

Surgeons and Physicians on the Move in the Asian Waters (15th to 18th Centuries)

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An omnipresent risk factor on all sea voyages were significant environmental influences, including weather conditions, disease, malnutrition, as well as the viruses, germs, bacteria, and animals that transmitted diseases on board ship. Having surgeons and physicians on board, as well as taking certain precautionary and relief measures were essential parts of sea voyages that saved lives. Shipboard surgeons and

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physicians were essential during longer sea voyages. They had to continuously take charge of all health and hygiene issues among crewmembers. In Europe, this role became particularly important with the onset of the great Age of Sail, when sailing distances multiplied exponentially. Among European seafarers, shipboard health conditions were frequently anything other than ideal. Giovanni Francesco Gemelli Careri (1651 – 1725), a seventeenth-century Italian adventurer and world-traveller, crossed the Pacific in 1697, from the Philippines to Mexico on one of the well-known Manila galleons.^① He described this transoceanic trip in his diary “*Giro del Mondo*” [Journey around the World] (1699) as a nightmare—the journey was interminable, the sea was unruly, the food infested:

“There is hunger, thirst, sickness, cold, continual watching and other sufferings, besides the terrible shocks from side to side, caused by the furious beatings of the waves. I may further say they endure all the plagues God sent upon Pharaoh to soften his hard heart, for if he was infected with leprosy, the galleon is never clear of a universal raging itch, as an addition to all other miseries. If the air then was filled with gnats, the ship swarms with little vermin, the Spaniards call *gorgojos* (weevils), bred, so swift that they in a short time not only run over the cabins, beds, and the very dishes the men eat on, but intensively fasten upon the body. Instead of the locusts, there are several other sorts of vermin of sundry colour that suck the blood. An abundance of flies fell into the dishes of broth, in which there were also worms of several sorts.”^②

The captain died of a disease known as ‘Berben’ (that is, ‘beriberi’^③, Chin. *jiaoqi* 脚气, a severe and chronic form of thiamine (vitamin B1) deficiency, causing a polyneuropathy of the extremities, oedema, and congestive pulmonary

① He was carrying mercury to be sold in Mexico with a 300% profit.

② Quoted after Shirley Fish, *The Manila-Acapulco Galleons: The Treasure Ships of the Pacific: With an Annotated List of the Transpacific Galleons 1565 – 1815*, Central Milton Keynes: AuthorHouse, 2011, p. 373.

③ The term *beriberi* is obviously derived from the Sinhalese word meaning “extreme weakness”.

signs).^① According to Careri, it “swells the Body, and makes the Patient die talking”. He also describes scurvy, as a disease “called the Dutch Disease, which makes the Mouth sore, putrefies the Gums, and makes the Teeth drop out”.^②

In similar terms to Careri, Prussian VOC soldier Georg Naporra reported on conditions on board eighteenth-century VOC ships to the Indian Ocean, as part of his *Ost-Indische Reise*. Already on the North Sea, Naporra was shocked by the rough shipboard living conditions: he mentions the constant noise—if not from sailors’ work and footsteps, from the waves crashing against the bough—the hot, dark and narrow conditions below deck, the smoky smell produced by oil-lamps, and the ever-damp clothes.^③ Approaching the tropics, the crew suffered from the heat and diseases such as scurvy, as below deck the combination of unhealthy and rotten clothes, bad quality beer, insufficient fresh air, the eating of unripe fruit, and incapable surgeons proved lethal.^④ Naporra reports on the disgrace of the situation, as the howling and moaning of the crew “could even have moved a stone”^⑤. The ship doctor Maas Bax held his consultations twice a day, the ship’s boy striking the main mast with a stick and enouncing a rhyme: “Cripples and blinded, come let yourself be bound, up near the main mast, the master will be found”^⑥. These descriptions graphically emphasize the importance of, and need for ship’s surgeons, as well as the difficult conditions they had to work in.

For China, we have much less information on the importance of shipboard medicine. However Chinese historical records occasionally do mention the unhealthy conditions on board of ships. So the 1534 *Caozhou ji* 操舟记 by Gao Cheng 高澄 (1494 – 1552):

① See Kenneth J. Carpenter, *Beriberi, White Rice, and Vitamin B: A Disease, a Cause, and a Cure*, Berkeley: University of California Press, 2000.

② Gemelli Careri, quoted from Shirley Fish, *The Manila-Acapulco Galleons*, p. 377.

③ Roelof van Gelder, *Naporra’s omweg. Het leven van een VOC-matros (1731 – 1793)*, Amsterdam: Atlas, 2003, p. 229.

④ Roelof van Gelder, *Naporra’s omweg*, pp. 259 – 260.

⑤ Cited in Roelof van Gelder, *Naporra’s omweg*, p. 260.

⑥ “kreupelen en blinden, komt laat u verbinden, boven bij de grote mast, zult gij de meester vinden”, cited in Roelof van Gelder, *Naporra’s omweg*, p. 261.

“ ‘ There are three negative things with this ship: In the case of the planks that cover the bottom of the ocean-going vessel, there is no emphasis on their being thick and double layered; each layer of wood is 3 *cun* and 5 *fen* thick (*i. e.* approximately 10 cm), each is run with iron nails in the cracks, and caulked with hemp lime. [In theory], if by misfortune the ship runs onto a reef, then, even if one layer breaks, the other layer will remain. Although on [such] modern (ships) the planking is 7 *cun* (*i. e.* approximately 21 cm) thick, the nails are only a bit more than one *chi* in length (*i. e.* approximately 16 to 17 cm), so I am afraid these (two layers of planks) cannot be held together (by the short nails); and if huge waves repeatedly clash and dash against it, then the nails will crack the planks and break them; even though you draw from the front, you will not be able to rescue (the ship): This is one negative item. I heard that in the past, two ships were dispatched, and that the cabins were broad, and the people few, so that one could avoid epidemic plagues and dysentery. Nowadays, there is just one ship [sent], consequently there are just 24 cabins, and beyond the space occupied by the food provisions, tools and utensils of the government officials, 30 people in total are located in one cabin; I am afraid (this will lead to) evaporation and high pressure, so that there will be many people suffering from epidemics and dysentery, and even doctor Lu^① would not be able to cure them; This is the second negative item. Ocean waves are large and powerful, and although the rudder stocks are made of sturdy wood, it is impossible to avoid their being destroyed and one cannot avoid having to replace them. Nowadays, the rudder holes [for placing the rudder stocks] are narrow, and it is difficult to remove and replace the stocks; in the midst of an emergency, who is able to go down into the water and cut a hole to replace them? If the rudders are not replaced, then the boat cannot sail forward; even supernatural beings would be unable to assist; This is the third

① This is a reference to the famous legendary physician Bian Que 扁鹊 (401–310), personal name Qin Yueren 秦越人, from Lu (present-day Shandong). His medicinal skills were said to be outstanding; he knew secret prescriptions and methods and was thus able to cure almost all diseases.

negative item. With these three disadvantages, how can one profitably move across a great current!'. . . After a period of less than ten days, the weather became extremely hot. Although on top of the ship one could enjoy the winds, the hatchways were still mostly subject to moisture and humidity; three or four out of ten people caught epidemic diseases or dysentery, those who actually did not get up again were seven.”

“此舟不善者有三：盖海舶之底板不贵厚，而层必用双；每层计木三寸五分，各铜以铁钉、艙以麻灰。不幸而遇礁石，庶乎一层敝而一层存也。今板虽七寸而钉止尺余，恐不能钩连；而巨涛复冲撼之，则钉豁板裂，虽班师弗能救矣：此一不善也。闻前使二舟，则舱阔人稀，可免疫痢之患。今共一舟，则舱止二十有四，除官府饮食、器用所占，计三十人共处一舱；恐炎蒸抑郁，则疫痢者多，虽卢医弗能疗矣：此二不善也。海涛巨而有力，舵杆虽劲木为之，然未免不坏，亦不免不换也。今舵孔狭隘，移必难；仓卒之际，谁能下海开凿以易之！舵不得易，则舟不得行；虽神人亦弗能支矣：此三不善也。三者未善，何以利涉大川乎。”……逾旬不至，天气颇炎。船面虽可乘风，舱口亦多受湿；染疫痢者十之三、四，竟不起者七人。^①

This quotation intends to provide a basic comparative analysis of European and Chinese “maritime medicine”. It will examine the emergence of maritime medicine and the professions of ship surgeons and maritime physicians in European seafaring, and compare it with the Chinese tradition. In this way, it also provides a kind of encyclopaedic overview. We will discuss the problem of scurvy, and introduce examples and practices of surgeons and marine physicians on board ships

^① Shiliuqiu lu 使琉球录 (1579), by Xiao Chongye 萧崇业 and Xie Jie 谢杰 in Shi liuqiu lu sanzong 使琉球录三种, *Taiwan wenxian shiliao congkan* 台湾文献史料丛刊, Taipei: Taiwan datong shuju, 1970, vol. 3 (55), p. 91: 使琉球录卷上, 造舟, with reference to Gao Cheng's 高澄 *Caozhou ji* 操舟记; see also *Shi Liuqiu lu* 使琉球录 (1562), by Chen Kan 陈侃 and Gao Cheng, newly edited by Guo Rulin 郭汝霖, also with reference to Gao Cheng's *Caozhou ji* and including a conversation between Xiao Chongye and Xie Dunqi 谢敦齐, in Yin Mengxia 殷梦霞, Jia Guirong 贾贵荣, Wang Guan 王冠 eds., *Guojia tushuguan cang Liuqiu ziliao xubian* 国家图书馆藏琉球资料续编, Beijing: Beijing tushuguan chubanshe, 2002, vol. 1, pp. 1 - 242, 88 - 89 (with slightly different reading), and online under <https://ctext.org/wiki.pl?if=gb&chapter=865083>, entry 108.

that navigated the Indian Ocean and Asian-Pacific waters, only few of whom, of course, are known by name. We will also try to provide insights into equipment, medicines, and practices as well as cross-cultural comparisons.

The fact that much less can be found on this topic in Chinese sources, compared to the documentation in the European context, does not of course mean that the Chinese had no physicians on board, or did not care about maritime medicine. In contrast to European seafarers, the Chinese, for example, had paid great attention early to a correct diet on board. None the less, in comparison to Europe, for China, long-distance maritime expeditions remained the exception, rather than the rule, and a systematic exploration of the maritime world did not occur. It was, above all, the politico-economic particulars of European maritime expansion, and European development of colonialism and capitalism, which involved routinized and long-distance overseas voyages, including frequent naval battles during these voyages, that required a knowledge of shipboard medicine on a regular and standing basis. China, by contrast, with the exception of the Mongol long-distance voyages, in particular Qubilai Khan's (r. 1260 – 1294) large-scale expeditions of conquest against Japan (1274 and 1281), against what became Majapahit Java (1292 – 1293), and the Mongol naval missions to countries in mainland Southeast Asia and in the Indian Ocean as far as India (especially after 1277),^① and later the Zheng He 郑和 expeditions (between 1405 and 1433)^②, had no comparable tradition of routinized long-distance overseas voyages. Nor did China ever develop a colonialism comparable to the colonialism of the European countries, one that systematically explored the maritime world beyond Europe, and that consequently required a special field of maritime medicine on a permanent basis.

① See Tansen Sen, "The Yuan Khanate and India: Cross-Cultural Diplomacy in the Thirteenth and Fourteenth Centuries," *Asia Major*, Third Series, Vol. 19, No. 1/2, China at the Crossroads: A Festschrift in Honor of Victor Mair, 2006, pp. 299 – 326.

② These were rather one-time naval operations without long-term consequences in terms of overseas expansion, but they constituted an interesting precedent in view of victualling and shipboard medicine. See Mathieu Torck, *Avoiding the Dire Straits: An Inquiry into Food Provisions and Scurvy in Maritime and Military History of China and Wider East Asia* [East Asian Maritime History, 5], Wiesbaden: Otto Harrassowitz, 2009, pp. 142 – 143.

A General Survey on the Development of Naval Medicine in Europe

The emergence of naval medicine and ship surgeons

With the gradual disappearance of coastal shipping, and the initiation of long-distance high seas voyages in the course of the fourteenth century, new technical, medicinal and hygienic requirements emerged. The era of European expansion going along with the long trans-oceanic voyages placed new challenges before sailors and captains. Pedro IV of Aragón (1319 – 1387) had already mandated so-called “Naval Instructions” (Ordenanzas navales) in 1354, but the new challenges, and the basically non-existent medical understanding needed for such dangerous long voyages, required new initiatives. In 1522, the Consejo de Indias issued new instructions that, also included establishing positions for physicians and surgeons on board ships. On both military and commercial overseas voyages, the medical fraternity started to play an important role. The presence of physicians and surgeons on board of ships was indispensable for responding to all the dangers as well as the hygienic and medical challenges met even on board commercial vessels. The century of Carlos V (1500 – 1558) and Felipe II (1527 – 1598) was noted for the setting of standards and regulations to improve sanitary conditions on board of ships. ^①

Looking more to the Asia-Pacific space, we focus here on Spanish rather than Portuguese surgeons in particular, but will still also provide examples of Dutch and English as well as physicians from some other countries, active in Indian Ocean waters. It is clear that significant advances in maritime medicine went along with the process of European expansion, and that specific needs, for example, during naval wars, or when ships were crossing wider oceanic spaces needed to be met. In the early phase of European expansion, it seems that very basic medicinal skills

^① Some physicians and surgeons who accompanied great military or discovery missions, such as Diego Álvarez Chanca, Luis Lobera de Ávila, Gregorie López or Dionisio Daza Chacón, occupy a special position in the history of medicine.

were considered sufficient, but eventually ship-surgeons were better trained, were vested with more authority, and consequently had to treat a wider range of diseases. Definitely, European governments also tried to make their “tough job” more attractive, especially when voyages to far-away places required skilled personnel that could potentially cope with tropical and unknown diseases, and that disposed of a fundamental pharmaceutical, medicinal, and even linguistic skills to be able to learn about the treatment of many diseases from local specialists. One increasingly encounters ship apothecaries who were able to study and document local botanical environments, and were skilled in preparing medicines.

In November 1554, the first rules for hygiene on ship board were promulgated in Spain; they comprised simple obligations, such as sweeping and cleaning on and below the deck, or perfuming with rosemary once a week.^① In 1588, the distribution of wine was restricted—the heavy, unhealthy consumption of alcohol on board of Western ships is well-known. The continuing long-distance trans-oceanic voyages, as well as the wars with the Netherlands and France, required better sanitary conditions and medical treatment on board. A decisive step towards better sanitary conditions was the certificate issued by Felipe IV on January 26, 1622, establishing that sick and wounded people on board of ships should be transferred to local hospitals and no longer remain on board.^②

In 1633, the *Ordenanzas del Buen Gobierno de la Armada del Mar Océano* were published in Madrid.^③ These regulations, on the one hand, paid particular

① This historical development is described in Salvador Clavijo y Clavijo, *Historia del cuerpo de sanidad militar de la armada*, Tipografía de Fernando Espín Peña, San Fernando, Cádiz, 1925, here especially page 35.

② Salvador Clavijo y Clavijo, *Historia del cuerpo de sanidad*, p. 42; it is part of the Collection Vargas Ponce, legajo xx, a copy of which lies in the Naval Museum of Madrid. See María Luisa Rodríguez-Sala, con la colaboración de Karina Neria Mosco, Verónica Ramírez Ortega y Alejandra Tolentino Ochoa, *Los cirujanos del mar en la Nueva España (1572 – 1820) miembros de un estamento profesional o una comunidad científica?* [Serie Los Cirujanos En La Nueva España], México: Universidad Nacional Autónoma de México *et al.*, 2004, p. 34.

③ *Ordenanzas del Buen gobierno de la Armada del Mar Océano de 24 de Henero de 1633*, Barcelona, en casa de Francisco Cormellas, al Call, por Vicente Suriá, 1678. New facsimile edition by the Historical Institute of the Marine (Instituto Histórico de Marina), Madrid, 1974, located in the Archive of the Naval Museum in Madrid.

attention to the curing, healing and assisting of mariners who fell ill at hospitals in locations where the Spanish armada or military had established a presence. They introduced the norms under which the inspectors of each hospital were authorized to contract with medical personnel. The provision of skilled personnel for locally established hospitals, such as the hospital at San Blas on the Californian coast, is considered important in the regulations; but, it is made clear as well, that physicians and surgeons should also accompany crews on their overseas journeys. As explained by María Luisa Rodríguez-Sala, the training and education of ship surgeons and doctors suffered significantly from the declining power of the Spanish navy. She states that one has to distinguish between different categories of doctors, with different qualitative authorities and permissions, ranging from those with full educations and authority (*médicos cirujanos*), those permitted to assist with intestine diseases (*médicos*), those permitted to practice in a certain branch (*médicos latinos* or *cirujanos de ropa larga*, *i. e.* long-gowned surgeons) who, as a rule, possessed a proper education, the so-called surgeons who had passed their entire education in Spanish (not Latin), and were restricted to taking care of external diseases or of internal diseases in cases of particular urgency only (*médicos romancistas*), and a kind of surgeon (*cirujanos de heridas* or *cirujanos de ropa corta*).^①

María Luisa Rodríguez-Sala introduces in detail the specific steps undertaken to improve ship-board sanitary and health conditions. This historical development

① María Luisa Rodríguez-Sala, con la colaboración de Karina Neria Mosco, Verónica Ramírez Ortega y Alejandra Tolentino Ochoa, *Los cirujanos del mar en la Nueva España (1572 – 1820)*, p. 36. Sherry Fields, *Pestilence and Headcolds: Encountering Illness in Colonial Mexico*, New York: Columbia University Press, 2008, chapter I, p. 40, with reference to Lourdes Márquez Morfín, *Sociedad colonial y enfermedad: Un ensayo de osteopatología diferencial*, México: Instituto Nacional de Antropología e Historia, 1980, p. 105: “Colonial sources show that in 1545 there were apparently only four certified doctors in the entire capital of New Spain. One of them, Cristóbal Méndez, had recently been arrested by the Inquisition on charges of sorcery; . . . Over two hundred years later, every city and town of importance in New Spain still suffered a shortage of licensed physicians. Between 1607 and 1738, the University of Mexico granted 438 bachelors’ degrees in medicine, an average of 3.35 a year.” See also Manuel Gracia Rivas, “La Sanidad naval española: De Lepanto a Trafalgar,” *Cuadernos de Historia Moderna, Anejos*, no. 5 (2006), pp. 169 – 185.

was initially going along hand-in-hand with the gradual disappearance of coastal shipping and the need to fight against the black death in Mediterranean and European space. Then, of course, the long maritime crossings undertaken during the period of European expansion—and Portuguese and Spanish seafarers were the first to venture into these cross-continental open maritime spaces, and naval conflicts among European nations required improvements in medicinal treatments to be successful.^① As educated physicians, generally speaking, preferred to stay on land, many even lost the practical experience to cope with all the required new challenges, so that surgeons were sometimes more acquainted with all the necessary medical challenges compared to physicians. One can also observe a tendency to hire medical people who were often not officially educated (*proto-médicos*) for commercial voyages and better trained surgeons (*cirujano mayor*) for military enterprises. Those hired for long-distance voyages were, as a rule, practical doctors who were officially hired.^②

It must be emphasized that the medical profession as a whole was not highly valued in Spain, obviously because it had been dominated by Jews and Muslims.^③ Physicians and surgeons were all subjected to strict legal prescriptions concerning their legitimacy and, interestingly, their blood purity (*limpieza de sangre*). Originally, a large number of Jews and Muslims practiced as physicians, but after Jews were expelled by the Catholic Spanish kings in 1492, they were no longer permitted to enter the universities and practice medicine. Although officially not permitted to settle in the New World, many Jews and Muslims from Spain did so, especially with the increasing pressure from the Inquisition. Statutes of the University of Mexico stated early on that no native Americans, blacks, mulattos,

① María Luisa Rodríguez-Sala, con la colaboración de Karina Neria Mosco, Verónica Ramírez Ortega y Alejandra Tolentino Ochoa, *Los cirujanos del mar en la Nueva España (1572–1820)*, p. 31 et seq.

② María Luisa Rodríguez-Sala, con la colaboración de Karina Neria Mosco, Verónica Ramírez Ortega y Alejandra Tolentino Ochoa, *Los cirujanos del mar en la Nueva España (1572–1820)*, p. 37.

③ Linda A. Newson, *Making Medicines in Early Colonial Lima: Apothecaries, Science and Society*, Leiden/Boston: Brill, 2017, 20ff; James Lockhart, *Spanish Peru 1532–1560 – A Colonial Society*, Madison/Milwaukee (WI); London: The University of Wisconsin Press, 1968, p. 189.

chino morenos, or any kind of slave or former slave were permitted to enter the university.^① In theory, consequently, the professions of physicians, apothecaries, and surgeons were limited to those who could demonstrate legitimacy and blood purity, but practice often looked differently.^② The expulsion of Sephardic Jewish physicians from Spain also resulted in their presence in the West-Indies, in the Dutch colonies of the Caribbean, via their re-settlement in Amsterdam, and subsequent departure from there. In particular, G. T. Haneveld has pointed out the influence of able Jewish medical practitioners on colonial medicine at Curaçao during the late seventeenth and eighteenth century, mentioning doctors such as Yshack Gomes Casseres (d. 1693), Dr. Yoseph Ysrael de Zarate (d. 1728), or Dr. Joseph Capriles (1738 – 1807), who was named “el doctor de la Espada”.^③

In Spain, the role of a ship’s surgeon (*cirujano*) evolved out of the roles of barbers or apothecaries. They treated external ailments, such as wounds and injuries, broken bones, and skin diseases, such as boils and rashes. They also typically pulled teeth, let blood, and treated kidney stones, hernias, and venereal diseases.^④ The surgeon was usually equipped with a variety of medicines and cloth to make bandages and dressings, with a saw to carry out amputations, and a number of other tools, such as scissors, clamps, various types of knives, cauterizing implements, needles, hammers and picks, and injections. Frequently he had to prepare medicines and ointments on board, and consequently also

① Sherry Fields, *Pestilence and Headcolds*, p. 106. See also pp. 107 and 108 for the education and curriculum of the medical students in Mexico. In a recent study, Linda Newson also zooms in on the classification and social status of medical men in early colonial Peru. Newson draws on James Lockart’s initial classification, and draws our attention to the important position of the *boticarios*, apothecaries who were the only ones who were allowed to make medical recipes. The surgeons were the first practitioners of medicine to arrive in the New World, as they were attached to the armies of conquest. *Boticarios* would after political stability had been reached. See Linda A. Newson, *Making Medicines in Early Colonial Lima: Apothecaries, Science and Society*, pp. 60 – 61, 65 – 68, 155.

② See Linda A. Newson, *Making Medicines in Early Colonial Lima: Apothecaries, Science and Society*, p. 190.

③ G. T. Haneveld, “De Antilliaanse Geneesheer,” in L. W. Statius van Eps and E. Luckman-Maduro (eds.), *Van scheepschirurgijn tot specialist: 333 jaar Nederlands-Antilliaanse geneeskunde*, Assen: Van Gorcum, 1973, p. 2.

④ Sherry Fields, *Pestilence and Headcolds*, p. 109.

needed spoons, funnels, spatulas, a mortar and pestle, scales and a small brazier.^① The discovery of the San Diego wreck, a Spanish galleon under the command of Don Juan Antonia da Morga Sánchez Garay (1559 – 1636) that sank on December 14, 1600 near Fortune Island after a naval encounter with a Dutch fleet under Captain Oliver van Noordt (1558 – 1627), can attest to the fact that such objects were carried on board. Artefacts included, for example, a bronze mortar, ceramic pots for medicines, lead weights and larger jars.^②

In Western maritime history, the Dutch made the best progress in maritime medicine.^③ By the mid-sixteenth century, a growing distinction of surgeons descending from barber-surgeons, who continued to cut hair and treat superficial illnesses, can be observed. Dutch ordinances speak of two kinds of surgeons, those who treat illnesses that occurred on the surface of the body, such as pox, syphilis, cancer, scrofula, excrescences, ulcers, etc., and those who used instruments to carry out operations, such as removing bladder stones, repair hernias, or extract teeth.^④

In the Dutch case, Harmen Beukers clarifies the distinction between surgeons' and physicians' careers. While Dutch physicians were already university trained in the seventeenth century, surgeons belonged to a class of artisans, whose training and certification were regulated by a surgeons' guild. Apprentice-surgeons lived in a master's house, and acquired knowledge informally, while the larger towns' surgeon guild provided some courses in anatomy or botany.^⑤ Geyer-Kordesch and MacDonald also further emphasised this distinction between land-based physicians and surgeons in Europe, from the late sixteenth century onwards: Whereas the guild-trained barber-surgeons took care of treating wounds, topical and venereal diseases, setting fractured or dislocated bones, and occasionally

① Shirley Fish, *The Manila-Acapulco Galleons*, p. 317.

② Shirley Fish, *The Manila-Acapulco Galleons*, p. 317.

③ Harold J. Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age*, New Haven: 2007, p. 3, passim.

④ Harold J. Cook, *Matters of Exchange*, pp. 143 – 144.

⑤ Harmen Beukers, "Dodonaeus in Japanese: Deshima Surgeons as Mediators in the Early Introduction of Western Natural History," in Kazuhiko Kasaya and Willy vande Walle (eds.), *Dodonaeus in Japan: Translation and the Scientific Mind In the Tokugawa Period*, Leuven: Leuven University Press, 2001, p. 287.

performing amputations, university trained physicians were also versed in internal medicine. In addition, they add that the more ‘lowly’ barber-surgeons also performed bloodletting and teeth extraction.^① In seventeenth- and eighteenth-century Glasgow, as an example, surgeons were clearly accorded a subordinate status in comparison to physicians, whose prestige concerning surgery rose during the eighteenth century.^② From these functions, it seems that the role and functions of surgeons would have sufficed in a maritime context, except on long-distance voyages where exotic diseases had to be treated.

Beukers also points out that the traditional division of labour between medical doctors and surgeons did not apply to the Dutch merchant fleet, as the former were mostly absent from the commercial shipping circuit. Therefore, guild-trained surgeons also had to treat internal diseases such as scurvy, dysentery, and typhoid fever, and had to prepare medicine themselves. Textbooks circulated to prepare surgeons for the exam system, such as Johannes Verbrugge’s *Het nieuw-hervormde examen van land-en zee-chirurgie*. These functional necessities and the exam system caused ships’ surgeons to receive a higher remuneration than their colleagues on land, and they were granted an equal on-board rank to junior officers, in order to create a more attractive position.^③

As early as 1676, regulations were issued to improve the health care aboard the trade ships of the VOC. These stipulated that no surgeons were allowed aboard unless they had proven their competence through examinations. Students were obliged to attend courses in surgery and anatomy.^④ Father Alvaro de Benavente (1647 – 1707) who, in April 1687, “sailed from Batavia in [one of the] galleons of the Company of Holanda, and after many and fearful tempests it reached the Cape of Good Hope, where the Dutch made a halt of two months at

① Johanna Geyer-Kordesch and Fiona MacDonald, *Physicians and Surgeons in Glasgow, 1599 – 1858; The History of the Royal College of Physicians and Surgeons of Glasgow*, vol. 1, London: The Hambledon Press, 1999, p. 79.

② Johanna Geyer-Kordesch and Fiona MacDonald, *Physicians and Surgeons in Glasgow, 1599 – 1858*, vol. 1, pp. 80 – 81

③ Harmen Beukers, “Dodonaeus in Japanese,” p. 288.

④ Mathieu Torck, *Avoiding the Dire Straits*, p. 42; Arnold E. Leuftink, *Harde Heelmeesters: zeeleden en hun dokters in de 18e eeuw*, Walburg Per, c1991, pp. 28 – 29.

the great colony and settlement which that nation maintain there for this purpose; it is a very populous city, and well supplied with all that is necessary to human life, for it possesses a very healthful climate, at the latitude of 36° [on the side] of the tropic of Capricorn. In this city they have a large hospital for treating the sick, with very skilful physicians and surgeons, and with all the comfort that could be found in any other part of the world.”^①

One of the most famous Dutch ship surgeons was Nicolaus de Graaf (1619 – 1688) who made five voyages alone to the Far East. Based on notes he had made during his various trips, the *Reisen van Nicolaus de Graaf, naar de vier gedeelten van de wereld* were published posthumously in 1701.^② He started his service with the VOC in 1639, and made his first voyage as a ship surgeon on board the *Nassau*. This trip took four years, and took him as far as Malacca, where “he earned a broken skull and a large head wound at the siege of Malacca”.^③ In the late 1660s, de Graaf travelled to Sri Lanka where he stayed for two years. He travelled up the Ganges, and also cured Muslim governors. We also know that he spent two years in Bengal, and returned to Sri Lanka in November 1671, “apparently very wealthy from private trading, since he sent many goods (including saltpetre, opium, nutmeg, bales of silk and cotton clothing, and fifty-seven slaves) as a ‘present’ to the chief Dutch port of Batavia aboard a ship”.^④ In May 1683, de Graaf took service as a low positioned chief barber-surgeon (*opperbarbier*) and came as far as Macao in 1684 – the year when the Kangxi Emperor 康熙 (r. 1662 – 1722) had just reopened the ports for maritime trade. He accompanied a delegation to the Kangxi Emperor, and returned to Batavia in November 1685 via the Moluccas and Bantam.

On Taiwan, where the Dutch had their castle Zeelandia, a Dutch ship surgeon is said to have vivisected a Chinese prisoner in front of a large crowd, certainly as a means of frightening the local population. Dutch surgeons also

① *The Augustinians in the Philippines, 1670 – 94*, vol. 42, p. 242, see <http://www.gutenberg.org/files/34384/34384-h/34384-h.htm>.

② Harold J. Cook, *Matters of Exchange*, p. 179.

③ Harold J. Cook, *Matters of Exchange*, p. 179.

④ Harold J. Cook, *Matters of Exchange*, p. 179.

successfully treated some Qing officials, and consequently assisted in the VOC's trade negotiations with the Chinese.^① This example, again, shows that surgeons and physicians were not simply medical doctors, but were at the same time engaged in trade and various other matters.^②

Early modern British naval medicine followed the same tendencies as the Spanish and the Dutch: in *Surgeons of the Fleet*, David McLean shows how seventeenth-century Tudor vessels engaged some physicians, but primarily employed “humbler barber-surgeons or apothecaries”^③. One of the earliest English books written on naval surgery can be dated back to 1598, and describes procedures for the irrigation and stitching of wounds, as well as for fixing ligatures by applying pressure and minimizing bleeding. On British ships the pharmacists' drugs were also directly mixed on board using pestles and mortars.^④

Medicinal experts and physicians were often not only hired by commercial authorities to merely carry out their profession, but they would also sometimes engage in studying local medical traditions and botanics. The British East India Company (EIC), for example, welcomed surgeons and physicians to conduct studies and medical investigations in India. The Scottish surgeon and botanist William Roxburgh (1751 – 1815) successfully used his medicinal training and natural knowledge that he had gained at the University of Edinburgh for commercial activities, and eventually gained a fortune through private trade across the Indian Ocean.^⑤

① Harold J. Cook, *Matters of Exchange*, p. 180.

② See also Diane Rosemary Bruijn, *Ship's Surgeons of the Dutch East India Company in the Eighteenth Century: Commerce and Progress of Medicine*. PhD diss., Rijksuniversiteit te Leiden, 2004.

③ David McLean, *Surgeons of the Fleet: The Royal Navy and its Medics from Trafalgar to Jutland*, London: I. B. Tauris, 2010, p. 2. On the status of surgeons in the formative years of naval medicine, see Carpenter's remarks in Kenneth J. Carpenter, *The History of Scurvy & Vitamin C.*, Cambridge/New York et al.: Cambridge University Press, 1986, p. 29.

④ David McLean, *Surgeons of the Fleet*, p. 2; see J. D. Alsop, “Warfare and the creation of British Imperial Medicine, 1600 – 1800,” in Geoffrey L. Hudson (ed.), *British Military and Naval Medicine, 1600 – 1830*, Amsterdam and New York: Rodopi, 2007, pp. 24 – 25.

⑤ Minakshi Menan, “Medicine, Money, and the Making of the East India Company State: William Roxburgh in Madras, c. 1790,” in Anna Winterbottom and Facil Tesfaye (eds.), *Histories of Medicine and Healing in the Indian Ocean World*, Vol. 1. *The Medieval and Early Modern Period* [Palgrave Series in Indian Ocean World Studies], London: Palgrave Macmillan, 2016, pp. 151 – 178, here p. 152.

Another example, Benjamin Heyne (1770 – 1819) was appointed as surgeon at the Moravian mission in 1790. In 1792, he was working in Tranquebar, and then entered the service of the EIC, first as a botanist and then as an assistant surgeon in 1799. His responsibilities included suggesting and prescribing bazaar medicines that were needed for the EIC's army. In this context, he also studied Siddha medicine, which various EIC physicians and surgeons valued highly.^① In addition, other EIC physicians were interested in Tamil medical texts and Siddha medicine. Patrick Russell (1726 – 1805), the EIC's ship surgeon in the late eighteenth century, may be cited as an example. Theodor Ludwig Frederick Lonach (1740 – 1803) was a Danish surgeon at the military hospital at Tranquebar in 1777 who also collected manuscripts.^② The German missionary Johann Ernst Gundler (1677 – 1720) even wrote a text about Tamil physicians.^③ Mention should also be made of James Wallace's *A voyage to India; containing reflections on a voyage to Madras and Bengal in 1821, in the Ship Lonach; instructions for the preservation of health in Indian Climates; and hints to surgeons and owners of private Trading-Ships* (London: Underwood, 1824).^④

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- ① S. Jeyaseela Stephen, "The Circulation of Medical Knowledge through Tamil Manuscripts in Early Modern Paris, Halle, Copenhagen, and London," in Anna Winterbottom and Facil Tesfaye (eds.), *Histories of Medicine and Healing*, pp. 125 – 149, here pp. 143, 126.
- ② S. Jeyaseela Stephen, "The Circulation of Medical Knowledge," p. 132.
- ③ *Der malabarische medicus, welcher kurzen Berricht gibet, theils was diese Heyden in der medicine vor Principia haben; theils auf was Art und mit welchen Malabaren*, AFS, Tamil Manuscripts, M2 B11, Franckesche Stiftungen, Halle.
- ④ We would also like to refer to the East India Company's *A Register of ships, employed in the service of the Hon. the United East India company, from the union of the two companies in 1707, to the year 1760; specifying the number of voyages, tonnage, commanders, and stations. To which is added, from the latter period to the present time, the managing owners, principal officers, surgeons, and pursers, with the dates of their sailing and arrival; with an appendix* (London: 1798), which is accessible online under http://find.gale.com/ecco/eToc.do?sort=&inPS=true&prodId=ECCO&userGroupName=salzburg&tabID=T001&searchId=¤tPosition=0&contentSet=ECCOArticles&relevancePageBatch=&doDirectDocNumSearch=false&docId=CB3330846318&docLevel=FASCIMILE&workSubLevel=ETOC&workId=1426901200&action=DO_BROWSE_ETOC&DOCRN=CB130846317&totalCount=1&pageFrom=; and Hugh Ryder, *The new practice of chirurgery: being a methodical account of divers eminent observations, cases, and cures, very necessary and useful for surgeons, in the military and naval service* (London, 1693), http://eebo.chadwyck.com/search/full_rec?SOURCE=pimages.cfg&ACTION=ByID&ID=V34605&discovery_service=primo, accessed on October 7th, 2019.

Ship's chaplain Michael de Febure's logbook from the 1721 journey on board the Austrian-Netherlandish ship *Sint-Pieter* to the Indian Ocean contains a crew list mentioning the function or 'qualities' of three medical specialists, their salaries indicating a difference in function: the main medical function mentioned was that of 'Doctor-herbarius' François Huberty, presumably indicating his double function of pharmacist as well as doctor, with as additional two medical crew members Timot Hilarius Marriesen serving as first surgeon ('Prima churisien'), and Josephus Primilius as 'Second surgeon', the latter being attributed a lower payscale and thus presumably functioning as assistant-surgeon. Contrary to other crew members or sailors, these medical specialists originated further away from the ship's home port of Ostend: 'Doctor-herbarius' Huberty originated from Huy, while first surgeon Marriesen came from Holstein. Only the second surgeon, or assistant Primilius, originated closer to the port, belonging to the West-Flemish town of Ieper.^① The reason why medical specialists sometimes had to be hired from afar may be explained by naval duty and long-distance voyages being considered unattractive professions in the fraught shipboard environment of Early Modern Europe, as Alsop explains. Medical specialists, such as college-trained doctors, would have rather chosen to make a career on land, due to which shipboard medicine usually became the domain of barber-surgeons, who had learned their trade through an apprenticeship system.^②

For the Austrian-Netherlandish General Imperial Company (GIC), more colloquially known as Ostend (Oostende) Company, sea voyages to China held a particularly high risk for crew-members' health due to disease. For instance, Captain Carpentier's 1724 ship journal from on board the *Arent* reports how, during the return journey from Canton to Ostend, the ship's surgeons administered healthcare to captain Balthazar Roose, who had long since been incommoded by diarrhoea, presumably due to dysentery—called the "bloody flux"

① Ghent University Archive, BHSL, Le Febure, Michael, and Jan Frans Janssens, *Logboek Van Het Schip Sint-Pieter, Kapitein Jan Frans Janssens, Op Zijn Reis Van Oostende Naar Oost-Indië En Terug, 1721 – 1722*. 'Rolle der Equipage'.

② J. D. Alsop, "Health and Healthcare at Sea," in Chery A. Fury (ed.), *The Social History of English Seamen, 1485 – 1649*, The Boydell Press, 2011, pp. 219 – 220.

or “de roode loop” in Dutch ^① – from which he died and was buried at sea^②. As David Boyd Haycock has noted, dysentery or bloody flux was a quite common infectious disease in early modern Europe, and would spread easily within the confined and damp areas of a ship, yet its distinction with Asiatic cholera was not easily made. ^③ To make matters worse, the disease was often considered as seasonal, climatological or nutritionally related, in which one of the shipboard health benefits, namely eating fruit or grapes, was wrongly considered as its cause instead of a remedy. ^④

Apart from disease, ships’ surgeons also had to treat physical injuries related to the ship as a work environment. Ships’ journals frequently mention accidents such as sailors slipping over ropes, falling overboard, or more dramatical cases, such as captain Carpentier reported on the ship *Esperance* in 1726, when shipman Geliame Henkes was beyond surgical attention as he “had fallen from the rigging and fell with his chest on a Hook so that his Whole face was broken with no means to repair it and was not capable to receive the dishes from the kitchen as he was so injured” . ^⑤

Michael De Febure’s logbook testifies to the urgent necessity of the ship’s medical specialists, as soon as it reached the Indian Ocean. On the 8th of November 1721, nearing Ceylon, De Febure’s log reads: “Daily we get many sick people in the berth, so of scurvy, as otherwise, so that more than a third of the crew are unable to work.” ^⑥ This situation did not improve over subsequent

① Stadsarchief Antwerpen (SAA), GIC 5655, “Rapport au retour du cap N Carpentier China L’Aigle 1724”, p. 28.

② SAA, GIC 5655, “Rapport au retour du cap N Carpentier China L’Aigle 1724”, p. 17.

③ David Boyd Haycock, “Exterminated by the bloody flux,” *Journal for Maritime Research*, 4 (1) (January 2002), p. 16.

④ David Boyd Haycock, “Exterminated by the bloody flux,” p. 21.

⑤ “Gevallen was hut de maerse en viel met sijn boorst op een Haeck soo dat sijn Eel aenseght en stuk was hij gen medel en inegen om het selve te vermaecken en niet capabel en was om de gerechten vna de keuken te ontfange omdat hij soo gequetst was.” in SAA GIC 5696 ‘Journael Boeck van Desperance N Carpentier’ -Vridaeg den 15 November 1726.

⑥ “Wy kryghen daeghelyck veele sicken in de koye soo van scheurbuyck, als andersins, soo datter meer als 1/3 onbequaem sijn tot werken.” in Ghent University Archive, BHSL, Le Febure, Michael, and Jan Frans Janssens, *Logboek Van Het Schip Sint-Pieter*, folio 12.

days, which led De Febure to mention that “we became so weak in our sailors, that even those officers of the Cabin were needed to attend the watch, the Lord preserve us of the enemy or heavy weather because that would end very badly.”^①

The Problem of Scurvy

Directly linked with long overseas voyages was scurvy. Mathieu Torck has investigated in detail the history of scurvy and its treatment on board ships. As he has shown, scurvy was an omnipresent issue on board of Western ocean-going ships, while hardly any information on scurvy can be found in Chinese and East Asian sources.^② Torck introduces the gradual development of treatment in the West, and then compares it with practices in China and Asia. The first person to write about scurvy on a scientific basis in the West was the Dutch-born John Echth (*Lat.* Echthius, ca. 1515 – 1554),^③ who practiced in the German city of Cologne.

Gradually, as Torck describes, the experiences of sailors began to form the basis for the medical instructions of sea surgeons, and were included in the manuals on military medicine. A first such manual in England was published by a certain William Clowes (1543 – 1604), a doctor and surgeon, in 1596; it contained a description of two decoctions that were recommended in case a sailor became ill with scurvy. The main antiscorbutic ingredients were “scurvy grass” (*Cochlearia curiosa orofficinalis*) and watercress, to which were added cinnamon, ginger or almonds.^④ Especially for the long-distance voyages overseas of the great European nations, such as the Dutch or the British, the treatment of scurvy was essential. James Lind (1719 – 1794) worked as a ship surgeon on a British warship, the *HMS*

① “Wy warden soo slap in onse matroosen, dat selfs die van de Caiute ghenootsaeckt waren de wachten by te woonen, den Heer bewaert ons van vyant oft swaer weder want het sauder seer slecht aflopen,” in Ghent University Archive, BHSL, Le Febure, Michael, and Jan Frans Janssens. *Logboek Van Het Schip Sint-Pieter*, folio 13.

② Mathieu Torck, *Avoiding the Dire Straits*.

③ Cf. Gerrit A. Lindeboom, *Dutch Medical Biography (A Biographical Dictionary of Dutch Physicians and Surgeons 1475 – 1975)*, Amsterdam: Rodopi, 1984, p. 510.

④ Mathieu Torck, *Avoiding the Dire Straits*, p. 27.

Salisbury, and made some experiments with affected sailors. He discovered that a well-balanced diet was essential, and recommended, among others, also pickled cabbage (sauerkraut).^① He advised the British navy, and later compiled his *A Treatise of the Scurvy. Containing an Inquiry into the Nature, Causes and Cure of that Disease. Together with a Critical and Chronological View of what has been published on the subject.*^②

Despite Lind's advances in the search for a prophylactic strategy against scurvy, no decisive steps were taken to eradicate the recurrence of the disease on a permanent basis. A combination of the lack of a basic understanding of biochemical and nutritional principles, and the absence of any form of accumulation, systematization and global diffusion of scientific knowledge about scurvy caused the disease to linger on. Until the nineteenth century, the Western history of seafaring is full with cases of scurvy, and its elimination remained one of the major motivations for maritime medicine. Torck introduces the case of a French expedition into the St. Lawrence estuary in 1534, carried out under the command of Jacques Cartier (1491 – 1557). Interesting for us is that Cartier describes how local American Indians were affected by scurvy, but were able to heal the ailment by applying native cures. This emphasises the need to look beyond the scope of Western seafaring and medical history in order to obtain a more complete insight into the ways pre-modern and early-modern societies struggled and dealt with nutritional and epidemic diseases.^③

Samuel Bawlf has pointed out that Francis Drake (1540 – 1596), as a European precursor in finding possible shipboard cures for scurvy on his expedition to the Pacific, found that fresh fruits such as oranges and lemons formed an excellent remedy for scurvy. Bawlf mentions that it is uncertain whether Drake

① Sauerkraut was for example also recommended by James Cook. See Mathieu Torck, *Avoiding the Dire Straits*, p. 38, with reference to Christopher Lloyd, *The Voyages of Captain James Cook round the World*, London: Cresset, 1949, p. 107.

② For a modern edition of this work see James Lind, *A Treatise on the Scurvy*, New York: Gryphon, 1980.

③ Mathieu Torck, *Avoiding the Dire Straits*, p. 20, with reference to Kenneth J. Carpenter, *The History of Scurvy & Vitamin C*, p. 8, original source: H. P. Biggar, *The Voyages of Jacques Cartier*, Ottawa: Acland, 1929, pp. 204 – 205.

actively realised the importance of fresh fruit for combatting scurvy, or if he merely decided to add them to the shipboard diet whenever possible and noted its effects. According to Bawlf, captain Cook is often credited with discovering the remedy against scurvy, yet he mentions that Drake had either already grasped this intuitively, or that there might have been an influence from the native inhabitants of the Sierra Leone coast, whose mangroves were covered in oysters, and who supplied lemons and fruit^①. Another experimental measure by which food was used on Drake's ships in an attempt to remedy scurvy, or other consequences of nutritional deficiency, was the preparation of a stew of mussels and seaweed, in order to restore strength to affected sailors^②.

As with scurvy, J. D. Alsop points out that the main cause for illness among early-modern European sailors was due to a deficient diet. He mentions that sixteenth-century sailors lived on a monotonous diet, which was detrimental to their health, with staple foods such as salt beef, stockfish, biscuits, cheese and beer, causing nutritional deficiencies in vitamin C and B as a result^③. Vitamin B deficiency could provoke mental disorders, while vitamin C disorder was a cause for scurvy—paradoxically its remedy was thought to be one of its possible causes at the time^④. Victual lists detailing the shipboard rations on board Southern-Netherlandish ships reveal that a similar monotonous diet was still in vogue during the first half of the eighteenth century, the diet only getting more diversified during the second half of the eighteenth century.^⑤ For European sailors, the

① Samuel Bawlf, *The secret voyage of Sir Francis Drake, 1577 – 1580*, New York: Walker and Company, 2003, p. 179.

② Samuel Bawlf, *The secret voyage of Sir Francis Drake, 1577 – 1580*, p. 108. There is even earlier evidence of local native cures. Vasco da Gama's heavily afflicted crews on their way to India benefited from the intake of oranges while passing through Southeast African waters, a method they learned from Arab sailors. See Mathieu Torck, *Avoiding the Dire Straits*, pp. 17 – 18.

③ J. D. Alsop, "Health and Healthcare at Sea," in Chery A. Fury (ed.), *The Social History of English Seamen, 1485 – 1649*, p. 194.

④ J. D. Alsop, "Health and Healthcare at Sea," pp. 210 – 213.

⑤ This is apparent from comparative research on the Southern-Netherlandish 'Prize Papers', in particular captured shipboard victual lists of the ships *Aurora*, in 1703 in The National Archives (TNA), Kew, High Court of Admiralty (HCA) 32 / 48 / 69, '1703 L'Aurora of Dunkirk', and the ship *Princesse Louise* in 1758 in TNA, HCA 32 / 230 / 18, '1758 Princesse Louise of Copenhagen'.

longer sea voyages into the Indian Ocean and the Pacific entailed larger health risks, which would form the context from which remedies for such deficiencies were discovered.

Another cause for food-related illness consisted of the scarcity in water supplies during European ships' return journeys from the Pacific or Asia. De Febure's logbook notes that, once the homeward bound *Sint-Pieter* passed the Tropic of Cancer in 1722, storage was becoming 'bad in food and drink', and when the ship proved unable to replenish or resupply, De Febure mentions: "Even the water starts to become bad now, and our folk will lack. The salted meat can be eaten by few, almost none, anymore"^①. David Boyd Haycock mentions that, on board European ships in the mid-eighteenth century, bad water quality was recognised as an important cause for dysentery—yet the disease would be attributed to the inhalation of the air around the water instead of its ingestion.^②

In China, on the contrary, sources hardly ever speak of scurvy. The relatively high sensitivity and proneness to scurvy of the Chinese peoples would actually have expected the opposite. But as Mathieu Torck has discovered in an interdisciplinary approach, this is not the case: "The almost total absence of references to the disease may indicate a reluctance to mention pathological phenomena. Another possibility that I have put forward is that the quality of the food supply aboard Chinese junks was high from the beginning. . . Evidence shows that the Chinese carried tea leaves aboard their ships. Biochemical analysis has shown that tea not only contains a small amount of vitamin C in the leaves, but also has a phytate component, which helps the body retain vitamin C for a longer period of time. It seems that Chinese sailors, when setting out to sea, carried with them, as it were, a small 'preventive package' which could avoid or at least

① "Het watter selfs, dat nu al begint wat slecht te worden, sal ons volck oock manqueeren. Het ghesauten vlees kan van wynighe, Jae by naer gheen, meer gheeten worden," in Ghent University Archive, BHSI, Le Febure, Michael, and Jan Frans Janssens, *Logboek Van Het Schip Sint-Pieter*, folio 37.

② David Boyd Haycock, "Exterminated by the bloody flux," p. 22; see also Mathieu Torck's chapter on water supply, Mathieu Torck, *Avoiding the Dire Straits*, Chapter 4, pp. 211 – 228.

postpone nutritional deficiency. Both pickled vegetables and tea played a crucial role as vitamin C sources for pre-modern Chinese sailors.”^① So it was the diet of Chinese and Asian crew-members, from fruits and vegetables to tea, that helped them to prevent the frequent outbreak of scurvy.

Physicians and Surgeons in European Colonies in Asia

Interesting for us is especially what we know about physicians or surgeons who accompanied crews in the Indian Ocean waters or on board of the “*nao de China*” on their long trans-Pacific crossings, a trade connection that was officially initiated in 1565 and lasted until 1815. Unfortunately, in comparison to information we possess on doctors who accompanied crews on their trans-Atlantic voyages, information is relatively scarce in the Pacific context in the written sources of the Spanish Empire. Against this background we hope to obtain more information on practices, equipment and people by analysing newly excavated shipwrecks and their cargoes, and sources in other languages. The trans-Pacific passage in particular constituted not only a venue for the spread of infectious diseases, but also of the necessary knowledge to treat them. Our new ERC AdG project TRANSPACIFIC^② will consequently investigate textual (such as letters, diaries, wills, judicial, religious and administrative texts) and archaeological sources from actors of various countries and ethnicities involved in these passages, and carry out a comparative analysis of the range of medicinal drugs, plants, recipes, and practices that were transferred from Asia to Latin America and vice versa. We seek to highlight the diffusion and transmission patterns of (epidemic) diseases as well as problematic aspects of shipboard diet deficiencies along the sea routes under investigation, and the survival strategies adopted by physicians and surgeons and the crews in general to cope with such challenges. As entries in Blair’s and Robertson’s famous collection of documents on the Philippine Islands suggests,

① Mathieu Torck, *Avoiding the Dire Straits*, p. 319.

② See <https://cordis.europa.eu/project/id/833143>, accessed on September 18, 2019.

both a surgeon and a physician should be on board.^① It is “no Prudence to go to Sea without a Surgeon” .^② A document stemming from Grau y Monfalcon’s Informatory Memorial of 1637 describes expenses and staff required for the trans-Pacific voyages (Number 53. Seventh division: the navy and marine):

“The ships that sail annually to Nueva España carry one commander-in-chief, or head, who, in addition to four rations that are given him, receives a salary of 4325 pesos; one admiral, 2900. Although it is ordered in the royal decree for the grant of the last of December, 604, that these ships have an overseer and accountant, with pay of 2000 ducados apiece, in order that they may keep account in their books of what is carried and taken, as in the last reports of expenses and salaries, those offices are not found. It is doubtful whether they are provided, and accordingly they are omitted. There are two masters, each of whom receives 400 pesos; four pilots, each 700; two boatswains, each 325; two boatswain’s mates, each 225; two notaries, each 225; two keepers of the arms and stores, each 225; two calkers, each 325; two water guards, each 225; two surgeons, each 225; two constables, each 325; twenty artillerymen, each 225 (who ought to serve a like number of pieces, according to the seventh section of the royal decree of 604); six Cahayanes [*i. e.*, Cagayans (Indians)?], each 60; two coopers, each 325. These wages amount to 20535 pesos, for sailors and

① See, for example, in volume 2 of Emma Helen Blair, James Alexander Robertson, Edward Gaylord Bourne, eds., *The Philippine Islands, 1493 – 1898. Explorations by Early Navigators, Descriptions of the Islands and Their Peoples, Their History and Records of the Catholic Missions, as Related in Contemporaneous Books and Manuscripts, Showing the Political, Economic, Commercial and Religious*, 55 vols., Cleveland: Arthur H. Clark, 1905, Gutenberg online version: “A surgeon and a physician, with their drugs; and two other barbers, because only one remains here”, Memorandum of things—not only articles of barter, but arms and military supplies—which are necessary, to be provided immediately from Nueva España in the first vessels sailing from the said Nueva España to these Filipinas Islands; of which the following articles must be speedily furnished, quoted from <http://www.gutenberg.org/cache/epub/13280/pg13280.html>; <http://www.gutenberg.org/files/42884/42884-h/42884-h.htm>, vol. 33, pp. 262, 263, accessed between July 2018 and March 2020.

② <http://www.gutenberg.org/files/28899/28899-h/28899-h.htm#doc1697>, vol. 39, p. 76, accessed on October 14, 2019.

common seamen belong to those whose posts are continuous. On the return trip [to Filipinas], when the usual reënforcements are carried, there is a sargento-mayor, who gets 600 pesos; one adjutant, 412; one royal alferez, 865. It is ordered by a royal decree of December 14, 630, that the latter officers be aided with only four months' pay at Acapulco, and that they be paid for the time of their service. Furthermore, there is a shoremaster at the port of Cavite, who receives 600 [650—MS.] pesos; and although it was ordered by a royal decree of April 22, 608, that he should not receive this salary, that office must have appeared indispensable. There is one builder for ships, and another for galleys, each of whom receives 690 pesos; one gunner to sight the guns, and an overseer of the royal works of Cavite, 800; one manager for the artillery foundry, 500; one founder, 450; one powder manager, 500; another of the rigging, 272. One galley is built every year, on an average, which costs 20000 pesos finished and ready for sailing, exclusive of the men who work at it. The purchase and equipment of 18 champans cost 2300 pesos. Therefore, according to the items above mentioned, the expense of this department amounts to 283, 184 pesos. ”^①

This document provides a nice insight into the crew on board including their payments. For comparison, the Spanish hospital in Manila received “3000 pesos; to the physician, 300; to the surgeon, 400; to the barber, 312; to the apothecary, 200; to the steward, 182 and one-half, and one tonelada in the trading ships. ”^②

A *Letter from Father Marcelo Francisco Mastrili* [1603 – 1637; beheaded in Nagasaki], in which he gives account of the conquest of Mindanao to Father Juan de Zalazar [1582 – 1645], provincial of the Society of Jesus in the Filipinas Islands describes the conquest of Mindanao and at random also provides some information on the health situation on board: “Twice we stopped on the way for provisions to

① <http://www.gutenberg.org/files/26004/26004-h/26004-h.htm>, vol. 27, pp. 131 – 132, accessed on October 14, 2019.

② <http://www.gutenberg.org/files/26004/26004-h/26004-h.htm>, vol. 27, p. 125, accessed on October 14, 2019.

refresh the sick—once at Iloilo, where our fathers entertained us; the other time at Panay, at the invitation of Captain and Alcalde-mayor Don Francisco de Frias. At last, since the winds were wholly contrary and his Lordship had suffered so much on the way, he resolved to disembark in Tayabas.” They travelled by land for two days and left the sick at Manila. ①

A letter from Santiago de Vera, sixth Spanish governor of the Philippines, from May 16, 1584 until May 1590, to King Felipe II (dated June 26, 1588) states that no physician was in Manila and one was urgently needed for the royal hospital. ② “Although your Majesty has ordered this camp and the royal hospitals to be provided with medicines and other necessities, as there is no doctor, the soldiers are only treated by unskilled surgeons who attempt to cure them. For this reason, many people die, and I beseech your Majesty, as it is so important to your service, to order the viceroy of Nueva España to send a good physician with an adequate salary at the cost of your royal estate. The city has no money with which to pay him, nor do the soldiers, since even the richest of them has not enough for his own support. [*Marginal note*: “Write to the viceroy of Nueva España to send a doctor and a surgeon to treat these people and give advice thereof.”] ③ Volume 8 includes the rules for the hospital in Manila. ④ In total, there existed, over time, eight hospitals in the Philippines: the Royal Hospital

① <http://www.gutenberg.org/files/26004/26004-h/26004-h.htm#xd0e2910src>, vol. 27, pp. 131–132, accessed on October 14, 2019.

② See <http://www.gutenberg.org/files/13701/13701-h/13701-h.htm>, vol. 7, p. 8; page 16 has the following entry: “The Dominicans have also built a hospital for the Chinese; it is supported by alms, partly contributed by “Sangley” infidels; and its physician is a converted Chinese who devotes himself to its service.”

③ <http://www.gutenberg.org/files/13701/13701-h/13701-h.htm>, vol. 7, p. 84, accessed on November 5, 2019; “For lack of a physician and of someone who knows how to cure sickness, many of the people die – especially the soldiers and sailors, who have few comforts”, p. 116.

④ <http://www.gutenberg.org/files/15445/15445-h/15445-h.htm>, vol. 14, pp. 209–210, accessed on November 5, 2019, provides some insight into the poor financial situation of medical care: “In the first place, knowing that women, both Spanish and mestizas, suffered greatly in case of sickness, for lack of a hospital in which to be treated, the Confraternity determined to establish one, which is still called the hospital of La Misericordia. They bought land and erected a building with the money given in alms; and they pay the expense of keeping a physician and a surgeon, of medicines, and of the maintenance of two Franciscan religious, who administer the sacraments and care for the welfare of the souls of the patients.”

(Hospital Real de Españoles), operating between 1577 and 1898, where the Spanish were treated^①; the Hospital of La Misericordia, operating 15782 – 1656, where slaves and Spanish women as well as natives and foreigners who could not afford other medicinal services were treated, in 1656 was renamed Hospital de San Juan de Dios and exists still today; the Hospital of the natives (Hospital de los Indios Naturales), founded 1578 by Franciscans especially for leprosy patients, since 1603 called Hospital de San Lazaro; the Hospital for Sangleys, Hospital de San Pedro Martir (1587 – 1599), then Hospital de San Gabriel (1599 – 1774), founded by Dominicans; and the Hospital of Los Vaños [i. e., “the baths”] or Hospital de Nuestra Señora de las Aguas Santas de Mainit, established in 1597 (until 1727) by Franciscans on Laguna.^② Also Chinese physicians lived and practiced on the Philippines. “The Chinese have also supplied provisions, metals, fruits, preserves and various luxuries, and even ink and paper; and (what is of much more value) there have come tradesmen of every calling—all clever, skilful, and cheap, from physicians and barbers to carriers and porters.”^③ Opposite of the fortress San Gabriel “one finds a Chinese physician, Chinese medicines”.^④

In the mid-30s of the seventeenth century, mention is also made of a hospital in the port of Cavite: “But a few months after, as the hospital of the port of Cavite had been put in order, so that the soldiers and sailors might have a place of retreat in their illnesses, Francisco Garçia was detailed as the physician of

① An interesting entry in vol. 35, pp. 290 – 291 states that “as that hospital [i. e. the Royal Hospital in Manila, AS] always had a surgeon and an apothecary (both Spaniards), the religious who served and ministered to them learned medicine by experience, and by means of the books which they read in the Romance [i. e., Castilian] tongue. By that means the other hospitals and infirmaries were furnished with nurses and physicians so competent that the best people of Manila preferred to be treated by them rather than by the Spanish physician.” See <http://www.gutenberg.org/files/13701/13701-h/13701-h.htm>, accessed on November 15, 2019.

② Arnel E. Joven, “Colonial Adaptations in Tropical Asia: Spanish Medicine in the Philippines in the Seventeenth and Eighteenth Centuries,” *Geography*, (30 March) 2012, p. 173; also <http://www.gutenberg.org/files/16133/16133-h/16133-h.htm>, vol. 20, pp. 237 – 240, accessed on November 15, 2019.

③ <http://www.gutenberg.org/cache/epub/15022/pg15022-images.html>, vol. 12, no pagination, accessed on March 21, 2020.

④ <http://www.gutenberg.org/files/50111/50111-h/50111-h.htm>, vol. 38, p. 55, accessed on August 30, 2019.

that hospital, with a salary of one peso per day—which was not a bad stipend.”^①
The medical situation on the Philippines is still described as very backwards in 1736
by Antonio Álvarez de Abreu (1683 – 1756) .^②

On Medicines and Practices

The ship’s doctor John Conney wrote a “Diarium practicum” in which he included six hundred remedies that he prescribed, while at sea between circa 1661 to 1664.^③ Ships were ordered to carry a surgeon and medicines; and surgeons more often than physicians accompanied early expeditions.^④ However, the publication of *Milicia Indiana*, a practical guide to treatment of soldiers in the field

① <http://www.gutenberg.org/files/16133/16133-h/16133-h.htm>, vol. 25, p. 271, accessed on August 30, 2019.

② “The writer believes that the Filipinos would give better results in medicine and surgery, and the advisability of a medical school could be sustained, but that medicine and even pharmacy which are both sorely needed in the islands could be established in the university. Foreign professors should be allowed to enter. Superstitions, abuses, and ignorance abound in regard to medicine and pharmacy among the natives. Drugs are allowed to be sold by peddlers, and adulterations are frequent. Parish priests are called in to act as physicians but often only after the native doctor, who works mainly with charms, has been unable to combat the ailment of his patient. But for all his inefficiency, the natives prefer their mediquillo to the priest.” See <http://www.gutenberg.org/files/50245/50245-h/50245-h.htm>, vol. 45, pp. 22 – 23. “(T) he poor parish priests have to serve as physicians and apothecaries in extreme cases.” p. 288. Or, Juan Maldonado de Puga notes (1742): “These islands are in need of physicians and surgeons, as well as of medicines; for excepting the capital Manila and the port of Cabite – where we have hospitals, and where the few secular persons who exercise the profession [of medicine] can render assistance – the rest of the provinces, and the many dependent towns, are supported by Providence alone, being helped by herbs and other simples about which they have been instructed by continual use.” See <http://www.gutenberg.org/files/54041/54041-h/54041-h.htm#xd24e6220src>, vol. 47, p. 162, accessed on September 7, 2019. He also describes the condition of the royal hospital in Manila and mentions a few physicians by name, such as Don Buenaventura Morales (p. 179), Father Fray Marzelo del Rroyo, “an excellent physician, and a strong defender of the privileges of the regulars” (p. 198) or Bachelor Don Miguel de la Torre (p. 207) .

③ See Lauren Kassell, “Casebooks in Early Modern England: Medicine, Astrology, and Written Records,” *Bulletin of the History of Medicine*, 88: 4 (2014), pp. 595 – 625, online: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4335571/>, accessed on September 7, 2019, with reference to Conney’s records Sloane MS 2766, fols. 2 – 32.

④ Juan B. Lastres, *Historia de la Medicina Peruana*, Lima: Imprenta Santa Maria, 1951, vol. 2, pp. 28, 31.

written in 1599 by a veteran captain in the Spanish army, Bernardo Vargas Machuca (1557 – 1622), indicates that, in reality, soldiers often had to improvise in the absence of trained doctors and surgeons. ^①

As mentioned in the case of the *Sint-Pieter's* crew list in 1721, the ship's doctor also served as herbarius or pharmacist. ^② Although we have no inventory of the doctor's medicinal chest on Austrian-Netherlandish GIC-ships, we find that the list of medicines destined for Asia in 1724, reveals some medicines that were also traded as commodities within Europe. More precisely, this concerned an intra-European Mediterranean trade from Livorno towards the North Sea (port of Ostend) in alum root, "drugs", herbal medicine, red argyle, cantharides, flower roots, sandarac, aniseed, orange peels and soap^③, or even cordials. ^④

Some of these ingredients would then be shipped from Ostend to European establishments in Asia, for use of the physicians there. The archive concerning the GIC's settlement in Bengal yields a "note of medicine necessary to be sent yearly for the establishment in Bengal", which gives us some indication of medicines used by European doctors in the Indian Ocean^⑤. Indirectly, it reveals information on the possible treatments given by physicians, and the diseases they could treat.

The list of medicines is divided into categories: Aq. Elect. Cons. Spirt. Tinct. Ol. Sal. Merc. Rad. Spec. Ol. Bacc. Ungt. Bals. Ol. Empl. It also includes an additional note stating that "it is to be remarked that those medicines of England are preferable, especially since several of its Compositions are not to be found elsewhere." ^⑥ Some of the pharmaceuticals in this list may be detailed as follows:

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- ① Benjamín Flores Hernández, "Medicina de los conquistadores, en la Milicia Indiana de Bernardo de Vargas Machuca," *Boletín mexicano de historia y filosofía de la medicina*, 6: 1 (2003), pp. 5 – 10.
 - ② Ghent University Archive, BHSL, Le Febure, Michael, and Jan Frans Janssens, *Logboek Van Het Schip Sint-Pieter*, folio 13.
 - ③ The National Archives (TNA), Kew, High Court of Admiralty (HCA) 32/245/1, "De Stadt Bergen (captain Jens Lax), Livorno to Ostend", 1757.
 - ④ TNA, Kew, HCA 32/230/14, De Prinse Karel (captain Clement Beens), Marseille to Ostend / St. Valery, 1756.
 - ⑤ SAA GIC 5573 – 5574, [Factorerie de Bengale sous la Direction de Parrabert], 'Notte des medicines Necessaire toutes les Années pour l'Etablissement à Bengale', 1724 – 1726.
 - ⑥ "à Remarquer que ceux d'Angleterre sont préférable de plus que plusieurs de ces Compositions ne se trouvent pas ailleurs", SAA GIC 5573 – 5574, folio 1 verso.

Aq (ua) Theriac and Epidem, is mentioned by Zachary Matus as a naturalistic compound already known in Antiquity, as part of Galenic medicinal practices and including up to 80 ingredients. Its main ingredients were viper flesh and sometimes opium, while its chief effects were warding off effects of poison, as an antidote.^① As a complex compound, it was also used as a plague medicine, combining its Galenic doctrinal ancestry with the effects of pharmacological observations.^② The other medicinal items listed by the GIC as potions consisted of similar compounded concoctions.

Among the conserves we find Absynthe and Cynosbati, or conserve of dog rosehips (*Rosa caninus*), a mixture of rosehips and sugar, often prescribed as an English medicine for consumptive cases, coughs and “defluxions of rheum”.^③ Contemporary accounts also describe it as an ingredient in method for treating small-pox^④.

Another ingredient in this category was “*Mel Agiptiae*” or Egyptian honey—a traditionally long-standing and well-known cure for 60 species of bacteria, fungi and viruses. The antioxidant capacity of honey is important in many diseases and debilitating conditions due to a wide range of compounds in honey including acids, enzymes and reaction products. Honey has also been used for some gastrointestinal, cardiovascular, inflammatory and neoplastic states, as reported by Eteraf-Oskouei and Najafi at Tabriz University.^⑤ *Artemisia absinthium*, the dried flowers of wormseed, had since antiquity been “used as a carminative and diuretic, as a topical agent, and as a remedy for worms.”^⑥

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- ① Zachary A. Matus, *Franciscans and the Elixir of Life: Religion and Science in the Later Middle Ages*, Pennsylvania: University of Pennsylvania Press, 2017, p. 60.
- ② Christiane Nockels Fabbri, “Treating medieval plague: The Wonderful Virtues of Theriac,” *Early Science and Medicine*, 12 (2007), pp. 247–283.
- ③ Briony Hudson (ed.), *English Delftware Drug Jars. The collection of the Museum of the Royal Pharmaceutical Society of Great Britain*, London: Pharmaceutical Press, 2006, p. 148.
- ④ John Ball, *A Treatise of Fevers: Wherein Are Set Forth the Causes, Symptoms, Diagnosticks, and Prognosticks, of an I. Acute Continual, 2. Intermitting, . . . Fever, . . . Together with the Method of Cure. . . By John Ball*, London: J. Scott, 1758, pp. 158–159.
- ⑤ Tahereh Eteraf-Oskouei and Moslem Najafi, “Traditional and Modern Uses of Natural Honey in Human Diseases: A Review,” *Iran J Basic Med Sci (Iranian Journal of Basic Medical Sciences)*, 16 (6), June, 2013, pp. 731–742.
- ⑥ R. D. Mann, *Modern Drug use: An Enquiry on Historical Principles*, Lancaster: MTP Press, 1984, p. 107.

Among the category labeled “spirits”, we find volatile salts, sulphur, camphor, and vitriol. The latter could be used for the acidic preparation of Elixirs, such as the *Elixir vitrioli*, preferred for “hot constitutions, and weaknesses of the stomach.”^①

Tinctures containing myrrh and castor were used for making lotions or ointments, or infusions for herbal medicines. Infusion or Tincture of castor was particularly recommended for “nervous complaints and hysteric disorders”.^②

The list also contains several variants of mercury or *mercurius*: *Mercurius dulcis* & calomel are recognized as the most efficacious mercurials, and described as “the most efficacious of any, that are safe: and they are of great moment in the cure of topical disorders: as well such as arise from the venereal disease, and other contagious virulence, as from scrophulous, and other glandular disorders, or the defect of due secretions and evacuations”^③.

Lastly, other elements included an extensive list of roots and natural medical products, such as ipecocuan, rhubarb, sarsaparil, gentian, *cort. Peruv.* [Peruvian; *Cinchona officinalis*, also called “Jesuits’ bark”], lig Guaiac., sassafras, *hiera piera*, cordials, *antim diaph*, diagrid, colorynth, *aloes Succoti*, *sperm ceti*, *alum Rupei*, cantharides, *rez Jalapi*, camphor.^④

The above references to the functions of these medicinal drugs and substances already reveal the importance of British Dispensatories or Pharmacopoeia encyclopaedia, confirming the adaptation of European pharmaceuticals to the

① William Lewis, *The New Dispensatory: Containing, I. The Elements of Pharmacy II. The Materia Medica, III. The Preparations and Compositions of the New London and Edinburgh Pharmacopoeias; ... The Whole Interspersed with practical Cautions and Observations*, London: J. Nourse, 1765, Part III, p. 324.

② Andrew Duncan the Younger, *The Edinburgh New Dispensatory. Containing I. The Elements of Pharmaceutical Chemistry II. The Materia Medica III. The Pharmaceutical preparations and Compositions. Including Translations of the Latest Editions of the London, Edinburgh, and Dublin Pharmacopoeias 7th Ed. Corr. And Ell.*, Edinburgh: Bell & Bradfute, 1813, p. 563.

③ Robert Dossie, *Theory and Practice of Chirurgical Pharmacy; Comprehending a complete Dispensatory for the use of Surgeons*, Dublin: George and Alexander Ewing, 1761, p. 93.

④ For Spanish American medicinal drugs, see, for example, José Luis Valverde, *Evaluation of Latin American Materia Medica and its Influence on Therapeutics*, Granada: International Academy of History of Pharmacy, 2010; Stefanie Gänger, “World Trade in Medicinal Plants from Spanish America, 1717 – 1815,” *Medieval History*, 59: 1, 2015, pp. 44 – 62.

circumstances of Indian Ocean travels. The selection of medicinals mentioned may indeed have been based on British practices. From this medicinal inventory, the combined role of ship's doctor-pharmacist again becomes clear, as they had to mix the ingredients themselves while on shipboard, or at their Indian Ocean establishments, for which purpose they presumably needed education or a manual, so they could create fresh preparations according to disease or injury treated.

Among those diseases and injuries, our non-exhaustive list of pharmaceuticals allows us to identify treatments for illnesses such as virulence, venereal disease, glandular disorders, digestive issues or gastric disorders (probably including dysentery), nervous disorders, topical disturbances, bacterial infections, and pestilence. The main forms of treatment seem to have been purgation, inducing vomiting, and applying antidotes. Due to the urgency with which the above list was assigned in Europe, one may conclude that such disorders were found among European sailors in the Indian Ocean. One may also notice that most of the medicines featured on this list consisted of natural components, insect-, mineral-, or plant-based medicines. In reverse, Asian medicinal plants were also exported back to Europe: among medicinal commodities transported in sailors' chests from China, we find mention of small quantities of Galangal roots and Radix China, transported as smaller commodities.^①

As we have seen above, the Florentine merchant Francesco Carletti also reported on sickness and medicine. He repeatedly mentions how he fell ill with a very ardent fever, which he attributed either to over-exhaustion, or to "the indifferent or pestilent air of this climate, or the intemperance of these lands which are new to me"^②. In such cases, Carletti describes the ship's surgeon's treatment as "letting a great part of my blood, as it was there that for the first time my veins were pierced during seven consecutive days, which did not deliver me from my sickness"^③. In particular, Carletti was commanding a slave ship from Africa. He

① SAA GIC 5800, *Generael Cappy Boeck van het schip de Keyserinne Joannes de Klerck Anno 1725- "Canton den 23 November 1725"*.

② Francesco Carletti and Paolo Carile (ed.), *Voyage autour du Monde de Francesco Carletti (1594 - 1606)*, Paris: Chandeigne, 1999, p. 66.

③ Francesco Carletti and Paolo Carile (ed.), *Voyage autour du Monde de Francesco Carletti (1594 - 1606)*, p. 66.

testifies to the number of dead slaves' bodies, caused by "flux of blood", which he believed to be caused by the eating of nearly raw fish^①. Arriving in Cartagena in 1594, Carletti reports that there had been a great number of diseased on board his ship, and its crew-members incapacitated by fever. He mentions many of them died as soon as they arrived in the port, the cause of which he attributes to the unhygienic conditions of the town, and its 'pestilent air'^②.

Concerning treatment of the diseased, Carletti mentions that convalescent sick were prescribed pork and fish meat as being beneficial, while further noting on the cure for his own fevers that "For the rest, remedies against fevers consisted of abundant blood-letting, frequent purgation and vomiting, and for that they give to the patient, water to drink as much as they want, when the fever goes down, and make the patient sweat. With these remedies, the fever ultimately escaped"^③.

Upon visiting Japan in 1598, Carletti was struck by the great contrast between Japanese and European ways of treating the sick, as he noticed that the Japanese at Nagasaki treated their sick, by nourishing them with fresh and salted fish, shellfish and fresh and sour fruits, to which he adds that "never do they bloodlet their sick and they do everything contrary to us"^④. In China, and particularly in Macao, Carletti also remarks that medicine was undertaken in a different way, in particular when mentioning black pepper, as he notes that the Chinese "buy other things from Europe and India, most notably pepper, which I have been told they do not eat, but use it in their medicine, and in the composition of a certain mixture for plastering the walls of their houses so as to heat up the rooms and keep them healthy"^⑤. Many spices were in fact used in Chinese

① Francesco Carletti and Paolo Carile (ed.), *Voyage autour du Monde de Francesco Carletti (1594 - 1606)*, p. 68.

② Francesco Carletti and Paolo Carile (ed.), *Voyage autour du Monde de Francesco Carletti (1594 - 1606)*, p. 75.

③ Francesco Carletti and Paolo Carile (ed.), *Voyage autour du Monde de Francesco Carletti (1594 - 1606)*, p. 76.

④ Francesco Carletti and Paolo Carile (ed.), *Voyage autour du Monde de Francesco Carletti (1594 - 1606)*, p. 173.

⑤ Francesco Carletti and Paolo Carile (ed.), *Voyage autour du Monde de Francesco Carletti (1594 - 1606)*, p. 199.

medicine.^① As Mathieu Torck has shown, detailed medical knowledge about scurvy had accumulated in China in a land-based military context in the early eighteenth century, as the disease emerged from time to time among northern Qing army units. A testimony to this is a chapter in the medical compendium *Yizong jinjian* 医宗金鉴 (*Golden Mirror of Medicine*) which documents a description of the disease by an army physician called Tao Qilin 陶起麟. But it seems obviously unclear if China had a long-standing tradition of naval medicine and if Chinese physicians encountered the occurrence of scurvy as an ailment among sailors.

An early example of awareness of the importance of medicinal treatment on board of ships in the Chinese context is provided by the famous naval commander Ma Yuan 马援 (14 BCE – 49 CE), who led an expedition to Jiaozhi 交趾 (in present-day Vietnam) between the years 41 and 43 CE. During his stay in Jiaozhi, he is said to have discovered the benefits of a herb called *yiyi* 薏苡 or Job's tears (*Coix lacryma-jobi*) in overcoming miasmatic diseases, and subsequently introduced it to China.^② One would suspect that physicians also accompanied Chinese envoys on their voyages to foreign countries, but unfortunately, we do not possess much concrete evidence.

Joseph Needham is convinced of a longer Chinese naval medicine tradition. He refers to two texts, the Tang period work *Haishang jiyang fang* 海上集验方 by Cui Xuanliang 崔玄亮 (Jinshi, 795) and the Song text *Haishang mingfang* 海上名方 by Qian Yu 钱筮, translated as *Collected Well-tried Shipboard Prescriptions and Famous Shipboard Prescriptions*.^③ But probably the title should rather be translated as *Famous Recipes from Abroad*. Also Mathieu Torck is more critical in this respect and draws our attention to the intricacies of this question: “The problem lies in the expression *haishang* 海上, which should be translated ‘in the

① Robert Hartwell, “Foreign Trade, Monetary Policy and Chinese ‘Mercantilism’”, in Ryū Shiken hakase shōju kinen Sōshi kenkyū ronshū kankōkai ed., *Ryū Shiken hakase shōju kinen Sōshi kenkyū ronshū* 劉子健博士頌壽紀念宋史研究論集, Kyōto: Dohōsha, 1988, pp. 454 – 488. He speaks about Tang and Song times, but the use of aromatic and spice medicinal drugs in Chinese medicine continued into the Yuan, Ming and Qing dynasties.

② Fan Ye 范晔, *Hou han shu* 后汉文, Li xian 李贤 et. al. noted, Beijing: Zhonghua Book Company, 1965, p. 846.

③ Joseph Needham, *Science and Civilisation in China*, vol. 4, Cambridge Univ. Press, 1971, part 3, pp. 491 – 492, note (h) .

sea’ rather than ‘at sea’ or ‘aboard a seagoing vessel’. Thus, both works presumably refer to medicinal materials found in the sea. . . . In any case, we can only surmise that physicians must have played a role in securing the health of the crew, as did the ships’ surgeons aboard Western vessels. Needham suggests that they also had the special task of collecting medicinal herbs in the countries they visited. In this respect, the acquisition of medicinal herbs, such as *mubiezi* 木别子 (*momordica cochinchinensis*), in the Arabian port of Dhufar, as mentioned by Ma Huan 马欢, is a good example.”^①

That the Chinese were aware of phenomena such as seasickness is attested to in the medicinal literature from approximately 300 CE on.^② Such evidence stems, for example, from *Bencao gangmu* 本草纲目 (first published 1598) by Li Shizhen 李时珍 (1518 – 1593)^③, *Chishui yuanzhu* 赤水元珠 (*Pearls of Wisdom Lifted Out of the Purple Sea*), a text from 1596 by Sun Yikui 孙一奎 (1538 – 1600), or a seventeenth/eighteenth century text, *Yanfang xinbian* 验方新编 (*New Collection of Proven Remedies*), by a certain Bao Xiang’ao 鲍相璈. Sun Yikui observes: “Later due to seasickness she vomited up a number of bowls of saliva, her condition did not improve; it originated in her observation of [her own] vomited blood and in her condition of liver stagnation.”^④ Black pepper was also prescribed for blood

① Mathieu Torck, *Avoiding the Dire Straits*, p. 166, footnote 603, with reference to J. V. G. Mills (tr.), *Ma Huan 马欢: Ying-yai sheng-lan ‘The overall survey of the ocean’s shores’ (1433)*, translated from the Chinese text edited by Feng Ch’eng-chün, Cambridge: University Press for the Hakluyt Society, 1970, p. 54. See especially footnotes 602 to 604.

② Terms, such as “*zhuchuan*” 注船 (ship-influence), “*zhuchuan*” 疰船 (ship-influence, in different character), “*zhuliang*” 注浪 (wave-influence), “*yunchuan*” 晕船 (ship-dizziness), “*kuchuan*” 苦船 (ship-illness), or “*chuanzhu*” 船疰 (ship-influence) appear in the literature. See Doreen Huppert, Judy Benson, and Thomas Brandt, “A Historical View of Motion Sickness – A Plague at Sea and on Land, Also with Military Impact,” *Front Neurol.* 8 (2017), p. 114, DOI: 10.3389/fneur.2017.00114, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5378784/>, accessed on October 26, 2019.

③ The term used is “*zhuche zhuchuan*” 注车注船 (cart and ship-influence), translated as “motion sickness”. This referred to illness experienced on a cart or a boat, with heart pressure and headache as well as nausea and vomiting. See Zheng Zhibin and Paul U. Unschuld (eds.), *Dictionary of the Ben Cao Gang Mu*, vol. 1: *Chinese Historical Illness Terminology* [Ben Cao Gang Mu Dictionary Project, 1], Oakland: University of California Press, 2015, p. 689.

④ Doreen Huppert, Judy Benson, and Thomas Brandt, “A Historical View of Motion Sickness,” p. 114.

vomiting during Song times.^① Some Chinese remedies recommended to counter seasickness are those of healers, for example, drinking the urine of young boys, or taking white sand-syrup, or taking “some earth from the middle of the kitchen hearth and hiding a piece under your hair; do not tell anyone, this gives peace”,^② and, of course, praying to Mazu 妈祖, the goddess of the sailors. Exposed to the forces of nature, religion played an essential role among all crew-members.

Great care was taken of the health of crew-members during the Zheng He expeditions. Above we have already mentioned that up to 180 doctors or medical attendants were on board. The ships were always provided with food and with fresh water collected from the streams near the anchorage places, then taken in boats to the ships, and stored in water tanks.^③ Skilled doctors and/or pharmacists also collected medicinal plants during the Zheng He voyages. This was important, because China was struck by various infectious diseases and epidemics in early Ming times (for example in 1408, when in Jiangxi and Fujian more than 78400 people passed away; in 1411, when more than 6000 people in Dengzhou 邓州 and Ninghai 宁海 passed away, or another epidemic the same year with 12000 deaths; in 1435 – 1436, with 30000 deaths in Shaoxing 绍兴, Ningbo 宁波 and Taizhou 台州; in 1455 in Guizhou 贵州 with more than 20000 deaths; in 1475 in Fujian and Jiangxi with innumerable deaths, *etc.*)^④, smallpox being one of them, while, at the same time the maritime trade proscription policy of the Hongwu 洪武 emperor (r. 1368 – 1398) caused a shortage of medicinal plants and drugs that used to be imported from abroad—from rhinoceros horn and deer antlers (believed to strengthen the body), sulphur (used as skin ointment and against, for example, rheumatism), incenses, which were also burnt to drive away mosquitos, and a wide variety of other items, such as camphor, pepper, cloves, myrrh, cardamom, gharuwood (medicines containing gharuwood were

① Robert Hartwell, “Foreign Trade, Monetary Policy and Chinese ‘Mercantilism,’” p. 480.

② Doreen Huppert, Judy Benson, and Thomas Brandt, “A Historical View of Motion Sickness,” p. 114, with reference to *Yanfang xinbian*.

③ Gongzhen 巩珍, *Xiyang fanguozhi* 西洋番志国, annotated by Xiang Da 向达, *Zhongwai Jiaotong shiji congkan* 中外交通史籍丛刊, Beijing: Zhonghua Shuju, 1961, p. 6, in Gong Zhen’s foreword.

④ *Mingshi* 明史 (Zhang Tingyu 张廷玉 et al., Beijing: Zhonghua Book Company, 1974, pp. 442 – 443) includes a paragraph on epidemics during Ming times.

attributed a range of curing health effects including as stimulant, carminative, aphrodisiac, antirheumatic), storax, benzoine, *etc.* ^①

Surgeons and Physicians on the Move in the Asian Waters—From the Indian Ocean to the Asia-Pacific

On Board Western ships

Few of the surgeons or physicians who served on board are known by name. *Primo Viaggio Intorno al Mondo* [First Voyage around the World] by Antonio Pigafetta (composed *ca.* 1525, based on events of 1519 – 1522) mentions that the fleet had been supplied with all necessary things for the sea. “The stores carried consisted of wine, olive oil, vinegar, fish, pork, peas and beans, flour, garlic, cheese, honey, almonds, anchovies, raisins, prunes, figs, sugar, quince preserves, capers, mustard, beef, and rice. The apothecary supplies were carried in the ‘*Trinidad*’”. The name of the surgeon was Juan de Morales from Sevilla. ^②

We also know a certain Don Francisco García, who had originally been sent from New Spain, and was later requested by Sebastián Hurtado de Corcuera (? – 1600), governor of the Philippines between 1635 and 1644, to serve as a ship surgeon accompanying a galleon fleet to Ternate. ^③ On September 4, 1635, Hurtado de Corcuera requested that “(t) he surgeon of the royal hospital for the

① See also Louise Levathes, *When China Ruled the Seas. The Treasure Fleet of the Dragon Throne, 1405 – 1433*, Oxford: Oxford University Press, 1997, chapter 6.

② <http://www.gutenberg.org/files/42884/42884-h/42884-h.htm#r25>, vol. 33, 35, pp. 278 – 279, transcript made from the original document in the Biblioteca Ambrosiana, Milan, Italy.

③ <http://www.gutenberg.org/files/27127/27127-h/27127-h.htm#doc1636.2>, vol. 26, 57, Letters from Governor Hurtado de Corcuera: “(T) he viceroy of Nueva España, the marquis de Cerralbo, sent a surgeon named Don Garcia to this country for his crimes. He came, condemned to serve for eight years at the will of the governor, without pay. But as I had need of him to go in the fleet of galleons that I was despatching to the forts of Terrenate, I tried to have him prepare for that service. He took refuge in the convent of St. Dominic, where the fathers aided and protected him. One of them, named Fray Francisco de Paula, told me that among the multitude of my affairs that were to be treated by the Inquisition was the fact that I was trying to send the said Francisco Garcia in the fleet, as its surgeon, since he was a familiar of the Holy Office.”

said forts of Terrenate shall receive a salary of six hundred pesos per annum, without any ration.”^①

Another of the few so far identified ship surgeons on board a galleon that sailed from New Spain to the Philippines was a certain Agustín Sánchez. He passed away in 1580 on board the galleon *San Martín*, which was on its way in the direction of the Philippines under the command of Captain Pedro de Ortega. Agustín Sánchez pretended to be resorting to the Philippines in order to cure himself there, and his death brought about the inspection of the inventory list of goods he left. It was presented at the port of Acapulco in November 1592. As he had no heirs, basically nothing is known about his person; however well we are informed about the goods he was carrying.^② The *San Martín* arrived in March 1581 at the Philippines with the first four Jesuits and the Archbishop, Domingo de Salazar (1512 – 1594), on board.^③

Obviously relatively famous in the later seventeenth century was a certain Juan Ventura Sarra (fl. 1670 – 1675), a “great” Catalan “expert surgeon”:

“Governor Don Francisco de Mansilla despatched the galleon for Nueva España, appointing as its commander his son, Don Felipe de Mansilla y Prado, a young man of much courage and ability, who at the time was serving in the post of sargento-mayor of the Manila army, which is the second, in the esteem of military men, after that of master-of-camp. As sargento-mayor of the galleon he appointed Juan Ventura Sarra (the Catalan so famous for his successful surgical operations), on account of his being a man of much valor, and experienced in military service in Flanders and

① <http://www.gutenberg.org/files/27127/27127-h/27127-h.htm#doc1636.2>, vol. 26, p. 191. Later on, pp. 213 – 214, the document stats that “The surgeon of the hospital of Terrenate received six hundred pesos per year and two rations which amounted to forty-eight maravedís daily.”

② AGI, Contratación 487, N. 1, R. 14, 1592: “Autos sobre los bienes de Agustín Sánchez, cirujano de nao, que murió a bordo del galleon San Martín que navega por la costa de Nueva España al mando del capitán Pedro de Ortega.”

③ Béatriz Palazuelos Mazars, *Acapulco et le galion de Manille, la réalité quotidienne au XVIIIème siècle*, thèse de doctorat, Université Sorbonne Nouvelle-Paris III, [École doctorale 122] 12 Juin, 2012, p. 101.

Cataluña. This galleon made a very prosperous voyage, both going and returning. . . ”^①

Juan Ventura Sarra seemed to have accompanied, or was at least familiar with the situation of the San Telmo as sergeant-mayor^②. He reached Manila in 1679. As we can observe in other cases, too, he also engaged in maritime commerce on the way:

“This commerce with the coast of Coromandel had remained quite neglected by the Spaniards of Filipinas—who never had maintained any other trade and commerce than that with China, Japón, and Macán—until this year of 1674. Then a citizen of Manila, a Catalan, named Juan Ventura Sarra, a courageous man, having first made with a fragata which he owned a voyage to the kingdom of Siam, from which he gained some wealth, extended his navigation to this coast of Malabar, where he left trade established; and in the following year Don Luis de Matienzo went thither, with much silver, and gained enough profit to persuade the citizens of Manila to engage in this traffic. The principal commodity which is brought from the Coromandel coast is certain webs of cotton, many of them forty varas long, which they call ‘elephants’, which are highly valued in Nueva España; accordingly, it is this merchandise which is chiefly shipped to those regions.”^③

William Dampier, around 1697, writes about a certain Herman Coppinger: “Mr. Coppinger our Surgeon”, who “made a Voyage hither [i. e. Manila, AS] from Porto Nova, a Town on the Coast of Coromandel; in a Portuguese Ship, as I think. . . He then professed Physick and Surgery, and was highly esteemed among the *Spaniards* for his supposed knowledge in those Arts: for being always

① <http://www.gutenberg.org/files/34384/34384-h/34384-h.htm>, vol. 42, pp. 169 – 170.

② <http://www.gutenberg.org/files/34384/34384-h/34384-h.htm>, vol. 42, pp. 175, 178.

③ <http://www.gutenberg.org/files/34384/34384-h/34384-h.htm>, vol. 42, p. 155, also see pp. 157 – 158.

troubled with sore Shins while he was with us, he kept some Plaisters and Salves by him; and with these he set up upon his bare natural stock of knowledge, and his experience in Kibes.”^①

In her book on the Manila galleons, Shirley Fish quotes a biographical study of Fray Andres de Urdaneta by José Ramón de Miguel, “Urdaneta and His Times”, with a short reference to the *San Martín* and the galleon trade in general: “At the start the Manila galleon trade was absolutely liberalized, but soon royal decrees began to regulate it on the excuse that all trade should be for royal interests. With the passing of time, shipments became monopolized by a limited number of persons. In 1586, the galleon *San Martín* carried shipments for 194 different persons. Two hundred years later the cargo of the *San Andrés* pertained to only 28.”^② These liberalized beginnings were the times when also the doctor Agustín Sánchez was crossing the Pacific. So, probably, at least some early physicians and surgeons who accompanied the trans-Pacific galleons were, like many of the other contemporaneous crew members and passengers, at the same time some sort of traders.

But we also encounter what one may call “surgeon-merchants” or “doctor-merchants” (*cirujano-comerciantes*) in later periods. In her detailed study on naval physicians, María Luisa Rodríguez-Sala introduces José de los Reyes y Sánchez, who served on board of the *San Francisco de Paula* (alias *El Hércules*) that sailed to Manila.^③ He disembarked in Acapulco on February 15, 1782, and passed away unexpectedly shortly afterwards. De los Reyes y Sánchez left a quantity of goods in fifteen cases, originating from Asia, and to be sold in México City, as well as 8000 pesos of silver that he had given to a local merchant in Acapulco as a

① <http://www.gutenberg.org/files/28899/28899-h/28899-h.htm#doc1697>, vol. 39, p. 91. On Pulo (or Island) Condore, 2 of our Men died, who were poison'd at *Mindanao*, they told us of it when they found themselves poison'd, and had linger'd ever since. They were opened by our Doctor, according to their own Request before they died, and their Livers were black, light and dry, like pieces of Cork... At that island [Sumatra, AS] also the surgeon, Herman Coppinger, attempts to escape, but is taken back to the ship”, see p. 92.

② Shirley Fish, *The Manila-Acapulco Galleons*, p. 495.

③ AGI, Autos de Bienes de Difuntos, ES. 41091. AGI/10. 5. 11. 696//CONTRATACION, 5689: Número 2. De José de los Reyes, cirujano de nao, natural de la villa de Estepona, difunto en Manila con testamento.

security deposit.^① He had passed his youth in Cádiz, where he also obtained his education in the local college and hospital and practiced surgery, a profession he subsequently also executed on board ocean-going vessels. He had originally married a certain Josefa Mauro in Cádiz, but when he was widowed he decided to become a naval physician, and eventually, in March 1779, embarked on the *San Francisco de Paula*. This vessel simultaneously served as a warship in the battles between Spain and England. The death of his wife seems to have prompted him to make this decision to accompany the Manila galleons. Again, we know little to nothing about his practice as a physician on board, but more about the goods he traded, especially various kinds of fabrics to be used for clothing: for example, 68 pounds of first quality Canton silk, 274 pounds of first quality of flock silk (*seda de pelo-quiña*), 134 white covers (*de ocho varas*), 162 regular white skirts, 8 pieces of secondary quality gaze, 10 filigree fans, 10 filigree cigarette and 6 filigree cigar cases, *etc.*^②

What becomes evident from many of the above-introduced examples is the fact that many ship surgeons and physicians were simultaneously engaged in trading activities, were doctor-merchants, so-to-say. As far as the trans-Pacific trade is concerned, this was especially the case in the initial period of the galleon trade, but, as shown above, we encounter also various later examples. Given the unattractiveness of long-distance maritime crossings, with all the dangers and unhealthy conditions involved, it would seem logical that, except for the curiosity to discover new worlds and gain experience, the possibility of getting more wealthy by engaging in trade in particular could have convinced or lured potential surgeons and ship doctors. So-called “doctor-merchants” were consequently not an exception. Spanish documents, at the same time also provide information on salaries and payments.

A certain Juan Bautista Ramos served as second surgeon on the frigate *Santa Rosa*, on its voyage to New Spain. The archival documents state that the governor of the Philippines, in 1770, approved that he would be paid 227 pesos as salary,

① María Luisa Rodríguez-Sala, con la colaboración de Karina Neria Mosco, Verónica Ramírez Ortega y Alejandra Tolentino Ochoa, *Los cirujanos del mar en la Nueva España (1572 – 1820)*, p. 124.

② María Luisa Rodríguez-Sala, con la colaboración de Karina Neria Mosco, Verónica Ramírez Ortega y Alejandra Tolentino Ochoa, *Los cirujanos del mar en la Nueva España (1572 – 1820)*, p. 125.

a payment that was realized in Manila, but was reimbursed only drawn on accounts in México. On his trans-oceanic passage, he was only permitted to use the box of instruments he carried, and not that with artillery equipment, as this was beyond his category status.^① Again, we learn almost nothing about his practice on board.

As mentioned above, the Spanish Crown also established local hospitals to take care of mariners. At the hospital in Acapulco (Hospital Real de Acapulco, also known as San Hipólito Mártir) we encounter a certain Juan de Molina who had earlier worked at the hospital in San Blas. In 1797, Molina, for example, issued a health certificate to a mariner in Acapulco who refused to board a ship destined for Manila.^② Molina spoke up for better equipment and advocated a good infrastructure for medicines, especially during a period when many of the medicinal products were apparently provided through the galleon trade, and the *naos* de China. We possess an invoice from Molina, dated September 15, 1800, which lists a number of items, medicines and utensils, lacking in the hospital of Acapulco, such as injections, scissors, a sprayer or sprinkler (*ducha*), filter screens, or syrup ladles.^③

In 1803, Molina asked to be permitted to embark on the frigate *Hardanger*, a private vessel, which lacked a physician for the return journey from Acapulco to Manila. Although the payment was lower than his salary as a doctor in the local hospital—a ship physician or surgeon received a salary of just 35 pesos monthly—he wanted to go on board as he hoped to recover his health that had suffered tremendously from the hot climate in Acapulco. He said that he hoped to be able to recover his health on the sea (*en la mar*), which he had lost since quite some time due to the strong heat and other evils that were caused by the fatal local climate he had enjoyed during the fourteen years of service in Acapulco.^④ After his return

① María Luisa Rodríguez-Sala, con la colaboración de Karina Neria Mosco, Verónica Ramírez Ortega y Alejandra Tolentino Ochoa, *Los cirujanos del mar en la Nueva España (1572–1820)*, p. 122.

② AGN, California, vol. 74, exp. 21, f. 72r.

③ For more information on Molina, see also Michael M. Smith, “The ‘Real Expedición Marítima de la Vacuna’ in New Spain and Guatemala,” *Transactions of the American Philosophical Society*, vol. 64, No. 1 (1974), pp. 1–74.

④ AGN, Filipinas, vol. 52, exp. 6, f. 97r and v.

from Manila he requested to be permitted to proceed to the capital Mexico City in November 1810, in order to recover his health—that he had obviously not recovered during his stay on board and in Manila. Actually, he returned to Acapulco in 1811, and in 1812 he requested to retire completely from his position at the hospital in Acapulco due to his various sufferings, among others also scurvy (with swollen gingiva and ulcers all over his mouth).^① Obviously, he enjoyed a diet with little Vitamin C in Acapulco, perhaps a dot on the “i” when anyhow suffering from a light vitamin C deficiency after his overseas travels. As mentioned above, this shows that despite the advances in the search for a cure or preventive measures in a score of European countries, scurvy still easily occurred as a deep understanding of the underlying nutritional principles was lacking.

Another physician who was also active in the hospital of Acapulco around that time was Antonia Almeida. The local situation at that time was critical due to the independence wars in México. Endemic diseases spread alarmingly, and the port city also saw itself confronted with an increase of scurvy cases (see Molina). The authorities of the local hospital were consequently alarmed and requested help from an army physician like Antonio Almeida, who, interestingly, came to Acapulco with the frigate *La María* from the Philippines.^② Almeida stayed in Acapulco for just some months; we know that he was also curing mariners.

Sherry Fields draws attention to a modern paleopathological analysis of skeletons from beneath the Metropolitan Cathedral in Mexico City that reveal an interesting archaeological record of the health of colonial inhabitants: a “surprisingly high incidence” of scurvy and syphilis.^③ Antonio de la Ascención, a priest who accompanied an expedition (with the *nao San Diego*, the frigate *Tres Reyes*, and another long boat) from México to explore the coastline of California in 1602, for

① María Luisa Rodríguez-Sala, con la colaboración de Karina Neria Mosco, Verónica Ramírez Ortega y Alejandra Tolentino Ochoa, *Los cirujanos del mar en la Nueva España (1572 – 1820)*, p. 128, with reference to AGN, Hospitales, vol. 69, exp. 5, f. 114 r and v.

② María Luisa Rodríguez-Sala, con la colaboración de Karina Neria Mosco, Verónica Ramírez Ortega y Alejandra Tolentino Ochoa, *Los cirujanos del mar en la Nueva España (1572 – 1820)*, p. 129.

③ Sherry Fields, *Pestilence and Headcolds*, pp. 79 – 81, 99 – 100.

example, describes the outbreak of scurvy.^① He also notes that “the mysterious disease broke out in the same place that the Spanish fleet, coming back from the Philippines to Mexico each year, experienced” the problem of scurvy. He traces the problem back to “sharp, subtle and cold” winds that carry much pestilence that affect thin men. Part of the crew members of this expedition were saved because they made a forced landing in Mazatlan where some of them discovered a cactus fruit that cured them.^②

Mention should also be made here of José Rizal (1861 – 1896), who was not only a skilled physician but also a poet, novelist and sculptor, and Engelbert Kaempfer (1651 – 1716), the famous German naturalist, physician and explorer who crossed the Indian Ocean as far as Southeast Asia and Japan in service of the Dutch VOC, or Philipp Franz (Balthasar) von Siebold (1796 – 1866), famous German physician and botanist who wrote about the flora and fauna of Japan and was the father of the first Japanese female physician, Kusumoto Ine 楠本稻 (1827 – 1903; born Shiimoto Ine 失本稻).

The information on physicians travelling across the oceans increases tremendously in the nineteenth century, and we shall introduce only a few examples here.

Francisco Xavier de Balmis (1753 – 1819) supervised an expedition to New Spain in 1804 to vaccinate the local population against smallpox. In March 1805, he set sails for the Philippines taking 26 Mexican boys to accompany him. He arrived on April 15, after a five-week-long journey and began to vaccinate local children. In late summer the same year he sailed to Portuguese Macao with three Philippine boys. Earlier, a Portuguese merchant of Macao, a certain Don Pedro Huet, had already brought the vaccine from the Philippines to Macao.^③ Alexander Pearson,

① Father Ascensión wrote this account of the voyage October 12, 1620, drawing upon an unpublished diary he kept during the trip. This account was published in Spanish in Joaquín Francisco Pacheco and Francisco de Cárdenas, *Colección de Documentos Inéditos*, VIII, Madrid, 1864 – 1884. This English translation is published in Herbert Eugene Bolton, ed., *Spanish Exploration in the Southwest, 1542 – 1706*, New York: Charles Scribner's Sons, 1916, see <http://www.americanjourneys.org/aj-003/summary/>, accessed on October 21, 2017.

② Sherry Fields, *Pestilence and Headcolds*, p. 41.

③ Ann Jannetta, *The Vaccinators. Smallpox, Medical Knowledge and the 'Opening' of Japan*, Stanford: Stanford University Press, 2007, pp. 44 – 45.

Senior Surgeon of the EIC was also familiar with vaccination, and the EIC, in December 1805, even opened a public clinic for vaccinations in Canton and hired a full-time physician for this purpose.^① As Ann Jannetta notes, the dissemination of the vaccine throughout Asia required not only contact but cooperation among the English, French, and Dutch colonial governments that were in war in Europe. Dutch physicians, for example, strongly supported vaccination but their ships were unable to send the cowpox virus to Batavia. Instead it was French colonial physicians and officials who helped to get the vaccine to Batavia.^② The Dutch physician Hendrik Doeff (1777 – 1835) is said to have introduced vaccination into Japan. A French physician, M. Laborde, wrote a letter to the *Philadelphia Medical and Physical Journal*, stressing the importance to fight against smallpox on seafaring vessels, and the dangers a spread of this disease had for the increasingly globalized world population.^③ An infectious epidemic disease, such as smallpox, of course greatly enhanced the movement of skilled surgeons and physicians across the oceanic waters.

When confronted with diseases to which they found no remedy, European ship's surgeons would occasionally rely on the practices or knowledge of local medicines. For instance, the 1725 logbook of the Austrian-Netherlandish Ostend Company ship *De keyserinne* contains some correspondence between chief merchant Joan Tobias and captain de Clerck, revealing the dire situation of their crewmembers' health in China, mentioning how they attempted to have their quartermaster treated by a Chinese doctor near Canton, yet to no avail; "Meanwhile the dying begins to run its course again, and yesterday evening between four and five hours died very suddenly, in the house of the Chinese Doctor who would heal him, the quartermaster Jacobus Verbrugge and have buried him late the same evening"^④.

① Ann Jannetta, *The Vaccinators*, p. 46.

② Ann Jannetta, *The Vaccinators*, p. 47.

③ Ann Jannetta, *The Vaccinators*, p. 48.

④ "(O) ndertussen begint het sterven wederom sijn ganck te gaan, en is gisteren avont tussen vier en vijf uren seer schilijk overleden, in't huys van den Chineeschen Doctor die hem genesen souw, den quartiermeester Jacobus Verbrugge en hebben hem de selven avont Laate begraven", in SAA GIC 5800, *Generael Coppy Boeck van het schip de Keyserinne Joannes de Klerck Anno 1725- 'Canton, den 29 Sep 1725. Sr de Clerck, van Joan Tobias (supercargo)'*, fol. 1.

Surgeons and Physicians on Board of Chinese Ships

It appears that in Chinese history maritime medicine was an occasional matter and that tasks as naval or shipboard surgeons never developed into such an important and distinctive profession as in European seafaring. This certainly has to do with the fact that the Chinese, with the exception of the Zheng He expeditions, never officially undertook far-distance maritime and naval voyages. Chinese naval expeditions were an exception also in closer Asian waters in later Ming and Qing China. This would explain why naval medicine never developed as a systematic field of expertise and why, in particular, they were not that much in need of surgeons, who were indispensable in naval warfare, for example.

In addition, we need to consider the fact that Chinese sailors, firstly, frequently sailed close to the coasts where there were always ports in the vicinity and, second, that they paid great attention to the diet on board. Nevertheless, we know that Chinese vessels could stay out at sea for several months without encountering substantial difficulties. And yet scurvy was rare. This does of course not mean that the Chinese had no physicians on board.

At least the period of the famous voyages of Zheng He may attest to the official importance paid to guaranteeing health on board. An exact figure of how many doctors were on board of these voyages is preserved in *Ma Gong muzhiming* 马公墓志铭 [*Tomb Inscription of Lord Ma*], discovered in 1936, which mentions that 180 doctors accompanied each expedition. This is one doctor for every 150 crew-members: “(…) Among the officials that were commissioned by imperial order there were (…)

and 180 doctors (…).”^① The physicians may have been recruited from the Ming Imperial Academy of Medicine (Ming Taiyi yuan 明太医院). Obviously, at least during Ming times, their rank varied between 7 and 9.^② Entries in *Ming shilu*

① “Ma Gong muzhiming” 马公墓志铭, in *Zheng He jishi ziliao* 郑和家世资料, edited by Zhongguo hanghaishi yanjiuhui 中国航海史研究会, Beijing: Renmin jiaotong chubanshe, 1985, p. 2, quoted according to Mathieu Torck, *Avoiding the Dire Straits*.

② *Ming taizu shi lu* 明太祖实录, vol. 14, Taipei: Institute of History and Philology, Academia Sinica, 1979, p. 190: “乙未置医学提举司。提举, 从五品; 同提举, 从六品; 副提举, 从七品; 医学教授; 正九品; 学正、官医、提领; 从九品。”

明实录, in addition, clearly speak of “imperial physicians” (yuyi 御医)^① but also mention “people’s physicians” (miny 民医)^② what would suggest that the ships had both imperial physicians for the official and normal doctors for the ordinary crew members, such as craftsmen, sailors, *etc.*, on board. The former received a salary of between 30, 70, 80, and 100 *ding* in paper money (dingchao 锭钞), between 1 and 2 pieces of coloured silk clothes, 1 (or 2) bolt (s) of cotton cloth; the latter between 30, 40, and 45 *ding* in paper money and 2 or 3 bolts of cotton cloth.^③ Another entry simply speaks of “physicians” (yishi 医士), who would receive 50 *ding* in paper money.^④ Zhu Yunming’s 祝允明 (1460 – 1526) *Qianwen ji* 前闻记 speaks of “doctors” (yishi 医士) as a firm part of the crew members during the Zheng He voyages.^⑤

Also on smaller scale official expeditions physicians were essential. At least for the investiture missions to the Liuqiu Islands, we know that there were doctors on board: “As for boat people for the rudders, one uses 140 odd men, 100 men as accompanying soldiers, interpreters, receptionists for ceremonies, physicians, scholars (lit. ‘people who know characters’), and also all kinds of craftsmen, in total more than 100 men” (架舟民稍用一百四十人有奇, 护送军用一百人, 通事、引礼、医生、识字、各色匠役亦一百余人)^⑥

Shi Liuqiu lu 使琉球录 by Xiao Chongye also mentions doctors by name, He

① Ming taizong shilu 明太宗实录, vol. 118, p. 1500.

② Ibid.

③ Ibid.

④ Ming taizong shilu 明太宗实录, vol. 71, p. 999: “医士番火长钞五十锭彩币一表里。” An entry also states that “officials, soldiers, and physicians are sent, in total 365 men, who are rewarded with different quantities of silver, paper money, and coloured silks (送官及军人医者三百六十五人赏银钞彩币有差) .

⑤ Mathieu Torck, *Avoiding the Dire Straits*, p. 165, with reference to J. V. G. Mills (tr.), *Ma Huan; Ying-yai sheng-lan*, p. 15; and *Qianwen ji* 前闻记, by Zhu Yunming 祝允明, in *Jilu huibian* 记录汇编, edited by Wang Yunwu 王云五 (Taipei: The Commercial Press, 1969), vol. 70, 220. 37: “下西洋. 永乐中, 遣官军下西洋者屡矣, 当时使人有著瀛涯胜览及星槎胜览二书, 以记异闻矣。今得宣德中一事, 漫记其概。题本, 文多不录。人数: 官校、旗军、火长、舵工、班碇手、通事、辨事、书算手、医士、铁锚、木舱、搭材等匠、水手、民稍人等共二万七千五百五十员名。”

⑥ Chen Kan 陈侃, *Shi liuqiu lu*, in Huang Runhua 黄润华, Xue Ying 薛英 eds., *Guojia tushuguan cang liuqiu ziliao huibian* 国家图书馆藏琉球资料汇编, vol. 1, Beijing: Beijing tushuguan chubanshe, 2000, p. 23, and online <http://www.guoxue123.com/biji/ming/slql/027.htm>.

Jixi and Wu Niansan: “One doctor, He Jixi; he consequently prepares medicines in order to protect [the crew and people on board] against diseases, this concerns lives and bodies of hundreds of men. To possess this responsibility, how can it not be important!” (医生一名, 何继熙; 所以备药物、防疾疫, 又数百人躯命之所关也。此之为责, 岂不重哉!)^① When people on board were suffering from discomfort and illness (苦楚状), “then, the doctor Wu Niansan cured them; he used half a *jin* of honey, 20 *jin* of mild, watery liquor, half a *jin* of powdered ginseng (*Angelica sinensis*) and similar medicinals against cold and wind, and boiled them into a decoction of medicinal herbs; within one night [the disease] is cured” (遂命医人吴念三疗之, 用蜜半斤、淡酒三十斤、防风当归等药末半斤, 煎汤浴之; 一夕而愈矣).^② “Up to students of astronomy who were, as in the past, taken from Nanjing; from among the doctors also the two best ones were selected to go on board” (至于天文生照旧取之南京, 其医生二名亦各择其善者以行……其医生二名, 听本官自便, 各择其善者随行).^③

And we hardly know anything about private and commercial shipping. Definitely, merchants prepared medicines for all eventualities when they undertook longer sea voyages.

Some of the physicians who accompanied the Zheng He fleets are even known by name. Some biographies have been preserved^④, such as of those of Kuang Yu 匡愚, Chen Yicheng 陈以诚^⑤, and Peng Zheng 彭正。

“Kuang Yu: According to *Wanxing tongpu* 万性统谱. Kuang Yu, zi (courtesy name) Xiyan 希颜, was an excellent physician (*shanyi* 善医) with proven skills. He accompanied the distinguished eunuch Zheng He on three missions abroad; his methods were widely heard of.”^⑥ Kuang Yu from

① Xiao Chongye, *shi liuqiu lu*, in *Taiwan wenxian shiliao congan*, vol. 3 (55), p. 98.

② Xiao Chongye, *shi liuqiu lu*, in *Taiwan wenxian shiliao congan*, vol. 3 (55), p. 93.

③ Xiao Chongye, *shi liuqiu lu*, in *Taiwan wenxian shiliao congan*, vol. 3 (55), p. 127.

④ The biographies of several of these physicians who accompanied the expeditions can be found in Chen Menglei 陈梦雷, *Gujin tushu jicheng* 古今图书集成, Shanghai: Zhonghua Book company, 1934, vol. 465, 531, pp. 23–28.

⑤ The biography of Chen Yicheng explicitly mentions that he was attached to the Ming Taiyi yuan, Chen Menglei, *Gujin tushu jicheng*, vol. 465, 531, p. 24.

⑥ Chen Menglei, *Gujin tushu jicheng*, vol. 363, 306, p. 26.

Changshu 常熟 in Jiangsu 江苏 was also a specialist in collecting medicinal plants.

“Peng Zheng. According to *Jiangnan tongzhi* 江南通志, Peng Zheng, zi (courtesy name) Sizhi 思直, was a man from Taipingfu 太平府. During the Yongle period (1403 – 1424) . he was sent repeatedly as a good physician (*liangyi* 良医) to the Western Ocean. His descendants for generations dedicated themselves to this profession.”^①

The Tongzhi 同治 edition of *Shanghai xianzhi* 上海显志 records that on one of Zheng He’s treasure ships there was a doctor from Shanghai named Chen Chang 陈常. “His medicinal practices and skills were famous among contemporaries” (医术名于时).^② He accompanied Zheng He’s crew to the Western Ocean and during the three reign periods of Yongle, Hongxi 洪熙 (1425 – 1426), and Xuande 宣德 (1426 – 1435), he travelled through approximately thirty countries.^③

According to *Jiaxing fuzhi* 嘉兴府志, there was yet another doctor from Shanghai who accompanied the Zheng He expeditions, namely a certain Chen Yicheng 陈一诚, hao (art name) Chumeng 处梦, from Fengjin 枫泾 in Jinshan 金山: “He was very good in poetry and painting and particularly skilled in medicine. During the Yongle period he was selected as suitable to be attached to the Taiyi Yuan. Later, he accompanied the eunuch missions of Zheng He to various countries in the Western Ocean.”^④ Possessing a special status as imperial physician (*taiyi*) responsible for curing diseases among the imperial family, he had to supervise all medicinal matters among the crew members on board. After returning home, he was promoted as director of the Taiyi Yuan (太医院判). Xie Ping’an quotes a poem from him: “In all directions I was engaged to compound medicine according to the *Thousand Pieces of Gold Formulae*, in all four

① Chen Menglei, *Gujin tushu jicheng*, vol. 465, 531, p. 24.

② Ying Baoshi 应时宝 (rev.), Yu Yue 俞樾 (comp.), *Shanghai xianzhi* 上海县志, in *Zhongguo fangzhi congshu: Huazhong difang* 中国方志丛书 华中地方, vol. 169, Taipei: Chen Wen Publishing Co., Ltd, 1975, p. 6a.

③ Xing Rong 邢容, “Zheng He chuanshang de Shanghai yisheng” 郑和船上的上海医生, *Shanghai dang’an* 上海档案, no. 5 (1985), p. 32.

④ Wu Yingxian 吴仰贤 et al. (comp.), Xu Yaoguang 许瑶光 et al. (rev.) *Jiaxing fuzhi* 嘉兴府志, in *Zhongguo fangzhi congshu: Huazhong difang*, vol. 53, Taipei: Chen Wen Publishing Co., Ltd, 1970, quoted by Xie Ping’an 谢平安, “Zheng He chuandui li de ling yiwei Shanghai yisheng” 郑和船队里的另一位上海医生, *Hanghai* 航海 no. 1 (1983), p. 46.

directions [people] used to board the “ten-thousand-relief ships”^①, recording his long maritime voyages into distant places in the Indian Ocean, where he interrogated physicians of all the countries he visited and collected knowledge, herbs, and medicines to prepare ready-made elixirs (panacea) for the imperial family.^② Otherwise, most of the biographies do not say anything about their practices on board, but we can assume that they were well-trained physicians in Chinese traditional medicine, and also applied these practices.

While we do not possess much information on ship surgeons, we do have various kinds of evidence for doctors travelling across the East Asian waters—both voluntarily and involuntarily. These movements and travels are closely related with the search for skilled Chinese doctors in other East Asian countries, especially the Ryūkyūs and Japan.

As Angela Schottenhammer has explained elsewhere, kidnapping or smuggling of Chinese physicians to Japan was, a kind of popular sports in seventeenth century East Asia.^③ A certain Xu Zhilin 徐之遴 (ca. 1599 – 1678), for example, in 1619 (Genwa 元和 5) was kidnapped and taken to Japan, where his career really took off well. One of his tomb inscriptions states: “When Yizhen was approximately twenty years old, he travelled by ship from Yue (Zhejiang) to Beijing. During the trip he was kidnapped by pirates and taken to Nagasaki. This was in early fall 1619”. He first worked for the local daimyō (大名) of Satsuma before, in 1624, he was employed by the *daimyō* of Hyūga 日向, Itō Sukenori 伊东祐庆 (1589 – 1636), also named Mr Tōzen 东禅公, as personal physician (*shiyi* 侍医). Obviously, members of the Japanese elite who could afford this, tried to hire Chinese physicians to treat them and even were involved in getting merchant-pirates to kidnap qualified people from China, if necessary. Other Chinese physicians also went voluntarily to Japan. This trend

① Tang period poet Du Fu 杜甫 (712 – 770) described in a poem so-called “洋洋万解船，影若扬白虹”。

② Xie Ping'an, “Zheng He chuandui li de ling yiwei Shanghai yisheng,” p. 46.

③ Wang Su, “Sino-Japanische Beziehungen im Bereich der Medizin: Der Fall des Xu Zhilin”, in Angela Schottenhammer (ed.), *Trade and Transfer across the East Asian “Mediterranean”*, East Asian Maritime History, 1, Wiesbaden: Otto Harrassowitz, 2005, pp. 185 – 234.

continued throughout the early and mid-eighteenth century, a development that has to be seen in direct relation with Tokugawa Yoshimune's 徳川吉宗 (r. 1716 – 1745) policy proclaimed in 1718 (Kyōhō 3) to order ship captains to bring good Chinese physicians to Japan. ①

A doctor from Ningbo 宁波, a certain Zhu Laizhang 朱来章, even acted as a spy for the Qing government in Japan. His brothers, Zhu Peizhang 朱佩章 and Zhu Zizhang 朱子章 followed. Zhu Peizhang was questioned in Japan by Ogyū Sōshichirō 获生总七郎 about knowledge on medicinal plants. Zhu Laizhang also smuggled various books of medicinal contents into Japan.

Chinese doctors also went to, or were sent to the Ryūkyūs, obviously particularly upon request of the Ryūkyūan court. *Chūzan seifu* 中山世譜 (a local genealogy) reports that in 1630 (Chongzhen 3) the Ryūkyūans requested from the Ming court the dispatch of a doctor in order to treat the disease of King Shō Hō's 尚丰 (1621 – 1640) eldest son, Shō Kōkō 尚恭公 Urasoe 浦添. Or, during the reign of King Shō Tai 尚泰 (1849 – 1879), in 1860, the physician Wu Deyi 吴德义 was dispatched to the Ryūkyūs to help with vaccinations against smallpox. ②

On the other hand, Ryūkyūans regularly came to China to study medicine. Lü Fengyi, alias Tokashiki Tsūkan 渡嘉敷通寛 (1794 – 1846/49), is one prominent example. Tokashiki Tsūkan was one of the famous royal physicians of the Ryūkyūs, and author of the *Gozen honzō* 御膳本草 (*Materia medica of imperial dietary*), completed in 1832. Elsewhere we have investigated the *Liuqiu baiwen* 琉球百问 (*One hundred questions from the Ryūkyūs*), a collection of correspondence between the Chinese doctor Cao Cunxin 曹存心 Renbo 曹存心仁伯

① Ōba Osamu 大庭脩 (ed.), *Kyōhō jidai no Nit-Chū kankei shiryō 2 <shūshi sankyōdai shū > Kinsei Nit - Chū kōshō shiryō shū 3* 享保時代の日中関係資料 2 〈朱氏三兄弟集〉近世日中交渉史料 3., *Kansai daigaku Tōzai gakujutsu kenkyūjo shiryō shūkan* 關西大學東西學術研究所資料集刊 9 - 3, Kyoto: Kansai daigaku shuppansha, 1995, p. 703; also Xu Shihong 徐世虹 tans., *Jianghu shidai RiZhong mihua* 江戸時代日中秘話, Beijing: Zhonghua Book Company, 1997, p. 133, a Chinese translation of Ōba Osamu's *Edo jidai no Nit - Chū hiwa*; also Erhard Rosner, *Medizingeschichte Japans*, Leiden, Köln: E. J. Brill, 1989, p. 64. *Handbuch der Orientalistik*.

② *Kyūyō, fujian* 4, entry no. 179616. I have been unable so far to clearly identify Wu Deyi, but judging from his name he seems to have been a Chinese doctor.

(1767 – 1834), and Tokashiki Tsūkan.

In 1848 a Ryūkyūan delegation was sent to China to be instructed about smallpox prevention.^① Due to the relatively low medicinal standards on the Ryūkyūs in comparison to China, many Ryūkyūans also travelled to Fuzhou to receive medical treatment there in the local so-called “Liuqiu guan” 琉球馆 (Jap. Ryūkyūkan), the popular designation of a residence, which was particularly established during the Wanli 万历 (1573 – 1619) reign period to serve for the lodging of envoys and foreign guests in Fuzhou—the “*Rouyuan yi* 柔远驿”.

The kidnapping or forced movement of physicians by pirates was, of course, a practice that equally occurred among European pirates active near the African coasts, and on the Indian Ocean. Especially European pirates cruising near Madagascar forced the surgeons of plundered ships to join their crew as specialists. David Cordingly has pointed to the capture and detention of skilled seamen as a regular feature of pirate attacks, since pirate crews required specialised labour of carpenters and surgeons which was hard for them to recruit.^② This was also the case for the Austrian-Netherlandish ship ‘*Huys van Oostenryck*’ on its return journey from Canton towards the port of Ostend on February 1720, when it was captured by the pirate Edward Congdon near Madagascar. A notarial testimony delivered by the ship’s first mate and navigator, Joannis De Vos gives a first-hand account on the pirates’ raid and plundering. He mentions that, once the ship had been plundered, the captain and crewmembers who refused to take service with the pirates were brought back to their own ship, while the ship’s surgeons (‘*den opper en ondermeester Chyurgyns*’) were violently forced into service, and kept on board the pirate ship.^③ Presumably the pirates’ higher risk of wounded crew members due to their maritime predatory activities, or perhaps the

① For a list of students, including these names, coming to China during the Ming and Qing dynasties see 谢必震《中国与琉球》，厦门大学出版社，1996，第248—249页。

② David Cordingly, *Under the Black Flag: The Romance and the Reality of Life Among the Pirates*, Random House, 2013, pp. 105 – 122.

③ “Philippe Rycx, notaris publ te Oostende; 1 July 1720 Joannis De Vos schipper en onderstuurman van den fregat schepe genaemt het Huys van Oostenrycke-declaration,” in *Familiekunde Vlaanderen Regio Oostende (FVRO)*, Schaduwardchief Oostende-Notariaat Van Caillie, Depot 1941 boek 41, boekdeel 12 / 84, folio 17.

risk of catching venereal or tropical diseases in their zones of activity, dictated the necessity for such kidnappings. This would form yet another potential risk which could make the profession of ship's surgeon on long-distance expeditions seem unattractive, apart from the unhealthy conditions on board, and the challenges posed by tropical climates and diseases in general.

Conclusions

Shipboard medicine was and basically remained an unattractive profession, in particular for college-trained doctors. What attracted and convinced skilled personnel to practice this profession, were, sometimes, compensations in salaries, specific gains in experience, scientific curiosity, the chances of discovering new (botanical, medicinal, *etc.*) worlds and cultures, and, perhaps above all, the possibilities of engaging in trade.

The development of maritime medicine was a gradual process. As we especially observed for the beginning of European long-distance seafaring, medicinal regulations and instructions frequently remained an ideal rather than a reality on board of ships. But with increasing activities overseas, and ever longer sea voyages in the course of the European expansion in early modern times, those European countries that were involved in these endeavours did develop naval medicine, above all the Spanish, the Portuguese, the Dutch, the English and French, but of course also others.

A few characteristics can be observed in the process of the formation of European maritime medicine: Many European ship surgeons were at the same time engaged in trading activities ("doctor-merchants"), this is reflected in sources from many countries; they were frequently also engaged in other matters, such as trade negotiations, diplomatic encounters, *etc.*; on late seventeenth, early eighteenth-century European merchant and private vessels, ship surgeons were apparently very often not medical experts *per se* (especially English documents reflect this); increasing interest in sponsoring medicinal knowledge and surgeons' education apparently emerged only in the late eighteenth, early nineteenth century; among the Western specialists Dutch physicians seem to have possessed

the best knowledge and made the fastest progress. As far as official vessels were concerned, governments and the East Asia trading companies, such as the VOC or EIC, were very much interested in hiring good surgeons. They paid them a salary and encouraged them to study local environmental, climatic, and botanical conditions in the Indian Ocean and Asia-Pacific worlds. So, with the European expansion we also observe the increase in knowledge about local natural, botanical, zoological, climatic, *etc.* conditions and the required knowledge to survive in and successfully exploit these new worlds. Merchants possessed a great interest in understanding nature and natural facts because this was essential to the success of their business.

This rise of scientific medicinal knowledge is inseparably linked to the increasing role of private commerce that came to serve as the basis of state wealth, and that found its expression in the competitive zeal of the European nations to possess for themselves the products of Asia and the treasures of America.^① In the beginning phase of European expansion, medicinal knowledge was often more important for military, naval purposes. With growing competition among the European countries, among countries that relied competitively on the production of commodities in the hands of private property, on the private power of money, for their economic success, it became increasingly essential to possess the necessary, not only medicinal, knowledge to survive, but also use such knowledge to attract more foreign wealth into their state coffers. The European overseas discoveries and expansions accelerated the development of private merchant's capital on the emerging new "world-market", and constituted one of the principal elements in furthering the transition from feudal to the capitalist mode of production. And they required

① The development of science during the early formation process of capitalist production, especially the natural sciences, is directly related to the development of material production. Equally important for a fundamental change in the development of commerce was the emergence of national debts, i. e., the alienation of the state, of public credit (whose origins we discover in Genoa and Venice as early as the Middle Ages) that took possession of Europe during the manufacturing period—a political-economic system that implies that a state handed over the accumulation of wealth to private individuals and merchants. The first fully developed colonial system with a system of public credit, that is, national debt, was found in the Netherlands. Public credit as the credo of capital and public debt, as one of the most powerful levers of capital accumulation, developed first in the British Empire.

objective science as a basis for exploring and dominating the world.

In contrast, the Chinese never developed this systematic tradition of maritime or naval medicine as we see it in early modern Europe, especially in the Netherlands^① —a fact that mainly has to be traced back to the different political-economic circumstances in China. Imperial China never systematically explored or sought to explore the entire maritime world—Mongol attempts and the famous Zheng He expeditions were specific exceptions to this rule. Not driven by this kind of global expansionism, and the ever-increasing quest for maximum profits, they did not push ship's crews to the limits jeopardizing their very lives (no low-quality food rations; no huge sailing distances). In addition, probably also the socio-economic background of Chinese ship's crews was most probably much less problematic than those of Western ship's crews. Hence, there was no systematic need for the development of naval surgery, since ship's crews were never really confronted with the extreme medical challenges that Western ship's crews encountered throughout the "Age of Sail" (except for the common traumatology in the context of everyday shipboard life and work). While the elimination of a phenomenon like scurvy remained one of the major motivations for maritime medicine among European seafarers, the Chinese, as we have seen, were not confronted with this same problem.

To be sure, China's search for the wealth of the south since antiquity did result in more knowledge about the flora (and fauna) of South East Asia and parts of the Indian Ocean world. New herbs and medicinal drugs also from overseas were incorporated into Chinese medicinal treatises since Tang times at the latest (to what extent they were actually used in practical medicine is yet another question).^② The Chinese, too, were acquainted with the profession of shipboard surgeons and

① For this link between the rise of commerce in the Netherlands and the rise of science during the sixteenth and seventeenth centuries, see also Harold J. Cook, *Matters of Exchange*.

② See, for example, *the Youyang zazu* 酉阳杂俎 (Miscellaneous of the Youyang Mountain [in Sichuan]), by Duan Chenshi 段成式; the now lost *Haiyao bencao* 海药本草 (Materia Medica of Drugs from the Sea), written at the beginning of the tenth century by Li Xun 李珣, a man of Persian ancestry; *Bencao gangmu* 本草纲目 (General Compendium of *Materia Medica*) by Li Shizhen; or *Bencao gangmu shiyi* 本草纲目拾遗 (Supplement to the General Compendium of *Materia Medica*) by Zhao Xuemin 赵学敏.

physicians. We have introduced various examples of doctors on board of Chinese ships. In contrast to the European tradition, Chinese seafarers from early on even paid great attention to a correct diet on board. Possibly, at least during official voyages, they were also more sensitive to the necessity of hygienic conditions on board.

But with the exception of records and notes on some official expeditions and sea voyages, where doctors were involved to take care of the officials and soldiers on board, no works on shipboard medical practices are known to us, or have been preserved, while in “the West” a separate category of treatises and manuals on naval medicine developed from early on. During the Zheng He expeditions, as we have seen, also medicinal plants were collected overseas. In epidemics-affected Ming China, pharmacists and physicians certainly were in search of new remedies and perhaps even composed some kind of record or treatise that later got lost or was intentionally destroyed. We can also only speculate that Chinese private merchants took care about having a basic stock of medicines and perhaps had crew members skilled in medical treatments or preparing medicines on board. But, as is well known, these maritime merchants were not supported by the Chinese state. And, in contrast to Europe, there were no private maritime companies comparable, for example, to the VOC that ventured beyond the East and Southeast Asian waters to explore the world, that means, private maritime explorations that eventually received official government support.

Consequently, from Ming or Qing times, we do not possess any manuals for naval surgeons, nor any medical works or chapters in medical works documenting treatments for seafaring related ailments. Physicians like the above-mentioned Kuang Yu, and other doctors or pharmacists sailing with Zheng He, may have developed some initial routine. But nothing more than that.

During the “Age of European Expansion”, the profit-driven expansion of spheres of influence and, consequently, colonial empires (as a part of the emerging capitalist countries) provoked an impetus for the development of certain disciplines and professions, such as in the field of (naval) medicine. These specific preconditions did not develop or exist in early modern China.

“Western” medicine had entered and influenced Chinese medicine since antiquity. As Paul David Buell emphasizes, Chinese medicine is what it is because of Galenic and other non-Chinese influences.^① Since the sixteenth century, European missionaries brought new Western medicinal practices and knowledge to China—many Western medicinal works were translated into Chinese in the course of the seventeenth century.^② In the eighteenth century, the dissemination of this new Western medicinal knowledge shifted from theory to practice,^③ but this initially had hardly any consequences for maritime medicine. Western works on shipboard hygiene and naval medicine were only translated into Chinese during the nineteenth century, with the context of the Jiangnan Arsenal (江南制造厂, 1865).

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- ① Paul David Buell has stressed this in his numerous publications and in many personal and email conversations. According to him “Chinese medicine represents very much a globalized tradition” (e-mail conversation from April 13, 2020).
- ② For an excellent overview, see Nicolas Standaert, “Late Ming-Mid Qing: Themes. 4.2.7. Medicine,” in Nicolas Standaert (ed.), *Handbook of Christianity in China Volume One: 635 – 1800*, Handbook of Oriental Studies, Section 4, China, Leiden, Boston, Köln: E. J. Brill, 2001, pp. 786 – 802.
- ③ Especially the Kangxi Emperor possessed a very positive attitude towards Western medicine, and even wished to have European physicians at court, and definitely sponsored the dissemination of Western medicine in China. This notwithstanding, the application and use of new Western medicinal drugs and knowledge remained obviously mainly limited to the ruling and social elites, including the Qing military—the use of “balsam oil of Peru” 巴尔撒木油 in the Qing army as a remedy against sword wounds and external injuries is an interesting case in point, see Angela Schottenhammer, “Peruvian Balsam: An Example for a Transoceanic Transfer of Medicinal Knowledge,” *Journal of Ethnobiology and Ethnomedicine*, no. 16 (Nov 2020), see DOI: <https://doi.org/10.1186/s13002-020-00407-y>. The story that Jesuits came to cure Kangxi of a malarial fever with so-called Peruvian bark, *cinchona* (*Cinchona officinalis*, Chin. *jīnjīnà* 金鸡纳, also called “Jesuits’ bark”) is well known. Kangxi also ordered the French Jesuit Jean-François Gerbillon (1654 – 1707) to translate western knowledge on medicinal drugs into Manchu, and Gerbillon, together with Dominique Parrenin (1665 – 1741), later composed a Manchu handbook of western medicinal drugs and practices, *Xiyang yaoshu* 西洋药书 (Treatise on Western Medicinals). See, for example, Charlotte Furth and Marta E. Hanson, “Medicine and Culture Chinese-Western Medical Exchange (1644 – ca. 1950),” *Pacific Rim Report*, 43 (2007), pp. 1 – 10; Liu Shixun 刘世珣, “‘xiyang yaoshu’ jiedu fang yishi,” “西洋药书” 解毒方译释, *Gugong Xueshu jikan* 故宫学术季刊, No. 2 (2017), pp. 115 – 140.

印度洋 - 太平洋水域外科医生与医师的流动 (15—18 世纪)

萧 婷 马修·托克 闻·温特

摘 要：外科医生和医师是海上航行的重要组成部分。他们必须照顾病人和伤员，采取疾病预防和救助措施，关注船员的卫生健康问题。本文利用大量的中外文资料，梳理欧洲航海过程中外科医生和航海医师职业的出现与发展，并将其与中国传统船上医疗进行比较，探讨欧洲与中国“海洋医学”的发展路径和本质差异。进入大航海时代后，随着海外扩张活动的增加以及航海距离的延长，西班牙、葡萄牙、荷兰、英国、法国等欧洲国家的海上医学迅速发展，并逐渐形成系统的学科知识。许多欧洲外科医生和医师也同时从事商业贸易活动以及外交谈判活动。荷兰东印度公司的“国家职能”性质也促使其拥有最完备的海上医学知识体系。相比之下，中国方面关于海上医学的史料则相对较少。虽然中国在航海过程中早就注意到均衡饮食结构等问题，但由于政治经济环境的不同，中国并没有像欧洲国家那样频繁的全球性海洋扩张和探索行为，官方主导的、大规模的、定期的远洋航行有限，因此并未发展出像欧洲那样系统的海洋医学。

关键词：外科医生 医师 海洋医学 船上医疗 大航海时代

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