade as well as for the advancement of science. The nautical chart like its counterpart, the topographical map of a state, is of national interest and as such should be recorded as a national heritage.

THE HONOURABLE ENGLISH EAST INDIA COMPANY (EIC)

Two institutions: the Honourable English East India Company (EIC) and the British Admiralty's Hydrographical Department were instrumental in providing world-wide coverage of nautical charts, where required, during the 18th and 19th centuries were based in England. The former had a regional focus; the latter, had an agenda that was intended to be global, notwithstanding that political interference and major maritime power rivalry were of major consequences. Both had a national objective at heart: Britain's expanding interests overseas meant that its mercantile marine also stood in urgent need of accurate charts and navigational information on a world-wide basis.

From its first charter in 1600, the EIC operated one of the most extensive shipping operations in support of its trading enterprises during the colonial period. The merchant or mercantile fleet was responsible for carrying cargoes outward to the east, returning richly laden with exotic goods which found a ready (and profitable) market in Europe. The people who commanded these ships were career men who often spent a lifetime in the service of the Company. Voyages to the east were lengthy and uncertain, but the rewards were good, as captain and officers were allowed, in addition to their wages, to ship goods on their own account as 'private trade'.

Although it was a commercial enterprise it possessed some political clout on the sub-continent of India and places further east to as far as Hong Kong. Its particular focus was on gaining a foot in the door on the spice trade which the Dutch, and to some extent the Portuguese, had developed. In the atlas titled: *The East India Pilot* which was published, circa 1772, the statement "*To which is prefixed a general map of the East-Indies, exhibiting the extent of our (EIC) trade and acquisitions*" offers ample evidence of the rationale for the establishment of the EIC and the high regard it held for accurate charts and information for safe navigation. The confidence of the EIC could be seen in the following statement:

Should ever, by the Fate of Empires, the Europeans be expelled from the East, Geography will remain indebted to the Eaft-India [East-India] Company for a Mafs [maps] of Knowledge, unparalleled in the History of paft [past] Times.
[Emphasis added]

Hydrographical surveying and charting activities in the waters off the coastline of Peninsular Malaya and northern Borneo were undertaken by the EIC which was formed in 1599 under an original charter granted by Queen Elizabeth I of England. Hydrographers of the EIC included Alexander Dalrymple, Thomas Evans, James Horsburgh, John and Samuel Thornton and Stamford Raffles.

Alexander Dalrymple

In 1752, Alexander Dalrymple was sent to Madras, India, as a writer at the EIC. In 1759, he was appointed to the Secret Service of the Company to explore the eastern passages of the Indonesian and Philippine archipelagos. Dalrymple had many charts of his own to draw – and to have engraved on copper – of portion of the coast of China, Palawan, Borneo and the South China Sea in general. He outlined his proposal to publish an atlas of the charts and plans of ports in his collection and in volumes he detailed his voyages within the Southeast Asian seas to the year 1764.

The Plan I propofe to purfue is, with the utmoft Expedition to get an Index made to all the Journals, containing the day of feeing every Land or fhool, or having Soundings, fo that as foon as poffible the Company's Ships may have notice of every danger which has been difcovered from the earlieft times: and thus knowing every Ship which has feen any particular danger, the comparifon of the different Journals will facilitate the laying down thereof exactly.
[In this paragraph substitute: 'f' for 's']

In April 1766, he approached the Court of Directors for permission to make copies of charts to assist in reducing his own 'to a General Scale'. His intention was made clear in an advertisement dated 13 February 1769 where he proposed to engrave by subscription, a series of 18 charts (with 'the proper views of land' and other data) of Borneo, Palawan, Mindanao and Sulu, all from his own observations between 1759 and 1764. Many of his charts were of Dutch and Spanish origin, with some from France, Sweden and Portugal and others from Indian and Chinese pilots although the majority were English. Particularly East India Company captains, such as John Watson, John Whiteway and Alexander Sibbald, offered their services and observations while notes 'From British Museum' and 'Laid down from Journals' indicate research work by Dalrymple who had permission in 1770 to take extracts from ships' journals housed in East India House.

It is often of the utmost benefit, and always very fatisfactory, to Navigators to be poffeffed of particular plans of the Places whereto they may, by chance or accident, be carried, as well in as out of the common tracks; I have therefore thought it would be an acceptable fervice to the Publick to engrave the plans of Bays, Harbours, &c. in the East-Indies, which are in my Collection. None of thefe Plans being from my own observations, I cannot vouch for their exactnefs; but although they ought not to be blind-fold and implicitly relied on, they may be of very great ufe and affiftance Dalrymple deliberately excluded general charts: The Work here propofed is intended to be a mere Pilot-Book, confifting entirely of particular plans, without any General or Coafting Charts; and to be nothing more than an exact publication of fuch pieces as are thought worth engraving, with Views of Land, and Nautical Inftitutions concerning the Places to which thefe Plans and Views relate, . . .

The first number appeared on 5 February 1774, with 19 plates and 32 pages of 'explanation'. Dalrymple had avoided 'all ufelefs ornament' in the plans, refticting the engravers in each cafe to a fimple plan (with title and references) within a plain frame incorporating a fcale bar. His fingle extravagance was in views of land, either feparately on the plate or as coaftal profiles of inland hills on the plan. In the letterpreff was a list of 15 'Plates for No. II, nearly finifhed.' The fecond number appeared in May 1774 with 23 plates and 96 pages of letter-preff for Sumatra. Number three, published in Auguft 1774, was fmallier, with 12 plans of the Philippines and four pages of letterpreff. Number four was delayed until after 17 December 1774, though feven of the 12 plates bear dates in Auguft or earlier; this number had 16 pages of 'explanation'.

Before departing for Madras, which he did on the *Grenville* on 24 April 1775, Dalrymple haftened to complete his collection of South Atlantic voyages for publication. Nothing further is known of this, except that he had permission in April 1775 to take fhips' journals from East India Houfe on the *Grenville* to complete the work. Dalrymple had many plates in progress early in 1775. His departure for Madras became imminent, and 'A Collection of Plans of Ports' was fuddenly to be brought to a clofe. Two further 'numbers' were iffued, comprising 17 plates (including Johanna Bay from 1774), 24 pages of 'explanations', and preliminary pages to complete the collection. Though the date in the printed collection is 31 March 1775, Dalrymple could announce on 27 March that the collection had been completed.

In 1779, when Dalrymple was appointed Company Hydrographer, the terms of his appointment provided that, after the East India Company had received 50 imprefions of any

plate he prepared, the plate then became his own property. For nearly 15 years Dalrymple had dual roles; one at the EIC and the other at the Admiralty's Hydrographical Department.

In the tabulation below, there are notations of surveys of Pu. Pinang undertaken by Captain Walter Alves in 1763; of Quedah (Kedah) by James Rennell in 1762, John Allbridge in 1776; and Sambeelan Sands by James Rennell in 1763 indicative of the extensive interest in developing the ports of the Malacca Strait and ensuring safety to marine navigation.

[1	...	Junkfeylon	...					
2 - 1	0-2	E.	Quedah	...	Straits Malacca	...	(John Allbridge)	Capt. Allbridge, 1776
			Vero	...	D?	...	James Rennell	1762
			P? Pinang	...	D?	...	Walter Alves	1763 Capt. Alves
			Sambeelan Islands	...	D?	...	James Rennell	1763
5 - 1	0-4	E.	Straits Calong	...	D?	...	D? and Walter Alves	1763 and Capt. Alves

Table 1: Select hydrographical surveys undertaken in the Malacca Strait

A chart of particular interest to this study is: *36 Po. Pinang [Pinang, Malaya] 5 February 1774 1 - [Not re-issued]* and others of the Malacca Strait, an extract of which is depicted in Figure 1, below, that illustrates the Old and New Paffage [Passage] at the northern sector of the Malacca Strait. Perhaps the chart produced in 1774 was based on the surveys by Alves supplemented with additional subsequent hydrographical surveys.



Figure 1: The Old and New Paffage [Passage], 1782 in the vicinity of Pu. Penang

In 1779, Dalrymple was appointed Hydrographer to the EIC and was tasked to compile, fair draw and print charts for the use of the Company's ships. These charts were compiled from the surveys undertaken by numerous ships' captains from almost every part of the world. The charts were printed off printers' plates which were engraved. They were compiled in folios covering geographical areas and often there were two or more charts of the same area on different scales and with different limits (formats), as decided by the individuals who carried out the surveys, so that all available knowledge was placed at the mariners' disposal.

Thomas Evans, James Horsburgh and Stamford Raffles

In 1810, Captain James Horsburgh was appointed Hydrographer to the EIC, by the Court of Directors, on the death of Dalrymple. He saw the necessity for more correct charts of the Indian Ocean than had yet been constructed, and he resolved to devote himself to the task, by making and recording nautical observations. The resolution, from that day, was put in practice, and he began to accumulate a wealth of nautical knowledge that served as the materials of his future productions in hydrography.

About 15 leagues fouth of the port of Queda lies the ifland heretofore called Poolo Pinang, and now Prince of Wales's Island... There is a good channel between Prince of Wales's ifland and the malay caft, with a good depth of water. The channel to the fouthward of it, between Poolo Jeraga, and Poolo Kio, has been lately furveyed, and completely buoyed. In confequence, ships drawing 24 feet maywith great fafety go in and out, without the affiftance of a pilot, as Captain Light, the Governor, has placed beacons of 18 inches diameter, with different coloured flags, to point out the channel. The difcovery of this paffage will prove highly advantageous to the infant colony of Prince of Wales's ifland, as it will encourage mant fhips to touch there, bound to China, late in the feafon; which they formerly were cautious of doing, from the circumftance of the N.W winds fetting in in the month of Auguft; and they were generally 3 or 4 days beating around the north end of the ifland, which diftance they may now run down in an hour. (Horsburgh, 1841: p 365-66) [In this paragraph substitute: 'f' for 's']

Just before this appointment, however, he published his most important work, entitled *Directions for Sailing to and from the East Indies, China, New Holland, the Cape of Good Hope, and the Interjacent Ports*. These 'Directions', undertaken at the request of several navigators of the eastern seas, and compiled from his journals and observations during twenty-one years, have ever since continued to be the standard reference of Indian and Pacific Oceans navigation. Horsburgh devoted himself to the duties of his office, constructing many new charts, the last of which was one of the east coast of China, with the names of the places in Chinese and English; and published an 'Atmospherical Register' for indicating storms at sea, besides editing Mackenzie's *Treatise on Marine Surveying*, and the *East India Pilot*. His description of the geography and sailing directions of the regional seas were detailed and specific; for example, as illustrated in the following:

Malay coast, between Junkseylon and Prince of Wales' Island, now occupied by the Siamese, is fronted by many islands of various sizes; and inside most of the groups, and between them, there are passages for small vessels, but large ships generally sail outside. [Horsburgh, 1836; Vol. 2, p.209]
Prince of Wales' Island ... its centre bearing from Pulo Pera E.13°S. distant 25 leagues, and the soundings decrease regularly from 45 to 50 fathoms from the latter, to 30 and 25 fathoms within 5 or 6 leagues of the former, which extends from lat. 5°16' to 5°30'N. and 7 or 8 miles in breadth... [p.212]

During the early-19th century, the EIC carried out an ambitious charting programme stretching from the Red Sea, around the Indian subcontinent and through to the China Sea. The EIC continued to extend its trading through Penang and the Eastern Archipelago (present-day Indonesia) to Canton (China).

Stamford Raffles' experiences in Southeast Asia did not begin until 1805, when he was appointed assistant secretary to the Governor of Penang. At this time a British lieutenant, named Thomas Evans, was engaged in surveying the waters between Penang and the mainland, recording depths (soundings), as well as rocks and shoals. Evans' information was subsequently used in a map of the island published by Laurie and White in 1807 (Figure 2).

In 1819, Stamford Raffles (later, bestowed with the title, Sir) arrived in Singapore and opened it as a free port, its cession by a treaty with the Sultan of Johore following in 1824. In that same year British and Dutch spheres of influence on Peninsular Malaya and the Eastern Archipelago were recognised, and the EIC's posts in Sumatra were exchanged for Malacca. In 1834, the EIC's monopoly was broken, and the mercantile service was disbanded, although the EIC continued to administer its territories in Asia for many more years.

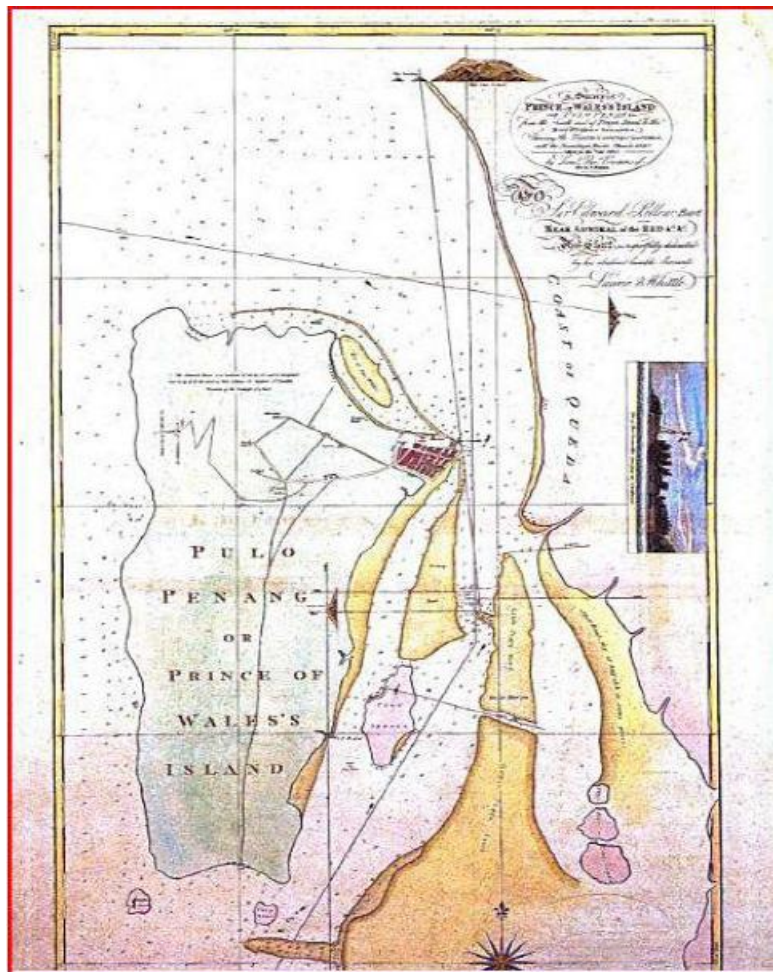


Figure 2: Pulo Penang or Prince of Wales' Island, Surveys by Lt. Thomas Evans, 1805; Pub. Laurie & White, 1807

The first attempt at triangulation survey was made in Penang in 1832 by an officer of the Royal Navy and hydrographical surveying and charting off the coast of Malay Peninsula and

elsewhere in the regional sea was undertaken by The Admiralty's Hydrographical Department.

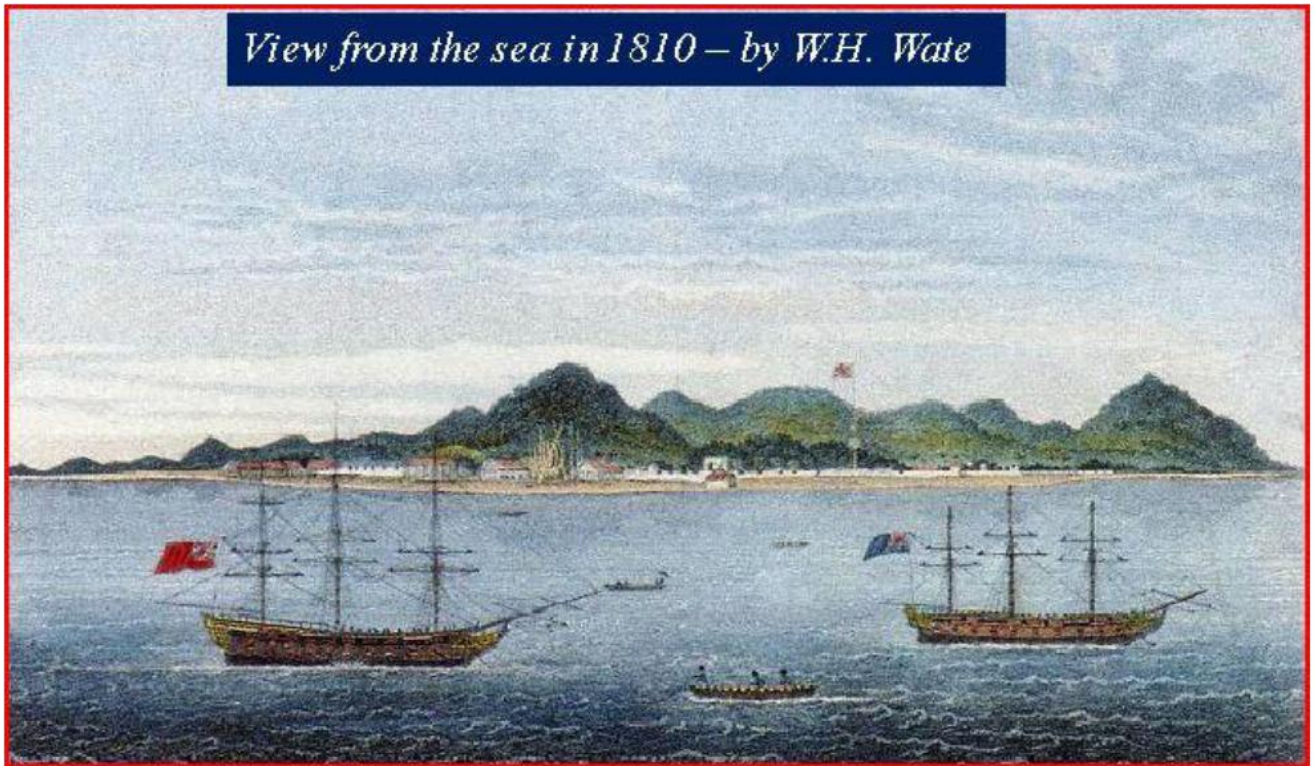


Figure 3: Painting of a view from seaward by W.H. Wate, 1810

ADMIRALTY'S HYDROGRAPHICAL DEPARTMENT

In 1795, the British Admiralty noting the EIC's success and its production of charts, appointed the Company's Hydrographer, Alexander Dalrymple, to the same post in the Royal Navy. Dalrymple's first task was to make an inventory of all the material available in London so that suitable charts could be compiled and produced for the use of the ships of the Royal Navy. The first printed Admiralty chart was issued in the early 19th century and production was interrupted, indeed curtailed, due to the Napoleonic War. In 1808, Captain Thomas Hurd, who had significant experience in hydrographical surveying, was appointed to relieve Dalrymple, and he increased the rate of supply of published Admiralty charts to the ships of the Royal Navy. In an enclosure to a letter of 7 May 1814, to the Lords Commissioners of the Admiralty, by Thomas Hurd, then Hydrographer, the status of hydrography was outlined and an admission as to the deficiency of nautical knowledge in almost every part of the world was alluded to. Hurd urged Their Lordships to remedy the situation by calling upon those naval officers of the day, whose scientific merits promote them as qualified for undertaking of hydrographical surveying and charting of the world's coastlines. Thus, the Royal Navy's Hydrographical Office came into being and, by 1823 the charts compiled and produced from the surveys were first made available for sale to those engaged in the maritime trade. This pattern continued unchanged till about the mid-1990s when a more commercialised and user-pay attitude and principle were adopted.

Admiralty hydrographical surveying and charting probably reached its peak in the early-1850s at the end of Admiral Beaufort's long term as Hydrographer. The charts of that period are admired for their extensive world coverage, their attention to detail, their accuracy and

their fine engraving. Most importantly, it was the relatively low price of the publication and of course, the support in the *Annual* and *Weekly Notices to Mariners* and the series *Sailing Directions* or *Pilots* that were issued to inform mariners of any changes to be made to the charts.

The 19th-century charts were characterised by the employment of subdivided latitude and longitude margins, an increasing density of soundings and details concerning the nature of the sea floor, the insertion of parallels of latitude and meridians of longitude at well placed intervals and the disappearance of rhumb lines emanating from compass roses. Simpler compass roses showing true and magnetic circles and a notation relating to magnetic variation began to appear, and a parallel ruler could be used to set down a course. Surveying of coastlines in various geographic regions and chart production proceeded vigorously. The cartography of the day was considerably more legible due to innovative printing techniques.

Under the Superintendence (1874-84) of the Hydrographer, Captain J.O. Evans, the already established commitments of the department and the surveying service steadily increased. Assisted with the mobility of steam-driven ships that facilitated undertakings of widely separated tasks, the activity in hydrographical surveys now shifted to Oceania.

Commander A. D. Taylor, late R.N., was created Superintendent of the Indian Marine Survey Department, and six experienced Navigating Officers of the Royal Navy were lent by the Admiralty for service under him. Besides these, a few officers of the Bengal and Bombay Marines were engaged in India, and an experienced official of the Admiralty Hydrographic Department was created Superintendent to the Drawing and Compiling Branch. During the spring of 1876, Commander Taylor made a tour of inspection along the Burmese coast, which resulted in the detection of many errors in the existing chart, and in a determination to have the important part of Amherst Island properly surveyed at the earliest opportunity. Commander Taylor's Department had further proved its usefulness by rendering advice to Government on a variety of marine subjects including the compilation of valuable list of lighthouses and light-vessels along the coast of British India had been compiled on the model of the Admiralty List.

LIGHTHOUSES IN THE BRITISH COLONIES

The importance of having a public board for the management of lighthouses abroad as well as at home was recognised in a letter to the Honourable Joseph Hume, Chairman of the Lighthouse Committee of the House of Commons, UK from Alexander Gordon, 1845. In the letter, Gordon commented further that:

The numerous letters, which you have received, from mercantile men and others abroad, bearing upon the imperative necessity of some good administration of our colonial lights, and many other circumstances, now combine to encourage reasonable hope of an early and decided change from the present state of neglect, uncertainty, extravagance, and abuse in colonial lights, to a well-organised system for their erection, maintenance, and government.

Gordon observed and opined that not only was there the want of a well-organised system, but the need of any department of Government charged with these matters of such importance to our colonial and foreign trade. There was at that time, no department of her Majesty's Government to which the colonies are encouraged to apply; and there was no lighthouse board to which they can directly apply for information and advice, as to the establishment and

maintenance of colonial lights, however much they may be desired. There was no board or department which would countenance offers of improvement in the construction neither of lighthouses, nor in the character and economy of the lights. The improvements, as regard expedition and economy, were acknowledged to be such as existing lighthouse boards have not equalled. He received no sympathy from such boards, and finding no quarter to make them known in, he endeavoured to obtain the attention of Government with these few words:

Some of the colonies would gladly be relieved of the responsibility of their sea-lights; all of them would be the better for a centralised system of advice and supervision. The three existing lighthouse boards at home, for England, Scotland, and Ireland, have enough to do, and wish no more responsibility and trouble. Why, then, should there not be a new system introduced?

A department established for erecting and maintaining colonial lights. Such a department would be obliged to study economy, and would show other boards how to practise it. Notwithstanding the favourable report, of the Admiralty to Sir Robert Peel, I was alarmed to find that the then Lords of the Admiralty, would gladly learn that such supervision (as they concurred with me in thinking necessary), could be undertaken by the Trinity House.

In justice to the shipping and commercial interests of the country, all future lights, whether at home or in any of Britain's colonies, Gordon opined, should be erected and maintained at the least possible original and annual cost (regard being had to efficiency). By economy in the original cost, a greater number of lights may be erected; by economy in the annual expenditure, the light dues will be less expensive. The board which he proposed and pressed upon the attention of the Home Government could arrange all this with justice, and could see that a perfect catalogue of all great sea and harbour lights throughout the world, should be accessible to every navigator. A perfect system could be adopted for classification, and for uniformity and equiformity of parts and stores, which are common to all lights, and which would entirely prevent the irregularities and abuses which I have detected in the matter of stores and materials.

Then officers of experience, who know the proper sites for lighthouses and beacons would be employed; and good, deserving, wounded but not entirely disabled, warrant-officers and seamen of character, would be employed as light-keepers. Naval officers in command of stations could take an oversight, and monthly reports of stock, and expenditure of stores, could be regularly returned home. New lighthouses could be erected expeditiously and economically, and maintained with certainty and regularity, with advantage and satisfaction to the shipping interest, and a great saving of public money, which now is really thrown away. He referred to a small number of lighthouses and harbour lights. At least twenty great lights ought at once to be handed over to such a board he proposed. The urgent necessity for such lighthouses were listed, should be at once looked into by this board; and clear statistical information collected by it, and insisted upon from all the colonial lighthouses and harbour lights (upwards of one hundred and forty in number were specified in a list), which, with few exceptions, are radically ill-managed, and most of them essentially bad in construction, action, and mutual relation.

The lapse of time in erecting lights, where absolutely necessary, is a very important evil to be avoided. Gordon alluded to the many years that were lost between the desire for and the erection of the lighthouse in Bermuda. Scores of lighthouses are and have been wished for and talked of for years without effect, only because there was no central office or board for encouragement, information, correspondence, and management. If any department had been entrusted with the subject of colonial lighthouses, and had allowed such a list to remain unattended to, what would have been said of the neglect? It was hoped that Her Majesty's

Government [of the day] would not allow such loss of life and property to pass before their eyes, without taking some decided and immediate step for the establishment of an administration, totally apart from the Trinity Corporation and other existing lighthouse boards.

Gordon was compelled to mention that his assistant, Mr. Paget Walker, had written to him the following remarks on the lighthouse at Colombo. It was originally built for a guard-room, to which they have added a lantern. There were 11 reflectors, made by Wilkins, five of which were greatly damaged, caused by a large piece of rock having gone through the lantern during some blasting operations. It is so hot [in the building] that a European would faint in it in a quarter of an hour, there being no ventilation, and, consequently, every thing covered with lamp black. It has not even a cowl [an air ventilator]. The lights are good at first lighting, but gradually get dim towards the morning. This is as may be expected while it is under the control of the military. Under a good system there are few eligible and expedient situations in the world where lighthouses would be necessary which could not be furnished with lights, or beacons, within twelve months' time; none where it would require more than two years.

There are about 50 great sea-lights in different parts of the world which might be better and more economically managed under a colonial light-board, but they would be managed much more expensively if placed under the Trinity Board. Gordon listed in his report (at Appendix D and E) all the colonial lighthouses named and commented that there were nearly 160 requiring the benefits of the system proposed. He was prepared to show, that the mean actual annual cost of maintaining sea-lights was as follows in England (*and need not be so costly in our colonies*), even for the highest and best order of lights:

Lighthouse on shore	£500 at most
Lighthouse on a rock or bank	£600
Light vessel	£1,100 (cost estimates in 1845!)

Lighthouses were established in places of greatest importance to the colonial regimes: outside major harbours, along busy lines of communication (sea routes), and near dangers to navigation such as wrecks and reefs. The history of lighthouses in maritime Southeast Asia offers some important insights about the nature of evolving imperial control.

LIGHTHOUSES OF PULAU PENANG

Numerous lighthouses were erected by the Portuguese administrators, the Dutch East India Company (VOC) and the British Empire (EIC) (which oversaw the greatest number of new lighthouses built) to provide navigation in and out of ports or through dangerous seas. Many of these lighthouses are situated on small islands and headlands. The four primary aids to navigation on, and in the vicinity of, Penang Island are:

- Pulau Rimau Lighthouse – Lat. 5° 14.6'N Lon. 100° 16.7'E
- Fort Cornwallis Light – Lat. 5° 25.3'N Lon. 100° 20.8' E
- Pulau Tikus Lighthouse – Lat. 5° 28.4' N Lon. 100° 17.9' E
- Muka Head Lighthouse – Lat. 5° 28.4' N Lon. 100°10.9'E

Pulau Rimau

1885. Active; focal plane 39 m (128 ft); two white flashes every 10 s. 17.4 m (57 ft) round cylindrical cast iron tower with lantern and gallery, attached to a 1-story keeper's house. Lighthouse painted white. This lighthouse marks the beginning of the approach from the south. The light is located on a small island off the south-eastern tip of Penang Island.

Fort Cornwallis (Fort Point, Penang) (1)

1882. Inactive since 1914. 21 m (69 ft) cast iron post with lantern and hexagonal gallery, painted white. Attached to the tower is a tall mast similar to a ship's mast, with two spars. The tower remained in service as a signal tower after the light was deactivated. Located on a promontory in George Town on the northeast side of the island.

Fort Cornwallis (Fort Point, Penang) (2)

1914 (station established 1882). Active; focal plane 27 m (89 ft); red flash every 2 s. 21 m (69 ft) square pyramidal cast iron skeletal tower with lantern, gallery, and enclosed watch room, painted white. Adjacent to the lighthouse is the tall signal mast carrying the original light (previous entry). Prefabricated in England, this lighthouse is a rare survivor of its type. It stands within the walls of Fort Cornwallis, a classic star-shaped late-18th century fort that was the first British outpost in Malaya. It is located on a promontory in George Town at the north-eastern corner of the island.



Figure 4: 1914 Fort Cornwallis Light, August 2009

Pulau Tikus

Date unknown; active; focal plane 15 m (49 ft); white flash every 3 s. 7 m (23 ft) post light with gallery, mounted on a small 1-story equipment room. Entire lighthouse painted white. There is a house, presumably an abandoned keeper's house, adjacent to the light, as well as a grave (probably of a former keeper). Pulau Tikus (Rat Island) is a small island just off the northeast coast of Penang Island.

Muka Head

Established in 1883 for the Straits Settlement Lighthouses. Its characteristics: focal plane 242.3 m; white flash every 10 s. 14 m round cylindrical granite tower with lantern and gallery, attached to a 1-story keeper's house. Lighthouse painted white. This is a staffed station. This lighthouse is the landfall light for Penang for ships arriving from the Indian Ocean. Located atop a high promontory at the northwestern tip of the island. There is no road access to this station; the lighthouse is accessible by a 2-hour hike from the entrance to Penang National Park at Teluk Bahang. Site open, tower open by arrangement with the keeper.



Figure 5: Muka Head Lighthouse, Penang

CONCLUSION

The main aims of the EIC and the English commercial traders at the time that Penang was founded for its strategic location and as a half-way trading post, was to capture the tea trade of China and the spice trade in the East Indies. Thus, political and strategic factors took priority in the decision-making process. In order to achieve its dominance in the trade links in the Indian Ocean the EIC and later the Colonial administration with assistance from relevant authorities located in the British Isles were compelled to ensure that ships on passages to and from Penang were given all the benefits and protection that could be offered in the given circumstances. These included accurate and essential information relating to marine navigation by way of nautical charts, *Notices to Mariners* and the in the construction and maintenance of lighthouses, light-vessels and navigational buoys. Naturally, there was also the need for the establishment of related infrastructure such as wharves; storage sheds (godowns), barges, tugs and equipment for handling the export and import of cargo. Penang was able to flourish in the first four decades.

Much of this success is attributed to the foresights of the EIC and especially individuals such as Captain Francis Light, Alexander Dalrymple, Thomas Evans, James Horsburgh, Stamford Raffles and Alexander Gordon for their valuable contribution, directly and indirectly, to the marine affairs and the economic foundation of the island. Naturally there were many other personalities, however, those mentioned above must be given due credit for the ambitious planning and administration to ensure the prosperity of the port of Penang in its first six decades of operation, shipping and trading.