

# Translation and the origins of Western science in Japan

SAKAI Shizu

This paper examines the early Japanese translations of European anatomical texts during the 17<sup>th</sup> and 18<sup>th</sup> centuries. Although Japan's encounter with the West began when a Portuguese ship drifted onto a Japanese island in 1543, it would be the Dutch that dominated Japan's early encounter with Western medicine and science. The preeminence of "Dutch learning" in Japan can be traced to a "policy of seclusion", which severed all ties with Western countries, except for the Netherlands. Dating from the early 17<sup>th</sup> century, this policy remained in place until Japan signed a trade agreement with the United States in 1858.

The seclusion policy prohibited travel abroad by Japanese and stymied efforts to investigate foreign civilizations systematically. Therefore, the books and implements brought to Japan by the Dutch became the main source of information about the European world. It is for this reason that the study of Western medicine in Japan began with the translation of Western texts. The Japanese people, in short, learned Western medicine through books. The great translator Sugita Gempaku (1733–1817) initiated these efforts, and the term Dutch learning (*rangaku*) emerged from the translation projects of his group.

At first, Dutch trading companies imported foreign books for a handful of high government officials in Japan who, quite simply, requested them out of curiosity. These officials could not read Dutch, and so they asked for medical books containing graphics—which turned out to include books on anatomy and surgery. At official behest, the first translations of these texts were completed in 1682. By the early 1700s, Japanese physicians, increasingly aware of the differences between traditional and Western medicine, began conducting dissections and undertook the serious translation of anatomical texts. They coined new medical terms based on the examination of body parts through dissection and the reading of anatomical texts. This process represented the gradual transition to Western science, a transformation formalized by the new Meiji Government in 1869, when it declared Western medicine as the official medicine of the country.

## Introduction

This paper analyzes the changes in medical discourse in Japan wrought by the transformation from traditional to Western medicine. “Traditional medicine”, in this context, refers to the theories introduced from China to Japan beginning in the 5th century A. D., theories that defined the mainstream of Japanese medicine for more than one thousand years.

The arrival of a Portuguese sailing vessel to a Japanese island in 1543 marks the beginning of the introduction of Western medicine, astronomy, and, not least, Christianity. However, in the late 1500s, Japanese authorities banned the teaching of Christianity, and at the turn of the 17<sup>th</sup> century severed all relations with Western countries—except for the Netherlands. (This policy of seclusion remained in place until 1858, when Japan signed a trade agreement with the United States). The period of isolation witnessed strict controls on the importation of books. Only those in high government positions, and their aids, were allowed access to foreign books, which initially included both medical and general works. These books functioned as entertainment, for satisfying the curiosity of this privileged group. Yet the officials could not read Dutch and thus requested medical books with graphics. The Dutch provided anatomical texts. The officials grew weary of simply looking at the pictures, however, so ordered the translations of some of the texts into Japanese. While these were the first translations of Western medical texts, they had little influence on Japanese medicine, because the Nagasaki interpreters had only limited medical knowledge.

By the early 18<sup>th</sup> century, restrictions on the importation of foreign books were gradually relaxed, except for those on works about Christianity. Growing awareness among some physicians regarding the difference between traditional and Western medicine led to anatomical dissections and the start of serious translation of anatomical texts. Dissection and translation formed the base of “Dutch learning”, and enabled the assimilation of Western medicine. The texts imported into Japan by the Dutch during this era were simply those texts then popular in Holland. As a result, most of the Western medical texts entering Japan were Dutch translations of German texts. When the Meiji Government completed the conversion to Western medicine in 1869, it thus selected the German model.

There was still no environment, however, for learning the general structure of Western science. Japanese scholars of the Edo period (1603–1868) held Chinese learning in too high an esteem for Western ideas to displace it. Edo scholars generally felt it enough to study the technology of Western science selectively. In later years, even after Western science was recognized widely as

an alternative to traditional learning, scholars still viewed it as useful only for practical application. Even during the Meiji period (1868–1912), after Western science became celebrated and when most traditional modes of thought were challenged, the ideological power of traditional learning continued to cast a shadow over Western knowledge, which many scholars continued to consider as inherently practical.

As we have seen, Japan first encountered Western medicine in the 17<sup>th</sup> century. Yet it was not until the 18<sup>th</sup> century that physicians in Japan recognized its scientific value. Perhaps the key event in this initial encounter was the translation of a Dutch anatomical text by a group of Japanese physicians. The translated anatomical text, *Kaitai shinsho* (New book of anatomy) was published in 1774 by Sugita Gempaku. Its translation represent the first significant introduction of Western science into Japan.

Together with Christianity, Western medicine had first been introduced to Japan by a Portuguese mission 220 years earlier, just a few years after the introduction of firearms around 1543. At that time, apart from a few Christian converts, Japanese did not actively adopt Western medicine. With the suppression of Christianity beginning in the late 1500s, followed by the expulsion of first the Portuguese and then the Spanish mission from Japan, and finally the exile of Japanese Christians in 1639, Japan's connection with Western civilization was severed. But not entirely. Trade with the Netherlands and Great Britain began at this time, with the restriction that religious proselytizing not enter into trading activities. This was the lynchpin of the so-called policy of isolation. Under this policy, only the Netherlands and China could trade with Japan, and only through the port of Nagasaki. One result of this policy was that Japan's subsequent encounters with Western civilization were conducted through the Dutch.

As for exchanges between Japan and other Asian countries, the government banned Japanese from going abroad in 1635, and thus all information about Asia came through China, via the trade conducted in Nagasaki. On occasion, Korean diplomatic missions visited Japan, and accompanying physicians transmitted bits of medical knowledge. Such occasions were rare, however, and only occurred twelve times during the 265 years of Edo.

Japan's self-imposed isolation ended in 1858 when it signed the United States–Japan trade treaty, one result of the famous intrusion by Commodore Perry. Due to these historical circumstances, Japan's encounter with Western medicine contains features generally not found in other countries that tried to acquire foreign knowledge. These features include :

1. The importation of foreign books, especially in Chinese, was banned due to government fears of Christian influence. However, Western books on medicine, artillery and astronomy were permitted.<sup>1</sup>
2. Because going abroad was prohibited, Japanese were unfamiliar with international publications; the books with which they became acquainted largely depended upon the choices made by Dutch merchants.
3. The medical books transported to Japan before the 18<sup>th</sup> century were ordered by *daimyô* (feudal lords), not by physicians. For this reason, these books were usually extensively illustrated and expensive books, usually on surgery and anatomy.
4. These books were written in Latin, and the Dutch surgeons residing in Nagasaki at that time didn't possess the language ability to translate them. Although the feudal lords thus couldn't understand the text, they were nonetheless impressed by the quality and detail of Western medical illustrations.
5. The first translation of Dutch medical texts by physicians appeared in the late 18<sup>th</sup> century. Ninety years earlier, anatomical texts had been translated by an interpreter, with the aid of Dutch physicians; yet, this work was sloppy and its influence was limited due to the translators' lack of familiarity with medicine.
6. Substantial translations took place during the 18<sup>th</sup> century. The translators, however, possessed only a limited understanding of Dutch, so the translations required great effort. However, the manner in which the translations were executed greatly influenced later translations.
7. There are significant structural differences between Western medicine and traditional East Asian medicine. In the process of translation, these discrepancies became clear, and new technical terms were created to articulate Western concepts.
8. The medical terms created at that time later informed the modernization of Chinese medical vocabulary and discourse.

### **Japanese medicine before the introduction of Western ideas**

Chinese medicine was introduced to Japan by physicians visiting Japan and by Japanese envoys traveling to Tang China (618–906 A. D.). The famous Taihō Law Code of 701 established a social system governed by the rule of law, and designated Chinese medicine as the official medicine of the country.<sup>2</sup>

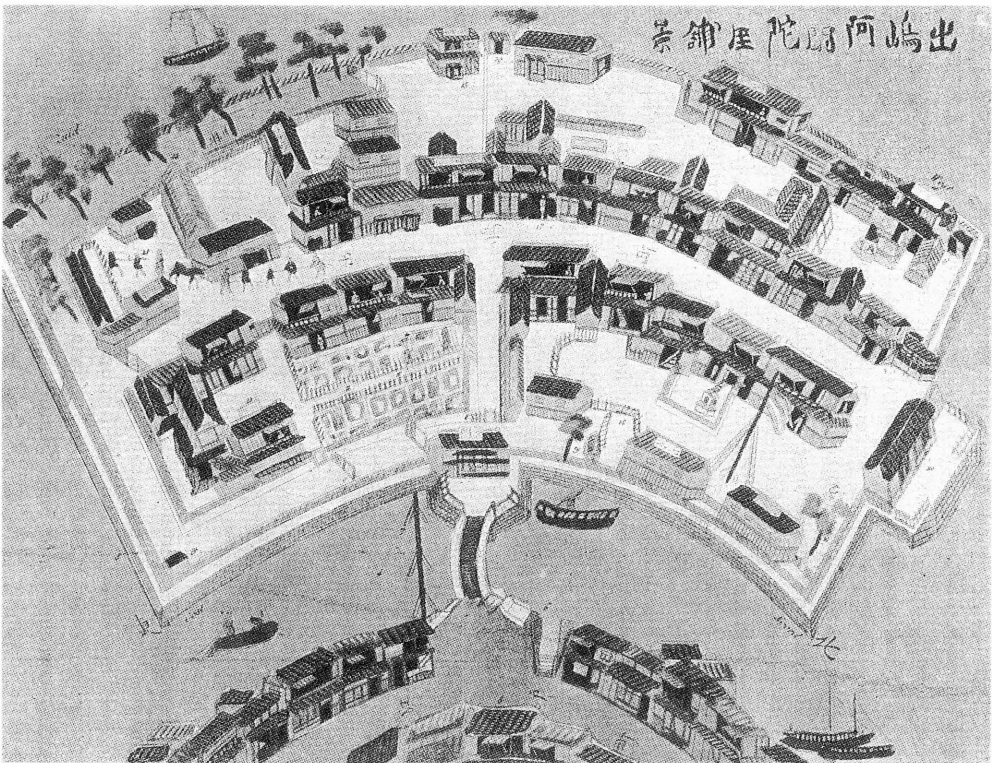
Chinese medicine was based on the concepts of yin and yang, the five solid and six hollow viscera, and the fourteen acupuncture tracts; therapies included the use of herbs, acupuncture, regimen, and exercise. In a medical environment

dominated by Chinese ideas, the Galenic theory orally transmitted by a handful of missionaries in the 16<sup>th</sup> century sounded strange, and exerted limited influence on Japanese doctors of the period. Japanese physicians were impressed, however, by the Western treatment of tumors. Traditional remedies involved the use of acupuncture and plasters, but the Western approach to tumors was more drastic, involving surgical incision and suture.

### **Communication with Western physicians during the period of isolation**

In 1639, when the government banned all Europeans except the Dutch, Dejima Island off Nagasaki became the sole window of Japanese contact with the West. Access to Dejima and the Dutch residing there was restricted, and only Japanese who gained special permission were allowed to visit the island. Some physicians, under the orders of high government officials, visited Dejima to learn Western medicine from the surgeons stationed at the “Dutch Settlement” (the Japan office of Dutch East Indies Company) (Fig. 1).

These physicians interviewed the Dutch doctors with the help of interpreters. Gradually, through the course of their work, the interpreters themselves



**Fig. 1** Deshima 1780

acquired quite a bit of medical knowledge, and some of them eventually became practitioners of so-called “Red-hair medicine” (the Dutch were then sometimes referred to as the “red-hairs”).

Japanese acquisition of Western medical knowledge during the 17<sup>th</sup> century typically went something like this: a Dutch surgeon delivered a medical lecture to Japanese physicians, sometimes employing illustrations from medical texts, sometimes showing instruments. An interpreter translated, and Japanese physicians transcribed these explanations. This perhaps explains why most of the medical records from this period take the form of dialogues.<sup>3</sup>

The Dutch sent a good deal of tribute to the higher officials in charge of foreign trade, such as Magistrate of Foreign Affairs and the Magistrate of Nagasaki. Among this tribute were a number of illustrated medical books. Books on anatomy was especially popular, and thus a copy of Andreas Vesalius’s *Fabrica* was offered.<sup>4</sup> Later, we see records of orders issued by higher officials to import such books. As official interest in these books grew, looking at the illustrations was no longer enough, and officials wanted full translations. However, scholarly treatises such as Vesalius’ resisted easy translation. So the Dutch presented the officials with a copy of *Pinax microcosmographicus*, an anatomical digest by Johann Remmelin, first published in Ulm in 1613.<sup>5</sup> Remmelin’s work contained only four pages of illustrations, with brief explanations. But the text’s anatomical chart offered a special feature. The chart displayed each organ separately, and then together, visually simulating the human body. The papers were cut in the shape of each organ and put together, so that when the reader opened the book, muscles, organs, and blood vessels appeared as the pages were turned (Fig. 2).

Immediately following its publication in Europe, Remmelin’s work became very popular, undergoing several revisions, enlargements, and extensive translation. In the first edition, the heart was not mentioned, for the book appeared before the theory of blood circulation theory had been discovered. A revised edition added an illustration of the heart. The edition introduced to Japan was the Dutch edition of 1667. Fortunately, translating the new explanations of [the heart] was not that complex.

An official ordered the interpreter Motoki Shōdaiyu (1628–1697) to translate Remmelin’s text. Motoki copied the text and brought it to the Dutch physicians. The physicians explicated the work by discussing its graphics, rather than by translating its textual explanations. Motoki listened, wrote down the explanations, and completed his rendering of Remmelin around 1682. He titled the translation, *Oranda keiraku myakuraku kinmyaku zōfu zukai* (Illustrated explanation of Dutch conduits, vessels, sinews, and viscera). Comparing Motoki’s



Fig. 2 Male body in *Pinax Microcosmographica*

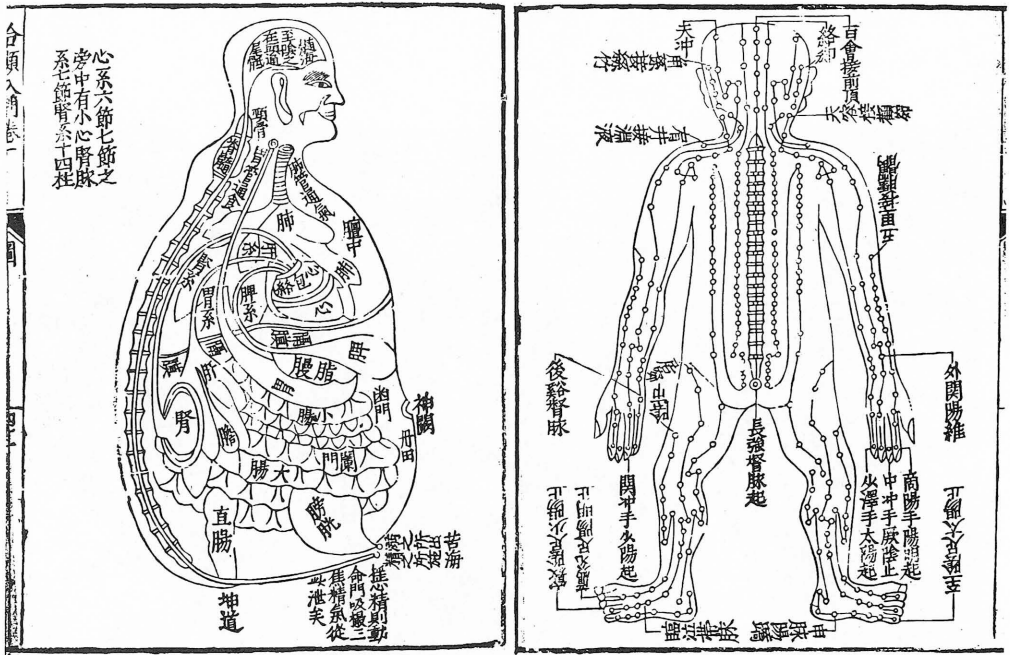


Fig. 3 Chinese chart of anatomy

work with the original, it is clear that the interpreter tried to understand Western anatomy within the framework of the Chinese theory of the five solid and six hollow viscera. Concepts falling outside the traditional conceptions of East Asian medicine, such as the brain, nerves, and pulse, were not fully understood.

The Japanese physicians studying with Dutch surgeons at Dejima learned that anatomy was the basis for surgery, and they received a copy of Motoki's book. The work didn't, however, enter the popular mainstream. Its illustrations looked too different from the traditional five solid and six hollow viscera for most Japanese readers to comprehend (Fig. 3), and the Japanese text left them baffled. The book's value remained largely unrecognized until the first anatomical dissection took place in 1754.

### The lifting of the ban on imported books and its influence

In 1720 Japan was still under the policy of isolation. But the government concluded that ignoring information on Western civilization harmed the country, and so the Shogun Yoshimune lifted the ban on all foreign books, except those dealing with Christianity. As a result, foreign books became available not only to officials but also to commoners, and some physicians obtained Western books on anatomy. Since they were unable to read the texts,



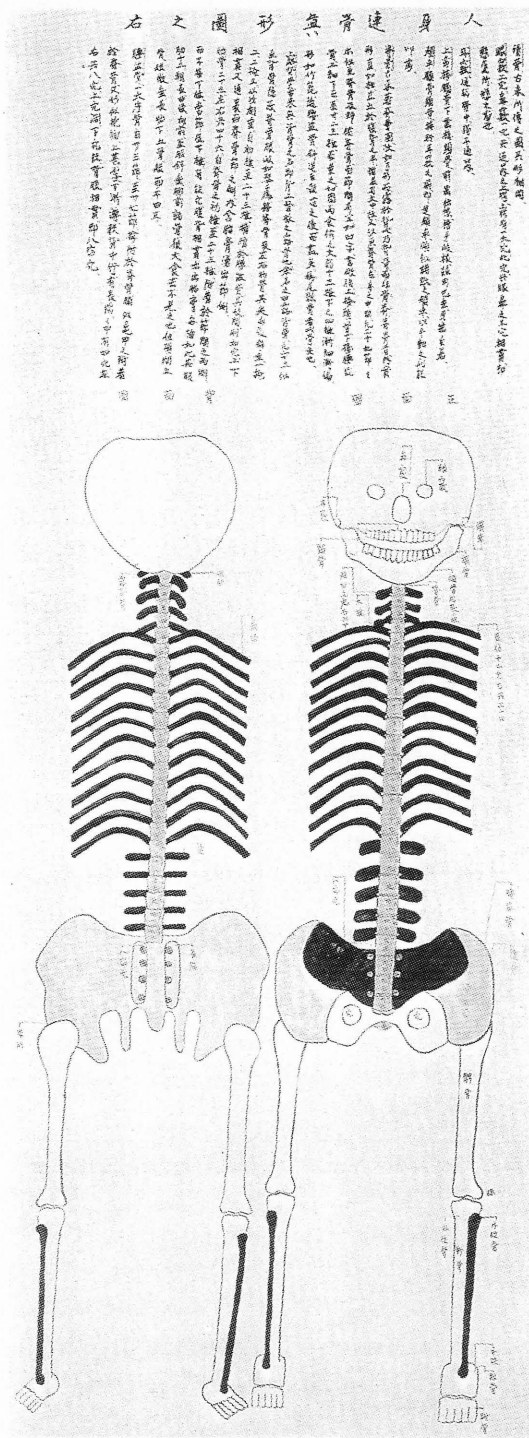


Fig. 4 Sketches of human skeleton by Toshuku Negoro

however, they could only gaze at the illustrations. These physicians grew interested in the differences between Western and traditional representations of the body, and began contemplating the possibility of dissections. Yet autopsy had never been officially performed. Irrepressible curiosity won out, and in the 1730s people started collecting the abandoned bones of criminals gathered at the execution grounds (Fig. 4), while others dissected animals.

In 1754, with official permission, an autopsy was conducted in Kyoto by a court physician, Yamawaki Tōyō (1705–1762). Comparing the dissected body with illustrations in a Western anatomical textbook, participants concluded that the Western illustrations were much closer to the perceived reality of human anatomy than the traditional charts.<sup>6</sup> Yamawaki wrote a brief treatise called *Zōshi* (On the viscera) in which he asserted that the truth is the same everywhere, in Japan as in foreign lands thousands of leagues away. The publication of this book in 1759 marks the beginnings of the move toward Western medicine.

After the first officially sanctioned autopsy, physicians in other parts of the country followed suit. Physicians conducting autopsies fell into two groups. The first group consisted of those learning Dutch surgery in Nagasaki. The second was made up of traditional physicians who, having seen Western books, had grown skeptical of the formulations of traditional medicine. They sought the opportunity to witness the dissected human body for themselves, in autopsies. Most of these physicians assumed that medicine in ancient China was based soundly on the medical classics, but that over time these authentic ancient teachings had become badly distorted. Yamawaki Tōyō, who planned and observed the first autopsy in Japan, belonged to the latter group.

### **The dawn of medical book translation**

In the early period of autopsies in Japan, physicians pursued three general aims: 1. to compare the dissected body with Western illustrations; 2. to identify and to measure dissected organs; 3. to execute drawings of the dissections. They did not yet endeavor to investigate the function of each organ. With regard to organ function, they still adhered to the theory of five solid and six hollow viscera. Even though the law now permitted the importation of foreign books, the publication of books on the West was still prohibited. The government feared that such writings might propagate “dangerous” thought. Knowledge of foreign languages (mostly Dutch) didn’t go beyond very limited groups, such as interpreters. It was in this environment that there emerged a group of physicians who dared to translate a medical text. This group was headed by Sugita Gempaku court surgeon of the Obama *han*, and Maeno Ryōtaku (1723–1803), court physician of the Nakatsu *han*.

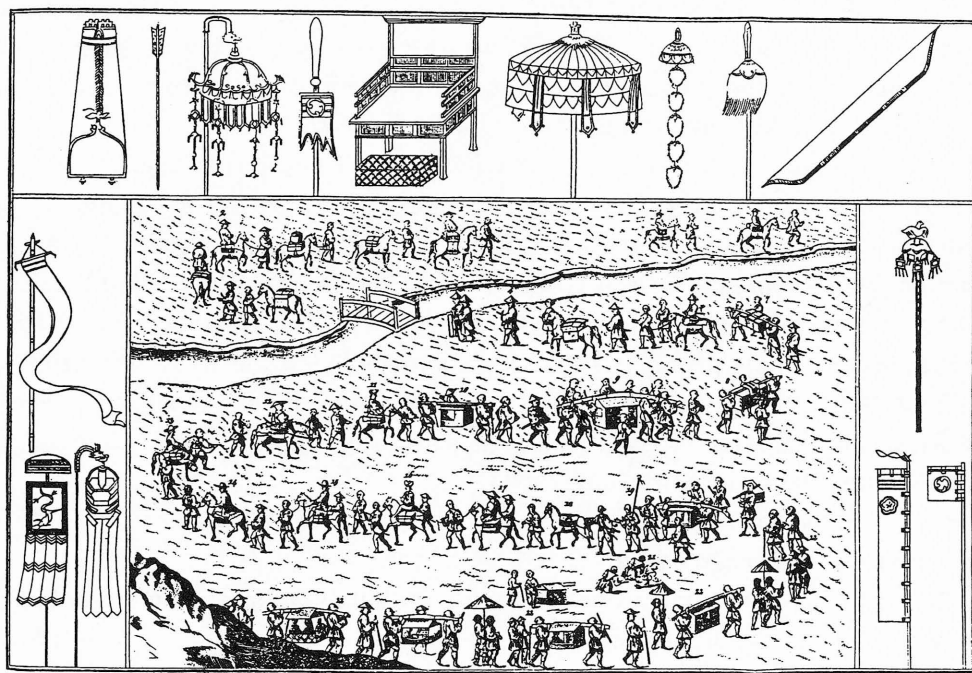


Fig. 5 Visit of homage to the Shogun in Edo

The Dutch, stationed in Dejima at the time, were required to pay a visit to the Shogun in Edo once every four years. Paying homage to the Shogun in Edo (*Edo-sanpu*) was no simple matter. It involved leaving Nagasaki in autumn and not returning until the following spring. These voyages entailed large entourage made up of important personages, such as the head, secretary, and physicians of the Dutch trading house. Accompanying the traveling retinue were officials from Nagasaki, interpreters, and numerous guards and bearers (Fig. 5). The head of the trading house paid a sizable tribute to the Shogun, and presented other powerful daimyō with substantial gifts. It was an elaborate and expensive tour. During this expedition, the Dutch parties stayed at designated inns, where local chiefs or physicians would visit to ask about the Western world. Upon arriving in Edo, officials, physicians and scholars descended on their inns, bringing more questions to the Dutch and their interpreters. It was on these occasions that Western books were shown and sold to civilians. Of course, others went to Nagasaki to learn Western medicine and acquired books there.

Sugita Gempaku had first been exposed to Western books on anatomy and surgery by interpreters at an inn where a Dutch party stayed. He was captivated and henceforth filled with the desire to observe an autopsy—something quite rare at the time. Gempaku's wish was realized on the 4th of March 1771. He invited along Maeno Ryōtaku, who had learned Dutch from Aoki Kon'yō (1698–

1769) in Edo and had studied Dutch medicine from interpreters in Nagasaki. Aoki Kon'yô was a Confucian who had been ordered by the Shogun Yoshimune to study the language of the Dutch whenever they and their interpreters came to Edo. In 1744, Aoki Kon'yô published *Reflections on Dutch letters*.

Along with others, Sugita Gempaku and Maeno Ryôtaku set out to attend an autopsy at the execution ground of Kozukahara. By coincidence, Gempaku and Ryôtaku had each carried to the autopsy a copy of the anatomy by Adam Kulmus, *Ontleedkundige Tafelen*, translated into Dutch by G. Dicten (published in 1734). As the two watched the autopsy with Kulmus' illustrations in hand, they were stunned at how precisely the illustrations depicted the actual structure of the body, and they concluded that the Chinese anatomical charts were mere fantasies. Immediately they decided to translate Kulmus' text, commencing work the next day, the 5th of March, 1771.

### **The original *Anatomische Tabellen***

Seventeenth century Europe witnessed the publication of numerous books on anatomy, and the books brought to Japan were primarily those selected by the Dutch. Most of the selected books were for beginners, and relatively cheap in price. Among those books for beginners, however, Adam Kulmus' *Ontleedkundige Tafelen* (1725) contained an epochmaking feature. Kulmus conceived the book as an antidote to the verbose and complicated lectures and anatomy texts in which students quickly lost interest. Kulmus invented a teaching method that mainly used illustrations, offering students only basic anatomical knowledge. To this end, Kulmus simply summarized in one page the following items about each organ: its definition, form, place, relationship with other organs, primary nature, components, parts, and function. He named his book *Anatomische Tabellen* (*Ontleedkundige Tafelen* in Dutch edition). He used German instead of Latin, because his target audience was beginners and practicing surgeons. When he wrote there did exist a number of simple explanatory books on anatomy, yet most of them were in descriptive form. For learners with no preliminary knowledge, Kulmus' book was the most appropriate. It was by sheer luck that the first book Japanese sought to translate happened to be this book.

To Kulmus' surprise, his book sold well, and went through four editions before he died in 1741, four years after the first edition. In the revised editions he added footnotes, updated the text in accordance with new theories, and wrote it to make it more intelligible and satisfying for students. After his death, it continued to be published and translated into Latin, French, Dutch, and other languages.

## Translation method

Translation is usually done by people who understand both languages, but as mentioned before, under the policy of isolation foreigners were not allowed free movement within Japan. When physicians thus decided to translate Kulmus' text, they could expect no help from the Dutch or from the interpreters. Not only did most physicians not read or speak Dutch, they possessed no knowledge of Dutch grammar. When they began the translation, they controlled merely the 600 Dutch words that Ryôtaku Maeno had learned in Nagasaki. Sugita Gempaku, later described those days in his essay *Rangaku kotohajime* (Dawn of Western science in Japan). Remembering the beginning of translation project, he wrote :

We conferred and discussed together how to approach the translation and put into proper and intelligible Japanese. We thought it too difficult to attack the internal structure of the body at the incipient stage of our work. At the beginning of the book, there were illustrations of the full view of human body, front and back (Fig. 6). As we were familiar with all parts of the body's outside, we thought it would be simplest to match the signs on the illustrations with the explanatory notes, thus learning the names of the parts of the body. At any rate, these were the first of the illustrations—and we decided to begin with them. The result of this work was the compilation of the volume called *Atlas and nomenclature of the human body* (*Keitai-meimokuhen*) or *New book of anatomy* (*Kaitai shinsho*). It was just as a small boat being launched into the great ocean.<sup>7</sup>

Gempaku and Ryôtaku translated the Dutch edition of 1734, which consisted of illustrations and tables of their explanation. The illustrations contained marks and short explanations. When the two started translating, they assumed that the word written after each mark was the name of the organ or part indicated by the mark in the illustration. For instance, when they saw the mark A written at the illustration of head, and the word *hoofd* written next to the A, they assumed that *hoofd* was the Dutch word for head, and they integrated it into their own Dutch–Japanese dictionary. Often they encountered such words as *zinnen* (sense), a notion that eluded their comprehension. Struggling with these unintelligible words, they coined new words such as *ishiki* for *zinnen*.

In the introduction to *Kaitai shinsho*, the authors explained the three methods of translation they employed for handling complex technical terms. The first was the “translation” technique—adopting appropriate corresponding words already existing in Japanese. For example, the Dutch word *beendered* can

## 20 T W E E D E

A. *Caput*, het Hoofd, is de opperste lighheid. (Zie de VI. Taf.) Hier toe worden gerekent

a. *Calva, pars capillata*, het met haar bezette deel. Aan 't zelve is

1. *Sinciput, Bregma*, het Opperhoofd, van vooren boven 't Voorhoofd.

2. *Occiput*, het Agterhoofd, strekkende van de kruin des hoofts tot aan den nek.

3. *Tempora*, de slaapen, naast de Ooren voorwaards.

4. *Ver-*

voorens weet, welke inwendige deelen onder deeze of greene plaatzen gelegen zyn. Inzonderheid dient deeze benaaming en uiterlyke verdeling des lighaams de schilders en beeldhouwers om de evenreedigheid tusschen alle de deelen des lighaams daar naar te schikken. Van zoodaanige goede gesteltenisse van alle de leeden heeft de beroemde *Abrechts Durer*, een Duitscher van geboorte, een goed landmeter en voortreffelyk meester in de schilderkunst, een verstandigen uitvoerig traktaat geschreven, 't welk byna in alle taalen is overgezet, waar in hy de evenreedigheid (*proportio*) der deelen, die te noemen zyn, naar hunne langte, hoogte, en breedte door een regten diameter afdeelt. De Physiognomisten

en Chiromantisten (gezig-en handkenners) willen mede uit de evenreedigheid der uiterlyke leeden, inzonderheid uit de rimpelen van het Voorhoofd, en de trekken in de handen (waar aan zy byzondere namen en kragten toe eigenen) eenig nut trekken, voorgewende, dat zy daar uit der stervelingen geluk en ongeluk, hunne gemoedsneigingen tot deugden of ondeugden, &c kunnen voorzeggen; gelyk zy ook uit de trekken en vlekken des aangezichts en der zelve onderlinge afftand en overeenkomst de verhoole moederlyke quaalen, zoo ontrent der zelve gedaante, als grootte, meenen te kunnen bepalen. Doch die gehele voorzeggung rufft op zeer onzekere giiffingen, en bestaat alleen in loutere herrfenschimmen.

## T A F E L 21

4. *Vertex*, de Kruin of de top des hoofds, alwaar zig de hairen verspreiden.

b. *Facies*, het Aangezigt. Omtrent het zelve is aan te merken

5. *Frons*, het Voorhoofd. Het zelve is in bejaarden rimpelagtig; tusschen de wynbrauwen glad of haarloos.

6. *Nasus*, de Neus. Des zelfs deelen zullen in de XI. Taf. beschreven worden.

7. *Oculi*, de Oogen, met de oogleden en winkbrauwen; zie de IX. Taf.

8. *Genae*, de Wangen. Opgeblaazende zynde hieten zy *buccae*, kaaken.

9. *Os*, de Mond, met de Lippen (Taf. VII. Het groefje aan de bovenste Lip hiet *Pbiltrum*, *Lacuna*: de twee zyden van 't voornoemde groefje worden genoemd *Myfices*, de Knevels.

10. *Aures*, de Ooren, welker deelen in de X. Taf. zullen verdoond worden.

11. *Mentum*, de Kin: des zelfs groefje hiet *Galafinum*.

c. *Collum*, de Hals, is dat smalle langachtige deel, waar op het Hoofd rufft, en waar aan men vint

12. *Jugulum, Guttur*, de Keel, zynde het voorste deel van den Hals,

B 3 wel-

Fig. 6 Text of *Ontleedkundige Tafelen*

be translated as *hone* (bone). The second method involved generating new meanings for extant Japanese words in cases where no corresponding concept existed in Japanese. For example, *kraakbeen* was translated as *nankotsu* (cartilage). *Kraak* means the sound of mice biting cups. The cup is soft, that is why mice can bite. So *kraakbeen* must be softer than ordinary bones, hence the name *nankotsu*, which literally means soft bone. Up to that time, the word *nankotsu* had only described fragile or weak people. The third technique employed direct phonetic transcription. For example, in the case of the Dutch word *klier* (gland), there existed no corresponding concept in Japanese, so the translators adopted the Dutch pronunciation and created a new word *kiriru*, adopting suitable Chinese characters to represent the sound. Even today, we see many such convenient transcriptions, but in *Kaitai shinsho* there are only a few. In the chapter for tissue, they decided that they should write the original Latin words, so they transliterated them while attempting to append translations where

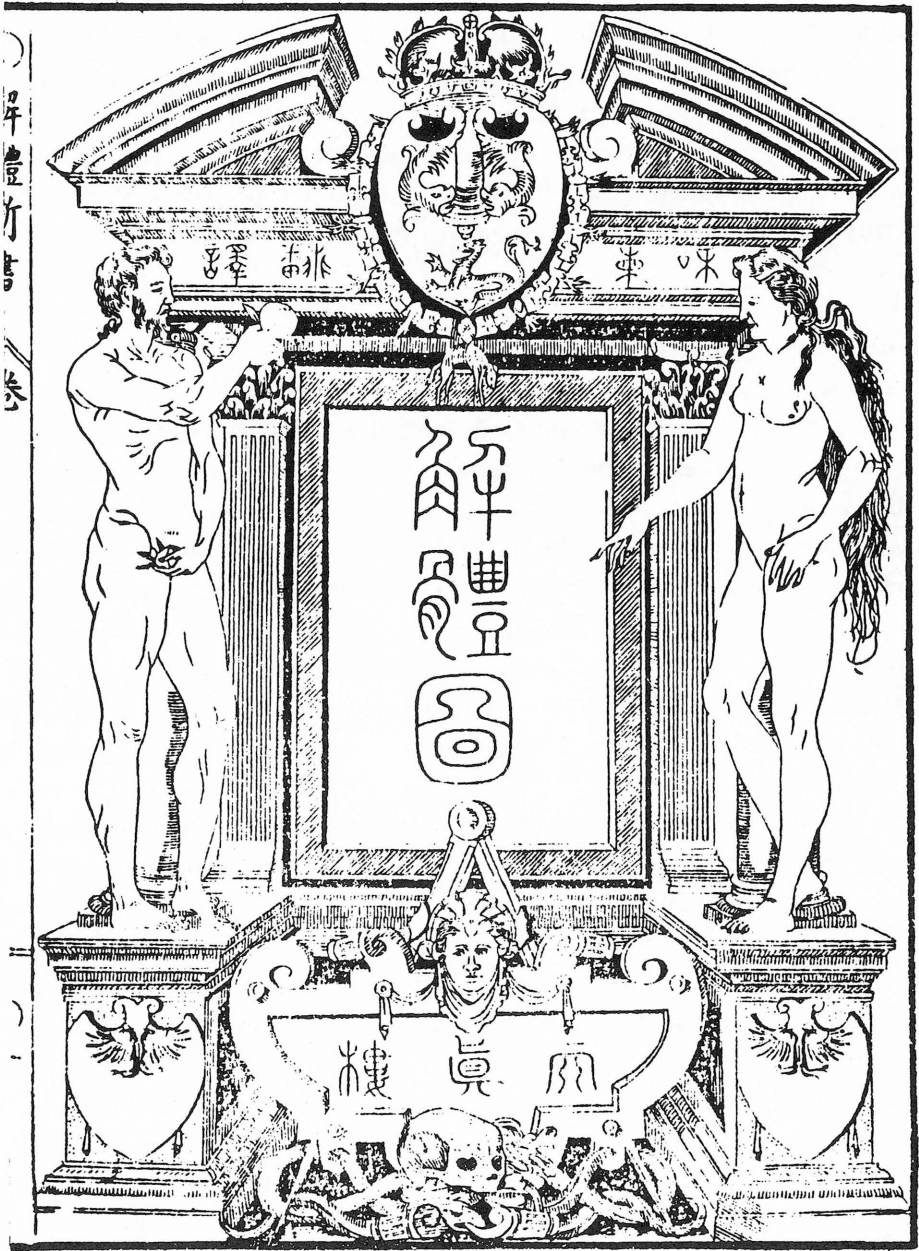


Fig. 7 A title page of *Kaitai Shinsho*

possible.

The translation of tangible objects was relatively easy. However, adjectives and the description of functions presented a formidable challenge. Understanding medical concepts that were completely unrelated to traditional Chinese ideas about the body was especially difficult. Since they possessed no knowledge of physics, moreover, translating the sections that explained the function of the eyes and ears from optical and acoustic points of view proved terribly complex. Whenever they encountered words they could not translate, they made notes of them and then checked a dissected cadaver. After three years of struggling in this way, they completed and published the translation in the summer of 1774 (Fig. 7).

### **The contents of the translated book**

The introduction of Chinese medicine to Japan was textual in nature. In other words, Japan learned about China's medical tradition not through contact with people, but largely through books. This pattern—the diffusion of new ideas textually and not orally—is typical of Japan's encounter with foreign ideas. The Japanese have consistently tried to understand foreign culture without going abroad, or without the guidance of those who had fully mastered the original medicine. One result of such an approach is that much tacit knowledge is often entirely missing, and the translation of professional books is conducted by amateurs. This method of transplantation had been practiced since Japan assimilated Chinese medicine. The translation work of Sugita Gempaku's group followed in this tradition.

Gempaku and his colleagues referred to eleven other foreign medical texts in the process of translating the Dutch document. They also consulted Chinese books on Western medicine. Still, despite these efforts, their work contains a number of mistranslations. For instance, the modern historian Satō Shōsuke has shown how the translation of sentences describing organs, such as the heart and the spleen, were based largely on the translators' imaginations and were thus incorrect.<sup>8</sup> The descriptions concerning the stomach, kidney, and bladder were translated fairly well. However, translating the functions of concepts unknown to Chinese medicine, such as nerve and brain, proved difficult. For example, the notion that the brain controls the entire body was an alien idea. Traditional theory stated that the heart controlled the body, and paid little attention to the brain. The notion of the brain's centrality in the body was thus bewildering. In the original book, a sentence reads: "The brain is the center of work of inner and outer perceptions," but the translation states, "center of consciousness". They translated "perception" as "consciousness".



Working their way through the text, the translators learned that light entered the eyes and formed images on the retina. Yet since they lacked the insights into the nature of light provided by physics, they wrote that people are able to see objects because, "Every thing that has form will pass through the iris, and then the pupil, is reflected in the vitreous body, and then reaches retina." Sensing that they had not captured the full mechanism of vision, they supplemented notes with the aid of Chinese science books.<sup>9</sup> Even so, their understanding conformed to Japanese conventions, and they were unable to convey precisely the meaning of the original text.

### The publication of *Kaitai shinsho*

After three years of labor, the translators neared completion. Since previous books on Western culture had all been banned, Sugita Gempaku went to great lengths to avoid that fate. For instance, when illustrations in the original book depicted a Christian cross, he substituted another symbol in its place, to avoid censorship. Before its publication, Gempaku produced a four-page brochure, *Kaitai yakuzu*, in order to test social response (Fig. 8). After publication, he first presented the book to government officials and related departments, noting

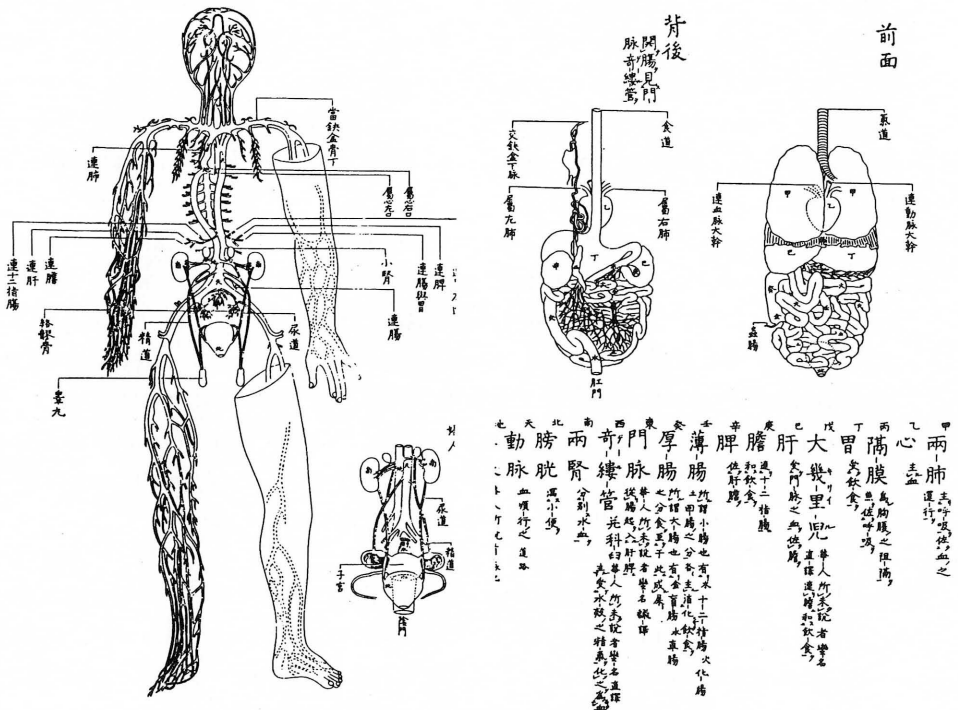


Fig. 8 *Kaitai Yakuzu*

carefully their reactions.

The success of *Kaitai shinsho* owes very much to the personality of Sugita Gempaku and the political savvy with which he oversaw its publication. If Maeno Ryôtaku had been asked to do this task, he likely would have failed. If translated works are not published and the translation languishes in storage, they lack historical meaning. This was the case in China. A book on anatomy was translated by missionaries in about 1720, but it was privately stored by the emperor, and remained unpublished.

### **The influence of *Kaitai shinsho***

The influence of the *Kaitai shinsho* was immeasurably greater than that of the *Oranda keiraku myakuraku kinmyaku zôfu zu* of 1682. The difference in their respective impacts can be traced to the different conditions under which the works were executed :

1. The translators of *Kaitai shinsho* were physicians themselves and the motivation for translation grew out of their personal interest.
2. Autopsies had been practiced prior to *Kaitai shinsho*, so the form and position of human organs could actually be observed.
3. Red-hair surgeons (Japanese who had studied medicine from Dutch surgeons) and other Japanese physicians who had read foreign medical texts since the latter half of the 17<sup>th</sup> century had begun to write about the different concepts of Western medicine, such as the nervous system, the circulation of blood, and muscles, though this knowledge had not circulated widely.
4. The main members of the translation group, Maeno Ryôtaku and Sugita Gempaku, possessed skills that aided in their translation. Ryôtaku, though not fluent, had learned some Dutch from Aoki Kon'yô, and had traveled to Nagasaki to learn Dutch from interpreters. Gempaku, as a surgeon, had gained some familiarity with Red-hair surgery.
5. Sugita Gempaku and his colleagues drew on eleven Western anatomy texts as references.<sup>10</sup> This suggests that quite a number of foreign medical books could be obtained on the market in the 18<sup>th</sup> century.

These facts indicate that the translators of *Kaitai shinsho* were much more familiar with Western medicine than those who translated *Oranda keiraku myakuraku kinmyaku zôfu zu*, and that they already possessed some confidence in the ideas presented in Western medical books. When they launched into the project of translation, they did so in the belief that their work would bring them

closer to the truth of the human body.

For readers without preliminary knowledge of Western medicine, reading and understanding *Kaitai shinsho* must have been difficult. Nevertheless, readers could easily see some of the fundamental differences between Western and traditional medicine. Because Western medical books were more lavishly illustrated and contained more detailed descriptions of the structure of the human body than Chinese texts, people came to view Western medicine as more precise and accurate than Chinese. In another words, the new medical texts suggested that Chinese medicine was wrong, and this triggered an inclination towards Western medicine.

In a country with a policy of isolation that prohibited people from traveling abroad for study, imported foreign books thus became the most important source of information. Modern Japanese science thus began with the translation of foreign books during the Edo period. It was Sugita Gempaku who tried to improve the quality of the translated texts that made up the core of so-called Dutch Learning. Meanwhile, in Nagasaki, interpreters who came into direct contact with the Dutch on the restricted island of Dejima undertook translations of Western works on natural history and astronomy, subjects different than those texts being translated in Edo.

### **The beginnings of Dutch learning and the assimilation of Western science**

Dutch Learning, in other words, grew up around a group seeking to acquire Western knowledge by translating Dutch texts. Ôtsuki Gentaku (1757–1827), a student of Sugita Gempaku and Maeno Ryôtaku, founded a school of Dutch learning where he taught Western medicine from translated texts and instructed beginners in translation techniques. Ôtsuki's early translation technique involved an original method that he developed when he had assisted in the translation of *Kaitai shinsho*. The technique involved translation with no knowledge of Dutch grammatical structure. Simply relying on the use of anatomy texts in Chinese and employing a Dutch–Japanese dictionary, he translated as best he could. More systematic study of Dutch came only after Baba Sajûrô (1787–1822), a professional interpreter from Nagasaki, joined the translation team in Edo. Dutch grammar was thus integrated into interpretation for the first time, and more efficient and accurate translation commenced. In this way, texts on basic sciences such as botany, physics, and chemistry were gradually translated, in addition to texts on applied sciences such as medicine, pharmacology, and astronomy.

However, more time would pass before Japanese translated Western works of literature and philosophy. Without question, the ban on Christianity played

a major role in this delay. But there was also the common perception that while the West was advanced technologically, in the realm of the spirit Chinese philosophy, especially Confucianism, was superior. The Edo government's official endorsement of Confucian teachings further influenced this lag in the translation of literature and thought.

The situation in Nagasaki was substantially different than that of Edo due to the presence of the Dutch, who conducted their business in Japan solely in that city. There the method of teaching translation, the profession of the Japanese interpreters, was already established in the 17<sup>th</sup> century. The area of activity of these interpreters was limited to a small island, but they were in daily contact with the Dutch and became involved in their business dealings. Their knowledge of the West was thus superior to that of most other people in Japan. And because of their deeper understanding of the West, their interests were much broader, encompassing astronomy and geography, and not just medicine. These translators were also active in translating materials on these so-called practical sciences.

At this time, the scholars of Dutch learning, including those in Edo, knew little about the development in Western science, and did not understand the structure of the natural sciences. Scientific texts were selected for translation on the basis of their perceived utility. This attitude of selecting only the practical sciences continued long after the Edo period.

One can glimpse the persistence of this attitude even during the Meiji period (1868–1912), which witnessed a complete shift in government medical policy from traditional to Western medicine. Consider the following anecdote. Edwin Baelz (1876–1905) spent twenty-five years teaching medicine at the Medical School of the University of Tokyo. In 1900, he delivered a speech at a special celebration in honor of his twenty-fifth year of service in Japan. Baelz stated that the Japanese ignored the long history of Western science, with its origins in Greece, and took no interest in the foundations of Western knowledge. He criticized Japan for taking only the fruit of modern science and for treating foreign teachers like himself as nothing more than sellers of harvested fruit. These words of Baelz strike modern Japanese as rather novel, perhaps because this attitude of receiving Western knowledge, which originated in the Edo period, still exists to some degree today.<sup>11</sup>

#### Notes

1. Iwano Seiichi, "On the development of European medicine in Japan during the 17<sup>th</sup> century, as recorded in the *Dagh-Registers of Dejima*" *Transactions of the Japan Academy* 26, 3 (1968): 157–

- 173 (in Japanese).
2. John Z. Bowers, *Medical education in Japan, from Chinese medicine to Western medicine* (Harper & Row Publishers, 1965), 4–5.
  3. Grant Kohn Goodman, *The Dutch impact on Japan (1640–1853)* (Leiden : E. J. Brill, 1967), 19–34.
  4. *Dagh-Registers of Dejima*, February 16, 1656.
  5. *In the wake of the Liefde, cultural relations between the Netherlands and Japan, since 1600* (Amsterdam : De. Bataafsche Leeuw, 1984), 102–103.
  6. Yamawaki Tōyō, *Zōshi* (A book of dissection) (1759) (in Japanese).
  7. Sugita Gempaku, *Dawn of Western science in Japan, "Rangaku Kotohajime"* (Hokuseido Press, 1969).
  8. Satō Shōsuke, *Kaitai Shinsho and revised Kaitai Shinsho Yōgakushi-ronkō* (A study on the history of Western science in Japan) (Shibunkaku Shuppan, 1993), 5–64.
  9. The Chinese science books are *Wuli xiaoshi* and *Mengxi bitan*.
  10. Gempaku refers to the works of Thomas Bartholin, Steven Blankaart, Caspar Bartholin, Volcher Coiter, Ambroise Paré, Johann Vesling, Jean Palfyn, Gerardus Blasius, Govert Bidloo, Juan Valverde de Hamusco, William Cowper.
  11. Toku Baelz, *Erwin Baelz, das Leben eines deutschen Arztes in erwachenden Japan* (22 November 1901) (J. Engelhorn Nacht, 1930), 118–122.