Border Crossing and Intellectual Curiosity - On the Modernization of Japanese Medicine during the Edo Period

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Introductory Remarks

In 1927, after traveling through China and Japan, the renowned physiologist Ludwig Aschoff emphatically declared that there was no need for any kind of “medical mission” in Japan.

Anyone who knows East Asia will not be surprised that I preface my comments with the following: There is no need for a medical mission in Japan. In Germany we have little idea of the vehemence with which Japan is trying to transplant the methods of European and American scientific research to her soil. This is especially true in medicine.
In China, Aschoff had not seen a single medical faculty managed by the Chinese themselves: most parts of the health care system were established or run by foreigners. In Japan, on the other hand, he counts six imperial universities and 18 other universities with medical faculties to which he adds four medical colleges. Aschoff describes these institutions in detail, and he praises the professional education of Japanese physicians and the research conducted there, as well as the treatment of patients in university and other hospitals. He expresses some astonishment about certain customs, but there is no doubt that Aschoff was deeply impressed by what he saw during his journey through the archipelago. Although an ardent protestant, Aschoff even warns his audience that Western missionaries should take care not to destroy Japan’s highly developed traditional culture.

This outstanding success in medical modernization owed much to Japan’s efforts during the second half of the 19th century, which started — as far as medicine is concerned — with the foundation of the Naval Training Institute (Kaigun denshûjo) in Nagasaki and the introduction of a modern Western-style curriculum in medical education. Many developments in 19th- and 20th-century Japanese medicine can be traced back to Dutch pioneers such as Johannes Lydus Catharinus Pompe van Meerdervoort (1829–1908), Anthonius Franciscus Bauduin (1822–1885), Antonius Johannes Cornelius (1843–1883), Koenraad Wolter Gratama (1831–1888), and Constant George van Mansvelt (1832–1912) and the overall efforts by the Dutch East India Company to provide up-to-date know-how in Western science and technology.

Yet, however qualified and enthusiastic these Western teachers were, they would have never achieved such impressive results if they had had to start their work from scratch. The Japanese counterparts of these European expatriates had long since begun to leave the realm of Sino-Japanese medicine. Guided by their own interests and aims, they had already crossed the boundaries of their tradition and were steadily approaching the West. This process took time: it can be traced right back to the 17th century, when the establishment of a Dutch trading post in Japan and the permanent presence of European surgeons and physicians led to a gradually intensifying exchange of medical knowledge, books, instruments, and pharmaceuticals.

**Early Beginnings**

During the 15th and 16th centuries, Japan absorbed a number of foreign innovations in smelting and forging methods and in crafts such as papermaking, silk weaving, and printing. Most of this know-how came from China. It was disseminated not by Buddhist monks or scholars as earlier knowledge had been but by merchants and artisans; hence it was predominantly of a practical nature. This also holds true for the spread of “Western Studies” (yōgaku). The Japanese response to European stimuli focused on military technology and medicine both at the beginning of and in the final decades of the Edo period. In the view of the Tokugawa government, the battle for the castle in Osaka and the
later troubles with the Christian peasants’ revolt in Shimabara in 1639 had demonstrated the usefulness of cannons and mortars. Some were cast at the first Dutch trading post, Hirado, and others were imported by the Dutch East India Company and presented as a gift to the shōgun. However, after the forced relocation of their trading post from Hirado to Nagasaki in 1641, the response of the Dutch to requests for such items slowed down considerably. Nevertheless, even during the 1650s, Japanese studies in mortar shooting and castle attack techniques continued. Then, with the growing stability of the Tokugawa regime, official interest in weaponry receded for more than a century. Medicine, on the other hand, never ceased to attract Japanese physicians.

The introduction of Dutch-style medicine, particularly surgery (oranda-ryū geka), was the result of structurally favorable conditions combined with individually motivated efforts and mere circumstantial events. In 1649, the Dutch East India Company dispatched a special envoy to Japan, as Dutch–Japanese relations had been somewhat strained by several incidents. When Andries Friese (Frisius) arrived in Edo at the end of that year, shōgun Iemitsu was ill. As his consent and a final audience were necessary to conclude the complex negotiations, Friese’s stay in Edo had to be extended several times. This enabled high-ranking — that is to say, for the most part elderly and ailing — Japanese officials, to test the skills of ‘Master Caspar’, a surgeon hardened on the battlefields of Germany, who had accompanied Frisius to Edo. The results must have been satisfying. At the request of the court, Caspar Schamberger (1623–1706) stayed in Edo for an exceptionally long 10 months. Thus, the usefulness of certain treatment methods, plasters, and ointments was acknowledged first at the top of the power elite. This turned out to be very important for the further promulgation of Western medicine during the following decades. The first requests for Western materia medica, medical books, artificial limbs etc., carefully registered in the trading post diary, reveal that the Japanese were aiming high from the very beginning.

Order from 26 February 1652 conveyed by the imperial inspector general Inoue Chikugo-donno on behalf of her Majesty and several high-ranking Gentlemen as well as for himself: […] 10 picols black mummy; 2 picols black billili like the one that was brought recently by the honorable Coyett; 2 picols black or real unicorn if it can be provided; […] 5 cupping glasses; […] 2 small bandage boxes or ointment boxes nicely decorated with copperbands; 2 mermaid teeth; 1 catty elephant fat; 1 elephant gall bladder; 2 alembics with heads for the distillation of Oleum vitrioli, Oleum Sulphuris, nitric acid etc.; […] 4 iron hands with screws made like natural ones in order to hold a sable for fighting or a pen for writing, being two left and two right hands, one pair made more laboriously and lavishly; 2 artificial legs made in the same way for use in case of losing a leg as well as for mere curiosity; several pieces of hematite to stop bleedings; […] an illustrated book in Portuguese dealing with human anatomy; a herbal with illustrations made after live plants; […] a human model made of copper, wood or other
material showing all parts of the body and internal organs in as much detail as possible; [...] 4

Obviously, the adoption of Western medical knowledge was seen as beneficial not only to the personal health of influential people at the court but also to the further development of Japan and thus to the consolidation of the Tokugawa regime. In addition to medicine and pharmacy, armaments, astronomy, and cartography were of special interest, and the supply of goods in these branches of knowledge was never threatened, even after the introduction of the Japanese seclusion policy.

The theoretical foundations of medicine practiced in Japan for centuries had come from China. As they differ significantly from those of Western pathology, one might ask to what extent these incompatibilities hampered the introduction of Western medicine. There were sporadic Japanese attempts to deal with Western pathology, but the language barrier proved to be a formidable obstacle, and direct access to the contents of Dutch publications was very difficult before the 19th century. It is not by chance that the introduction of Western medicine began with surgery, a field somewhat neglected in Far Eastern Medicine, but even in this comparatively concrete discipline, the Japanese made their choices and confined themselves to treatment methods they could integrate into their world. 5 For most of the Edo period, “Chinese Studies” (kangaku) with its easily accessible sources and rich tradition continued to be the basis, or at least the starting point, for any adherent of “Dutch Studies”.

**Economic Conditions**

During the Edo period, economics always played an important role, as the country was plagued by meager natural resources and limited export capacities. By restricting her external relations, Japan had become heavily dependent on a few partners for certain goods. Talks held in 1639 by the Dutch trading post chief, François Caron, with the imperial inspector general, Inoue Masashige, and the imperial councilor, Sakai Tadakatsu, show the government’s concern for an uninterrupted supply of raw silk, textiles, and herbal drugs and medicaments. 6

Previous research has linked the rise of “Dutch Studies” (rangaku) to shôgun Yoshimune, who during the 1720s and 1730s lifted an import ban on Western books while promoting Dutch language studies and the import and local cultivation of drug plants. However, a closer look into 17th-century sources reveals that medical and botanical books were never refused, and there had been a similar official request for foreign seeds, plants, and pharmaceutical technology six decades earlier under shôgun Ietsuna. 7 To avoid the drain of silver and gold, repeated efforts were made to curb the influx of goods deemed to be unnecessary and to develop local resources. The introduction of Western medical treatment methods, with their new recipes and expensive imported drugs such as mummies, theriaca,
and rare oils, inevitably led to the search for local substitutes, thus stimulating Japanese botanical studies and the improvement of plant cultivation.

At the request of the Japanese government, the Dutch East India Company also delivered large-scale distillation equipment from Europe as early as 1671. Some of the methods for producing oils were quite complex and lasted for as long as seven days. However, after three months of instruction, Japanese physicians had mastered all the techniques, and during the following decade, a variety of pharmaceutical oils were distilled. The two Western pharmacists dispatched to Japan during these years were also requested to take part in joint investigations of the flora in Nagasaki Bay. At the same time, the East India Company started to look for useful Japanese plants, which eventually led to Engelbert Kaempfer’s pioneering botanical research in 1690–92. At an early stage of Dutch–Japanese intercourse, plant studies had become a field of common interest for the company as well as for the Japanese. Plant studies by Europeans in Japan were almost never impeded by the restrictions that Japanese officials imposed on Western intelligence gathering.

Efforts to reduce imports and promote local production intensified under shōgun Yoshimune during the second and third decades of the 18th century. Nevertheless, throughout the Edo period, books and certain instruments and pharmaceuticals had to be ordered from the Dutch East India Company. As these deliveries helped to promote trade in other large-scale commodities and to smooth Dutch–Japanese relations, Batavia usually paid a lot of attention to such requests.
Physicians as Pioneers

The continuity in Dutch–Japanese medical exchange and the spread of “Dutch Studies” were not merely the results of their obvious usefulness or official promotion. Japanese physicians were less subject to the rigid social restrictions that regulated the movement and activities of the majority of their compatriots. As their profession enabled them to sustain a certain standard of living at any chosen place, they were in a quite favorable position to indulge in their studies and spread new knowledge. Medicine in Edo Japan was a kind of private science. Its integration into the public sphere occurred rather late and is closely linked to the activities of Pompe van Meerdervoort and his successors.

The European physicians at the Dutch trading post also enjoyed quite a comfortable position. Before the company was taken over by the Batavian Republic in 1795, most of them were not enlisted as “qualified personnel”, a status reserved for merchants. Thus, they were not involved in official trade activities or in policy making, having to take care of just a dozen Westerners at Dejima. However, because their skills were held in high esteem outside the trading post, they met a greater number of influential Japanese than their superiors did and had far more opportunities to collect information and material. Therefore, it is not by chance that many groundbreaking books on Japan were written by trading post physicians, while for most of the Edo period, “Western Studies” in Japan were conducted mainly by physicians or scholars turned physicians.

The Dejima Trading Post

From 1609, the Dutch East India Company ran a trading post in Japan that was relocated in 1641 to Dejima, an artificial island in the bay of Nagasaki. At first glance, the island appears quite spacious, but for anyone staying there a year or two, it became a narrow place. Even Engelbert Kaempfer, who in the 1680s had survived two hot years in the Persian Gulf, called it a prison. Nowadays Dejima is usually characterized as Japan’s only door to the West during the age of seclusion, but it was more than just that.

This tiny island was part of a vast network. During its golden age, the East India Company was a large commercial enterprise operating worldwide. By interacting with the Dutch, Japan was integrated into the global trading system. Dutch access to countries throughout Asia facilitated the accumulation and comparison of knowledge among ambitious European employees. Many of the Westerners arriving in Nagasaki had already worked at other trading posts. At an official and an individual level, the company had much more to offer than just knowledge about central Europe.

There were many restrictions imposed on Dutch–Japanese exchange and sometimes considerable risks, as demonstrated by von Siebold’s expulsion in 1829 and the harsh penalties for his collaborators.
However, others such as Kaempfer managed to smuggle maps out of the country, having nothing to offer in return for Japanese cooperation other than instructions about medicine, plants, or other fields of interest. In many cases, this was attractive enough to secure the help of Japanese counterparts. Without this illicit cooperation, Europe would not have learned much about Japan, and Japanese knowledge about the world would have been much less extensive.

Fig. 2. Copy made in Kōgyū Yoshio’s study by a physician from Yakata village visiting Nagasaki in 1776 (Nakatsu City Museum for History and Folklore).

**Nagasaki as the Cradle of “Dutch Studies”**

Before the rise of large private academies specializing in “Dutch Studies”, such as the “School of the Right Target” (*Tekitekisai-juku*) in Osaka and the “Iris and Orchid Hall” (*Shiran-dō*) in Edo, the Japanese interpreters at the Dejima trading post played a pivotal role in the transmission of knowledge. Genpaku Sugita (1733–1817), who felt the need to link the beginning of “Dutch Studies” to himself and his times, did not hold these interpreters in much esteem, but their language abilities were much better than he suggests in his famous memoirs. Whenever a European physician treated a local patient, whenever he talked to officials or private visitors, or whenever he instructed Japanese colleagues, interpreters stood at his side to render his statements into Japanese terms. The interpreters’ names can be found on countless official reports.

Not all the interpreters cared about Western science and technology, but some of them developed a strong interest in medical and related affairs. They started to make personal copies of official reports.
and letters, and collected books and bought or received medicaments and instruments. From the 1670s, interpreters such as Genpo Nishi, Chinzan Narabayashi, and Ryôï Motoki gained general recognition for their expertise in linguistic, surgical, pharmaceutical, geographical, and related matters. As their post was kept within the family for generations, large numbers of prints, manuscripts, and all kinds of instruments and objects were accumulated. The upper floor in Kôgyu Yoshio’s house, called “Dutch Hall” (Oranda zashiki), was famous throughout the country, as was his garden with foreign plants and his “Dutch New Year” festivities.\textsuperscript{12}

Japanese people were not able to leave their country, but an education at private schools run by active or retired trading post interpreters provided a stimulating look at Western medicine and the world. Furthermore, here the young scholars met like-minded peers from other regions. These educational stays in Nagasaki (Nagasaki yûgaku) were instrumental in establishing a network throughout the archipelago.\textsuperscript{13} Of course, not everyone was able to keep in contact with former fellows. Some went back to spend their life in the countryside, but, thanks to their stay in Nagasaki, they had a good grasp of what was going on in their profession and Japan. Manuscript copies made from important texts in Nagasaki schools can be found now even in remote mountain areas, showing that “Dutch Studies” was not the domain only of city and castle intellectuals but had its well-informed adherents in villages and hamlets as well.\textsuperscript{14} When it comes to the spread of medical knowledge, Japan does not seem to have any kind of hinterland.

Fig. 3. Page from a rural physician’s booklist (18th century) comprising more than 500 prints and manuscript copies (private collection, Imai village, Nagano prefecture).

**Printing and Copying**

After Johannes Guttenberg invented movable type printing and mechanical printing in 1439, the Western tradition of book copying and book illumination died quickly. Books could be reproduced
much more quickly and in greater numbers, but as most prints were quite expensive, the spread of knowledge continued to be rather limited.

In Japan, on the other hand, the traditional woodblock print dominated the printing industry until the 19th century. Nevertheless, during the 17th and 18th centuries, Japan surpassed by far any Western country in terms of published book titles and total circulation. Amazingly, this did not harm the art of copying. The copying of Buddhist sutras may have played a role in this, but, as in China, writing was an important way of acquiring knowledge. Thanks to this tradition, manuscript copies of important medical texts can be found even in remote mountain villages.

Fig. 4. Japanese microscope (mijinkyô, ca 8 cm) bought in Kyoto and used by the inhabitants of the hamlet Kiso (Kiso Valley, Shinshû). A note on the wooden box says: “Please return the microscope to its owner when you have finished using it.” (Miyagawa Collection, Kisomura, Nagano Prefecture).

**Homo Ludens**

The ultimate reasons for this phenomenon are yet to be explored, but objects, books, and manuscripts from the Edo period suggest that the Japanese were a very curious people. Western participants in the so-called “court journey” to Edo confirm this impression. At the same time, the Japanese had a quite playful spirit (asobigokoro). There were bright minds developing ingenious clockwork for tiny dolls that served tea or shot an arrow. In traditional timekeeping, the lengths of the six daylight and six nighttime hours were changed according to the season. Therefore, clocks had to be supplied with clockwork mechanisms that would have caused nightmares among European
watchmakers. Microscopes and telescopes were imported and then produced locally, and mostly used for amusement.  

As there was no imminent war to be fought, there was time enough for curious minds to explore freely. Even among administrative officials working for regional lords or the central government, we find a kind of generalist character who, in addition to his administrative job, spends his free time on activities like investigating local resources, writing poems, collecting shells and artifacts, painting, or studying Chinese and Japanese classics. Japanese mathematics (wasan), a discipline nowadays little known outside expert circles, had reached an amazing level in terms of complexity. There should have been many practical and rewarding applications, but thousands of books with mathematical problems and solutions merely served for individual amusement.

Collectors and Collections

During the 18th century, the influx of foreign things and the growing economic strength of the merchant class provided the basis for the rise of private collectors. As in Europe, artifacts and natural specimens were mixed up at first. Gradually objects were compared and sorted — in some cases even registered and published — preparing the ground for new concepts of classification while honing the collectors’ skills. Although Japanese houses had no curiosity chambers or cabinets, special, sometimes
gorgeous, lacquer boxes served this purpose as well. Usually the place of presentation was the tearoom. As in Europe, collections in Japan had a social function too.

Japanese physicians always took great interest in useful materia medica. It was a small step for them to expand their traditional medicinal boxes (yakurō) to large collections kept in medicinal cabinets (hyakumi-dansu). However, with changing treatment methods and the growing influx of new drugs, the need for information on pharmaceutical properties and on methods to uncover fakes eventually led to a new forum of communication. From the mid 18th century, so-called “materia medica exhibitions” (yakuhin-e) or “product exhibitions” (bussankai) were organized throughout the country. The participants brought their personal treasures, which were displayed and discussed. Jirō Endō and Teruko Nakamura have counted about 250 such exhibitions during the 116 years between 1751 and 1867. As there were no universities or museums, these events were instrumental in establishing a common base among professionals and accelerating the exchange of information and objects.

Fig. 6. “Materia medica exhibition” in the “Medical Hall” (igakkan) of the Asai family in Owari (print from Mitsutarō Shirai, Nihon Hakubutsugaku nenpyō. Tokyo, 1891; author’s collection).

Language Studies

For most of the Edo period, the Japanese interpreters at the Dejima trading post played a pivotal role in the cultural exchange between Japan and Europe. As they had access to the trading post from childhood, their spoken language abilities must have been at least sufficient to cover business matters...
and everyday problems. Medical instructions were the domain of specialists like Motoki, Yoshio, and Shizuki. However, physicians throughout the rest of the country had no opportunity or need to acquire oral communication skills. For them it was essential only to read Dutch books and above all to acquire the necessary medical terminology. During the 17th century, soon after the rise of Dutch-style surgery, interpreters and physicians started to compile personal glossaries, copies of which gradually found their way into the regions. However, even after the active promotion of Dutch language studies during the reign of shōgun Yoshimune, it took many more decades until these glossaries were expanded to fully fledged dictionaries. The task was daunting, not only with respect to the translation of abstract terms: even simple words proved to be a challenge, when the object itself was not yet known. Therefore, it became an invaluable help for Japanese scholars when trading post chief Hendrik Doeff (1777–1835), while waiting for relief from Batavia, used his prolonged stay at Dejima to compile a Japanese version of François Halma’s Dutch–French dictionary (Nieuw Woordenboek der Nederduitsche en Fransche Taalen, second ed. 1729). This book, completed by Japanese interpreters after he left Japan, contains more than 50,000 entries.²⁰

Fig. 7. Ranyaku sentei, teaching materials used in Kyōto around 1800 by Genkitsu Yoshio (Sōda Collection, International Research Center for Japanese Studies, Kyoto).²¹

In the 1670s and 1680s, the gifted interpreters Chinzan Narabayashi and Ryōi Motoki were able to present excerpts from Dutch editions of Ambroise Paré’s Chirurgie and Johannes Remmelin’s Pinax Microcosmographicus (Amsterdam, 1634/45).²² Nevertheless, they still depended heavily on explanations from trading post physicians. The first hint of a more systematic approach can be found
in the preface of Engelbert Kaempfer’s “History of Japan”, where he states that he taught the Dutch language to his assistant grammatically. According to Kaempfer, this young man, Imamura Eisei, soon enjoyed a better command of the language than most of his fellows at the trading post. During the first decades of the 18th century the situation improved considerably. Konyô Aoki and Ryôtaku Maeno, to name just the pioneers, rendered the main points of Dutch teaching materials such as Hakvoort’s “Letterkunde” and Bartjens’s famous arithmetic book “De Cyfferinge” into Japanese. These annotated excerpts were very helpful for anyone who wanted to read Dutch texts.

**Educational Institutions**

There were no universities in premodern Japan, but numerous temple schools (terakoya), private schools (shijuku), and official schools run by the regional domains (hankô) provided an excellent basic education. Despite the complex Japanese writing system, more people could read and write than in any Western nation. Some schools with unique educational concepts were widely popular, such as Tansô Hirose’s Neo-Confucian “Garden for Everybody” (Kangien) in Central Kyushu, which attracted some 3000 boys and young men from 64 of the then 68 provinces of Japan. Many of its graduates contributed in leading positions to the opening of Japan and its rapid modernization.

With the rise of Dutch Studies, similar private schools for a kind of secondary education appeared, the most prominent ones in Osaka and Edo gaining a nationwide reputation. After an education in such a 19th-century Dutch Studies institution, a gifted student was able to read Dutch books independently, had acquired a basic medical vocabulary, knew something about Western medicine and related sciences, and was aware of Japan’s place in the world.

Thanks to close Dutch–Japanese cooperation, Japan managed to keep track of essential developments in the outside world, including in medicine and allied disciplines. There is no question that this exchange was insufficient to provide a deeper insight into the theoretical background and the dynamic unfolding of modern medicine in Europe. Nevertheless, supported by a high level of education and an intellectual environment of curiousness and playfulness, for about two centuries, Japanese physicians acquired a great variety of treatment methods, an impressive amount of information on materia medica, a basic understanding of human anatomy, and a set of Western medical terminology. As most of this knowledge had spread even into rural areas, the ground was well prepared for the seeds that Pompe van Meerdervoort and his successors were about to introduce.

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Diary of trading post chief Adriaen van der Burgh, 24 May 1652 (National Archive, The Hague, NFJ no. 65).

Wolfgang Michel, On the Reception of Western Medicine in Seventeenth Century Japan, pp. 412–416.

Diary of trading post chief François Caron, 20 July 1639 (National Archive, The Hague, NFJ no. 65).


Yosioh Tanaka, who was instrumental in the establishment of public museums in Meiji Japan, spent his childhood in Iida next door to this family. For more on this topic, see Wolfgang Michel, *The Lure of Things — On the Specimens of the Ichioha Family in Iida (Shinshû)*, *Japanese Journal of the History of Biology*, No. 75, Dec 2005, pp. 3–10. [in Japanese]

It was later revised by Hoshū Katsuragawa, and published from 1855 to 1856 under the title *Oranda jii* (Dutch Dictionary).

This manuscript is based on Ryôtaku Maeno’s *Oranda yakusen*, written in 1785. For more on Yoshio, see Wolfgang Michel, Yoshio Genkitsu — Life and Works of a Forgotten Scholar of “Dutch Studies”, *Studies in Languages and Cultures* (Kyushu University), No. 21 (2005), pp. 89–109. [in Japanese]

