

Modern Japanese medical history and the European influence

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Abstract. Before the first European visited Japan in 1549, traditional Chinese medicine was mainly employed in Japan. Francisco de Xavier, a missionary of the Society of Jesus, tried to promote the introduction of Christianity by providing a medical service for Japanese citizens. However, Japan implemented a national isolation policy in 1639 and cut off diplomatic relations with the rest of the world, except Holland and China. For over 200 years, until the American admiral Matthew Perry forced Japan to open its doors in 1853, Japan learned about western medicine only from doctors of the Dutch merchants' office or from Dutch medical books. After 1853, Western medicine was rapidly introduced into Japan, and great achievements by Japanese medical doctors soon followed, such as the serum therapy for tetanus, the discovery of the plague and dysentery bacilli, the invention of Salvarsan for the treatment of syphilis, and the demonstration of the neurosyphilis spirochete. (*Keio J Med* 50 (2): 91–99, June 2001)

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Xavier's Visit to Japan and "Southern Barbarian Style Surgery"

The God of medicine in Europe is Asclepius, but the person honored as the founder of medicine is Hippocrates, who was born around 460 B.C. However, after Hippocrates and Galenus (130–201?), there was little development of medicine in Europe; such progress as there was, occurred in Arabia. Later, during the Renaissance in Europe, Andreas Vesalius (1514–1564) developed anatomy greatly. In the same period, Ambroise Paré (1510–1590) served as the chief surgeon for four French kings and left the saying, "I dressed him and God healed him (Je le pansay et Dieu le guarist)." Hospitals were being built in Europe in accordance with Christian teaching. These hospitals cared not only for acutely sick persons, but also for the poor or physically handicapped, and also the chronically sick. This was the background of the Europeans who came to Japan, where traditional Chinese medicine was mainly practiced.

Francisco de Xavier (1506–1552), a missionary of the Society of Jesus (Iezusu-Kai), visited Japan in 1549.

Obtaining the permission of the feudal lord of Satsuma, Shimazu, he engaged in missionary work in the western parts of Japan. According to the record of Nippon-Seikyo-Shi (History of Western Religion in Japan), Xavier nursed sick persons during his missionary work. In 1557 Macao was ceded to Portugal by the Chinese Ming dynasty as compensation for the subjugation of pirates, and Portugal used Macao as a base for trade with Japan.

Xavier had medical skill only at the nursing level. However, Luis de Almeida (1525–1583) brought the full scope of European medicine to Japan. Almeida came to Japan in 1555, and provided medical treatment to local people to encourage their conversion to Christianity. Almeida carried out medical treatment and surgery outdoors, partly because lighting was poor indoors, but also because he wished to avoid the rumor that southern barbarians (Nanban-Jin) sucked out people's lifeblood and ate human flesh. According to the recommendation of Almeida, Sourin Ohtomo (1530–1587), the feudal lord of Bungo, constructed a relief facility (a hospital, misericordia) in 1557 in the city of Oita. The surgery, which was done mainly by Spaniards

and Portugueses, was called “southern barbarian style surgery” (Nanban-Ryu-Geka). In comparison with the politically sensitive missionary work of the Society of Jesus, the Society of Francisco adopted an aggressively evangelistic approach. Hideyoshi Toyotomi (1536–1598), the Japanese ruler, became annoyed; in 1587 the fathers were deported (Bateren-Tsuihou) and in 1596, 26 missionaries were executed as martyrs.

“Red Hair Style Surgery” and Touyou Yamawaki

Formal diplomatic relations between Japan and Holland started in 1608, more than 50 years after the establishment of a western style hospital by Almeida. The policy of Japan in those days was strictly to prohibit Christian missionary work but to promote trade. The Spaniards and Portugueses were forced to retire from the entry-port (Dejima) in Nagasaki, because they propagated Christianity under cover of Christian medical treatment, and also because of their rumored intention to occupy Japan.

In this way, “southern barbarian style surgery” came to an end, and “red hair style surgery” (Koumou-Ryu-Geka) started on Nagasaki’s 13,000 m² entry-port island. Dutchmen were called “red hair persons” (Koumou-Jin) because of the color of their hair. Caspar Schamberger, a doctor of the Dutch merchants’ office, played an active part in the early stages, and his work was called “Caspar style surgery”. The import of medical books was prohibited by the national isolation policy (Sakoku-Rei) in 1639. However, Japanese doctors, who were eager to learn European medicine, wrote down what Dutch surgeons said, observed the operations and imitated them. During the 250 years of the Edo period about 100 Dutch doctors were stationed at the merchants’ office. Hoan Arashiyama (1633–1693) learned surgery from Dutchmen at Nagasaki’s entry-port island for 6 years from the age of 28, and wrote 6 volumes of “Learning Records of Red Hair Style Surgery (Koumou-Geka-Souden)”.

Touyou Yamawaki (1705–1762), a doctor who questioned the traditional Chinese concepts of anatomy, got hold of an anatomical textbook by Johan Vesling, published in Holland. In 1754 he observed the dismemberment of the corpse of a criminal in Kyoto, and was surprised at the accuracy of the textbook. Touyou Yamawaki could not understand Dutch, but he eventually published “Records of Dissection” (Zoushi) (Fig. 1) in 1759.

Cancellation of the Embargo on the Import of Dutch Books and Gempaku Sugita

The Shogun, Yoshimune Tokugawa (1684–1751), cancelled the embargo on the import of Dutch books

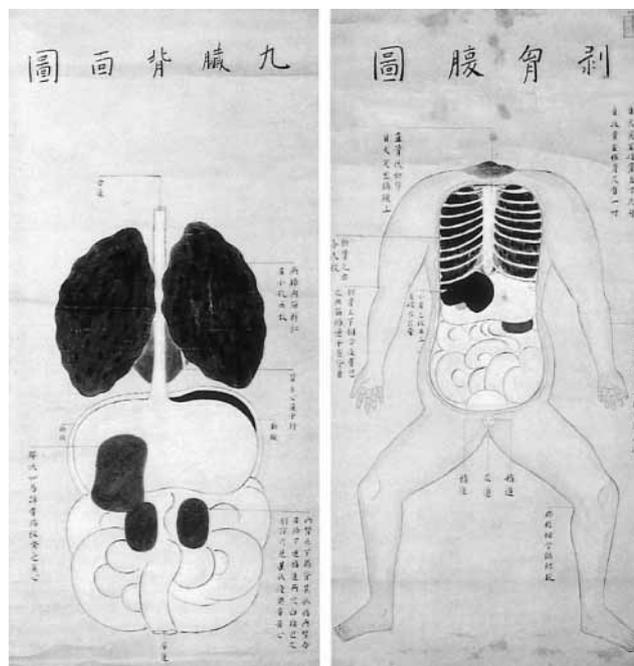


Fig. 1 Original figures of “Records of Dissection” (Zoushi) written by Touyou Yamawaki in 1759.

in 1720 (Bansho-Kaikin-Rei). Dutch studies (Rangaku) developed rapidly, and the famous “Kaitai-Shinsho” (New Textbook of Anatomy)” (Fig. 2) was published.

Gempaku Sugita (1733–1817) (Fig. 3) was a doctor of a feudal clan. Young Sugita wanted to take the best of Japanese, Chinese and Dutch medicine, and published “Accomplishment as a Surgeon” (Youka-Taisei). Later, he read “Tabula Anatomica”, a Dutch translation of an illustrated textbook of anatomy (1731 version) written by the German anatomist, Johan Kulumus. He observed the dismemberment of the corpse of a criminal in 1771, and, like Yamawaki before him, was astonished by the accuracy of the textbook. He then studied with Ryoutaku Maeno for four years, and finally published Kaitai-Shinsho.

Ryoutaku Maeno and Kaitai-Shinsho

Ryoutaku Maeno (1723–1803), who lost his parents in childhood, was brought up and educated by his uncle, Zentaku Miyata, a doctor of a feudal clan. His uncle’s precepts were (1) if you are doing only what other people are doing, you will stay fruitlessly behind them for your entire lifetime, and (2) any man worthy of the name should originate at least one thing and become a leader. At the age of 47, Ryoutaku became the pupil of Konyou Aoki (1698–1769), who was the Shogun’s book-magistrate (Bakufu-Shomotsu-Bugyo),

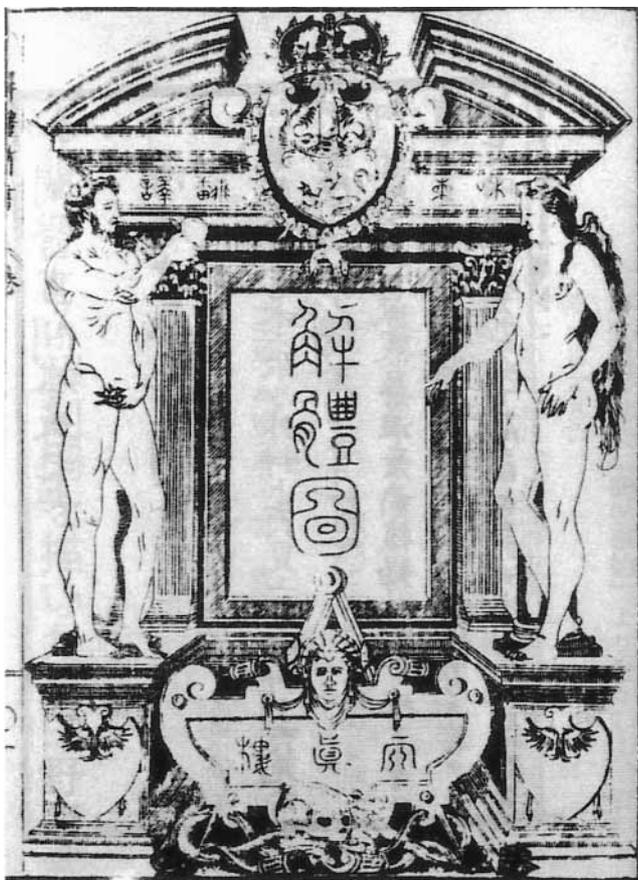


Fig. 2 Cover figure of “Kaitai-Shinsho” (New Textbook of Anatomy) in 1775.

and learned Dutch. Ryouroku Maeno followed the advice of his adoptive father by publishing *Kaitai-Shinsho*, which was an illustrated textbook of anatomy in classical Chinese writing. On the opening page of the *Kaitai-Shinsho* three names following Gempaku were listed, but the name of Ryouroku Maeno was not included, even though he had played the greatest role in its translation.

Gempaku, *et al.* found difficulty in the translation of Dutch words which had no Chinese equivalents. They translated cartilage as *Nankotsu*, nerve as *Shinkei*, the portal vein as *Monmyaku*, and so on, creating new Chinese words. A translation of pancreas was not made, and *Suizou* was named later by Genshin Udagawa (1769–1834). Gempaku described these painstaking efforts in his reminiscences “*Rangaku Kotohajime*” (*The Beginning of Dutch Studies*). *Rangaku Kotohajime* was reissued to commemorate the first general academic medical meeting in Japan in 1890, and Yuki-chi Fukuzawa (1835–1901) provided an introduction.

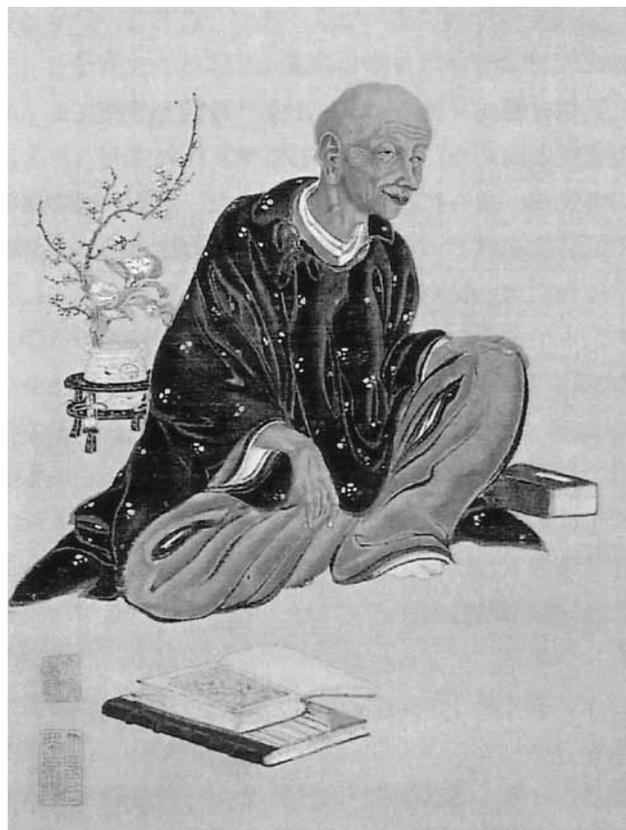


Fig. 3 Gempaku Sugita in 1812 (80 years old).

Seishu Hanaoka and Tusensan

In the era of Gempaku Sugita, a surgeon could only apply a plaster, suture a wound and lance an abscess. Seishu Hanaoka (1760–1835) (Fig. 4) developed surgery in Japan. He came to Kyoto at the age of 23, and learned old Japanese medicine and “Caspar style surgery”. Although Seishu himself could not understand Dutch, he combined Chinese and Dutch medicine and established “Hanaoka style surgery”. He used the names *Sakou* for aprocia and *Sain* for gynatresia. He performed operations for breast cancer, gangrene, hemorrhoids, and palatoschisis. He published a book “*Youka Hiroku*” (*Secret Notes for Surgery*). This was actually written by his pupils, based on notes of what he had said.

After 20 years of investigation, Seishu developed the anesthetic “*Tusensan*”, whose main ingredients are Korean morning glory and aconite. During this 20 years, his mother *Otugi* and his wife *Kae* devoted themselves to his research. His mother died without knowing of his success and his wife unfortunately lost her sight.



Fig. 4 Seishu Hanaoka (60 years old).

The first operation for breast cancer was on a 60-year-old woman named Kan. Since her sisters had died miserably of breast cancer, she asked for the operation without hesitation. The operation was performed on October 13, 1804, and Kan survived for 4 months afterwards, dying on February 26, 1805. In America, surgery to remove cervical neoplasm under ether anesthesia was first done by Morton at the Massachusetts General Hospital in 1846. Thus, Seishu invented and utilized an anesthetic 42 years earlier than the first use in America. However, it was not known to the world because of Japanese isolation policy and Seishu's secret.

Siebold and the Narutaki Cram School

Engelbert Kempfer (1651–1716), a doctor in the Dutch merchants' office, wrote "The Natural History of Japan" (Nippon-Shi), describing Japan as it was in the 18th century. In this book, there is a picture of Kempfer singing a love poem in front of the Shogun, Tsunayoshi (1646–1709), in Edo castle. Kempfer also introduced acupuncture and moxibustion in Japan.

Philipp von Siebold (1796–1866) (Fig. 5), a German ophthalmologist, stayed in Japan for six years from 1823. Siebold was born in a prestigious family in 1796; his grandfather, father and uncle were all medical professors. He had a wide knowledge of many subjects, such as natural history, ethnology, geography, history and language. Siebold had the title of surgeon lieutenant



Fig. 5 Siebold in his later years.

commander, but actually, he was given the task of general investigation of Japan by the Dutch government.

The reasons for Siebold's prominent place in Japanese medical history are (1) he had a great passion for Japan, and (2) there were already many scholars of Dutch studies in Japan who could translate even scientific books, because a half century had passed since the publication of *Kaitai-Shinsho*. Siebold opened the Narutaki Cram School (Narutaki-Juku) within a year after his arrival in Japan. A number of pupils studied Dutch there, and observed Siebold's clinical work.

Siebold performed vaccination against smallpox, bloodletting, abdominocentesis, tylectomy, surgery for cataract, optical iridectomy, etc. (Fig. 6). However, it is uncertain whether his school provided a systematic medical education or not. Siebold gave themes to his best pupils, and let them submit their graduation thesis in Dutch (*Dissertatio inauguralis*). From these Dutch papers Siebold gathered a wide range of information about Japan. Papers which Chouei Takano and Ryousai Kou submitted include "Japanese Diseases" (*Nippon-Shippeishi*), "The Outline of Moxibustion Method" (*Kyuhou-Ryakusetsu*) and "Questions and Answers on Japan Obstetrics" (*Nippon-Sanka-Mondou*). Siebold copied the university system in Germany and awarded a degree qualification (Doctor-Diplom), though it was purely a private one. However, most of his pupils



Fig. 6 Surgical equipment that Siebold used.

wished to gain this qualification, and struggled to write papers in Dutch on the themes given by Siebold.

The Siebold Affair and the Natural History of Japan

The staff of the Dutch merchants' office at Nagasaki's entry-port island were given an audience with the Shogun every five years. On the way to Edo, there were proposals of interview from many doctors and wealthy persons, and they offered huge presents to the staff. Also the staff could get much information from them. Genseki Habu (1768–1854), who was an ophthalmologist in the Shogunate, approached Siebold in order to learn the secret of the mydriasis agent, belladonna, which was mandatory for cataract operations. Siebold asked Genseki to get him some cloth bearing the mallow crest (Ai-No-Monpuku), which was the official cloth of the Shogunate, in exchange. Genseki did so, but the act was discovered, and this became known as the first Siebold Affair. Genseki received a heavy punishment, "deprivation", but he was pardoned later. In the Edo period, deprivation was a lighter punishment than Hara-Kiri (Seppuku), but heavier than house arrest (Chikkyo). Incidentally, Siebold's pupil, Ryousai Kou, had already described this mydriasis agent in the

translation "Ophthalmology Convenience" (Ganka-Binyou) and "Essentials of Ophthalmology" (Ganka-Hitsudoku), but Genseki did not know this.

Siebold later approached the Shogunate's geographer, Kageyasu Takahashi (1785–1829), and offered to exchange a world map for a map of Japan, which was a state secret. Kageyasu agreed to this proposal, but was found out, and this became known as the second Siebold Affair. Kageyasu died in prison. Siebold was sentenced to deportation and the map was seized, but Siebold had already sent copies to Holland. After this, the Narutaki Cram School closed and the pupils scattered.

After his return home, Siebold was considered Europe's top expert on Japan, and he wrote many books such as "Japan", "Japanese Plants (Flora Japonica)" and "Japanese Animals". Much of the information was based on the Dutch papers presented by Siebold's pupils. Siebold cooperated with the Russian emperor Nikolai, who was pressing Japan to open the country, and helped Nikolai to prepare the draft of a commercial treaty between Japan and Russia (Nichiro-Tsusho-Jouyaku). Also, he asked to accompany Matthew Perry's Japanese expedition, but Perry rejected this proposal because Siebold was under sentence of banishment in Japan. This was later lifted, and Siebold re-visited Japan in 1859.

Ryoujun Matsumoto and Pompe's Visit to Japan

Taizen Satou (1804–1872), a Dutch style surgeon, originally wished to become a pupil of Chouei Takano (1804–1850), who was a pupil of Siebold but was later imprisoned with Kazan Watanabe (1793–1841) under the Bansha-No-Goku (imprisonment of scholars for European studies). The request was refused, but Taizen Satou stayed in Nagasaki for three years to study. After returning to his hometown, he opened the Sakura Juntendo which was the first private hospital in Japan, offering smallpox vaccination and operations for ovarian cysts. Ryoujun Sato, who was the second son of Taizen, entered the family of Matsumoto (Shogunate's physician) as a son-in-law, and changed his name to Ryoujun Matsumoto (1832–1907). Taizen's successor was Shunkai Yamaguchi, who later changed his name to Shouchu Sato, and founded the Juntendo Clinic.

A warship was presented by Holland to the Shogunate in 1855. It was equipped with six big guns and the Shogunate named it "Kankou-Maru". Kaishu Katsu (Rintaro, 1823–1899), followed by dozens of the Shogunate's samurai, was sent to Nagasaki as the first naval student (Kaigun-Denshu-Sei). Two years later (1857), Kanrin-Maru, which the Shogunate had ordered to Holland, entered the port of Nagasaki. On this warship, a 28-year-old second-class military surgeon, Pompe van Meerdervoort (1829–1908) (Fig. 7) was embarked.



Fig. 7 Pompe in his youth.

Further naval students were recruited and Ryoujun Matsumoto was sent to Nagasaki.

Pompe's visit to Japan was the result of a special invitation by the Shogunate, and he became the surgeon of the navy teaching group. After taking up his new post Pompe immediately set about the preparation of medical lectures. Lectures on Western medicine were given at the western Nagasaki magistrate's office to dozens of students, including Ryoujun Matsumoto. In fact, Ryoujun Matsumoto was the only official medical student, and the other naval students were considered followers. As the number of students increased, a medical school (Igaku-Denshu-Jo) was established, and each feudal clan sent selected students. This was the forerunner of today's Nagasaki University Medical School.

During his term of office Pompe educated 350 surgeons and issued 133 graduation certificates. Medical education by Pompe was based on the idea of advancing to clinical medicine after thoroughly learning basic medicine, and in this respect, resembled modern edu-

cation. Pompe ordered a human body model "Kunstlijk" from Paris and used it to educate students. For anatomy education, Pompe himself conducted dissection and explained each part. Since the principle of excluding foreigners (Joui-Ron) was popular during this period, a foreigner's dissection of a Japanese body was considered outrageous. Therefore, the dissection was performed under a guard of 150 soldiers. The lectures were carefully programmed by making simple guidebooks in all subjects, distributing them to the students, and providing verbal explanations based on them. Most Japanese in the medical world in the Meiji era were pupils of Pompe, and many excellent doctors graduated from his medical school.

Nagasaki Recuperation Place and the Return Home of Pompe

The second important achievement of Pompe in Japan was the establishment of the Nagasaki recuperation place (Nagasaki-Youjou-Sho) which was the first Western style hospital in Japan. This was founded by the Shogunate in response to the request of the Dutch merchants' office and Pompe. The dimensions of this hospital were 25 meters east to west, and 8 meters north to south, with two-story Western style architecture in the shape of an H. It had 128 beds, of which about 70 were generally occupied.

Cholera was endemic in the whole country in 1858, and it was said that there were 260,000 deaths in the Edo area alone. Pompe predicted the outbreak of cholera in Japan based on information from Java, and suggested countermeasures to the Nagasaki magistrate's office (Nagasaki-Bugyo-Sho). Based on his report, the magistrate's office prohibited eating fresh foods and distributed a julep which was recommended by Pompe. This julep consisted of quinine and opium, and for this purpose, doctors bought the whole stock of quinine in Osaka.

Pompe returned to his home country in 1862 after 5 years in Japan. In 1863 the Shogunate sent six persons to study at Leiden in Holland for the first time. Ryoujun Matsumoto was advanced in rank from his Shogunate post to be the first surgeon general of the army, and was created a baron by the Meiji government.

Adoption of German Medicine and the Hiring of Foreigners to Assist Medical Education

When Pompe returned home, the Dutch government sent Anthonius Bauduin (1822–1885) as his successor. Bauduin had been a professor of Utrecht Army Surgeon School for 15 years. On the other hand, an English doctor William Willis (1837–1894) helped the Meiji government in the war of Bakumatsu restoration. It was

clear that Western medicine, especially surgery, was superior to the traditional Chinese-Kampo medicine in Japan. The new government wavered in choosing between the English medicine of Willis and the Dutch medicine of Bauduin. Finally, the government accepted the opinion of Guido Verbeck (1830–1898), a Dutch missionary, and decided to adopt German medicine in 1869. After that, medicine in Japan was predominantly German-influenced until the end of World War II. After the Meiji government had adopted German medicine, Willis went to Kagoshima and founded Kagoshima Medical School with the aid of Takamori Saigou (1827–1877).

Medical education by hired foreigners was started, and in 1871, Benjamin Müller (1822–1893), a surgeon of the German army, and Theodor Hoffmann (1837–1894), a specialist in internal medicine from the German navy, visited Japan. Also, the Tokyo University School of Medicine was established at the Kaga feudal clan mansion at Hongo in 1876. Erwin von Bölz (1849–1913) came to Japan in 1876 to take charge of internal medicine and obstetrics, and Julius Scriba (1848–1905) came in 1881 to take charge of surgery and dermatology.

In 1879 Tokyo University School of Medicine sent the best of its first graduate students to study in Germany. When they returned to Japan, they were successfully installed as professors in place of the foreign medical teachers. By 1903, all the professors of Tokyo University School of Medicine were Japanese, and the Japanese medical world had achieved independence. The continuation of traditional Chinese-Kampo medicine was prohibited in 1895 by the Diet.

Rintaro Mori and the Beriberi Argument

After his graduation from Tokyo Imperial University, Rintaro Mori (Ougai, 1862–1922) studied in Germany. After he returned to Japan, he became the army surgeon general. He is now remembered in the medical world for his mistaken advice about beriberi to the army. Beriberi was common mainly in cities, from the middle of the Edo era, and was called “Edo disease” or “Osaka swelling”. The 14th Shogun, Iemochi, died of beriberi. When Pompe and Bauduin examined these patients, they confirmed that the disease was “beriberi”, which is common in southeastern Asia, but not in Western countries. It is now known to be a deficiency disease of vitamin B₁ and causes muscle weakness, sensory disturbance and heart failure due to peripheral neuropathy. Vitamin B₁ is not contained in polished rice, but is contained in unpolished rice and wheat. Rintaro Mori insisted that a polished rice-based diet was excellent for soldiers from the viewpoint of nutrition. On the other hand, the navy adopted bread as a



Fig. 8 Shibasaburo Kitasato in 1892 (41 years old).

part of the diet on the advice of the navy surgeon general Kanehiro Takagi, and beriberi decreased sharply among naval personnel. However, the army entered the Russo-Japanese War without changing the diet at insistence of Rintaro Mori, the army surgeon general, and accordingly suffered severely from disease. It was after the Battle of Houten, the hardest land battle of the Russo-Japanese War, in 1905 that a rice and wheat mixed diet was adopted throughout the army.

Shibasaburo Kitasato and Koch

The 19th century was the time of the rise of microbiology. The true nature of infectious diseases was discovered by Louis Pasteur (1822–1895) in France and Robert Koch (1843–1910) in Germany, and there was great competition between nations to establish treatments. Shibasaburo Kitasato (Fig. 8) was the first Japanese to join the world leaders in medicine.

Kitasato graduated from the Tokyo University School of Medicine in 1883, and was sent to Germany to study in 1885, when he was 32 years old. Koch was astonished by the fluent German of Kitasato when he visited the Koch Research Institute. Kitasato was a committed student; he had never walked along any road except the one from his lodging to the research institute even after he had been in Berlin for a year.

Kitasato succeeded in the anaerobic cultivation of *Clostridium tetani*. Moreover, he discovered that the cause of tetanus is a toxin released by the bacteria, not the bacteria itself. Emil von Behring (1854–1917), who was working in the same institute as Kitasato, obtained a similar result with *Corynebacterium diphtheriae*, and these two investigators published a joint paper on serum therapy. They won high praise throughout the world, and Behring later won a Nobel prize. However, regrettably, Kitasato did not.

Kitasato originally planned to study abroad for three years, but this was extended to five years. In 1893, Cambridge University invited Kitasato to be president of a newly established research institute of microbiology. However, Kitasato declined the invitation, saying, “I have to go back to Japan and rescue my countrymen from illness and repay my obligation to the Emperor.”

However, unexpectedly, Japan did not welcome him. Tokyo University closed its gates, and the Ministry of Education, Science and Culture ignored Kitasato. Yukichi Fukuzawa at the Keio Gijuku founded a private infectious disease research institute, and Kitasato began to work there. The government granted a subsidy to this institute every year, but as the importance of research on infectious diseases grew, the institute became a national one under the Ministry of Domestic Affairs. Kitasato became head of the national research institute. When the school of medicine was established in 1920 in Keio Gijuku, Kitasato did not forget the help of Fukuzawa and became the first dean of the school of medicine.

In 1908 Koch visited Japan and stayed over 70 days. He gave a memorial lecture in the auditorium of Ueno Music School, at which Kitasato himself served as the interpreter. At the evening theater party, Ougai Mori undertook to translate the outline of the play. Koch fell in love with Japan and wanted to take a Japanese maid back to Germany. Kitasato asked a girl called Ohanasan to go to Germany, and she faithfully cared for Koch for two years until he died.

Kiyoshi Shiga and Ehrlich

Kiyoshi Shiga (1870–1957) discovered the dysentery bacillus in 1898, and studied abroad under Paul Ehrlich from 1901. Ehrlich (1854–1915) discovered passive immunity by serum injection and active immunity by toxin injection. Moreover, he discovered that toxins do not lose their immunogenicity even after they have lost their toxicity by heating, and he was awarded a Nobel prize in 1908. Many new dyes were being developed in Prussia, and Ehrlich suggested that Shiga should try the administration of these dyes to Trypanosomatidae. Hundreds of dyes were tested, and at last in 1904, Shiga

found that the dye Trypanrot had an anti-Trypanosomatidae effect. Ehrlich and Shiga described this method as dye therapy (Farbentherapie), and it can be regarded as the precursor of later techniques of chemotherapy.

Sahachiro Hata and Salvarsan

In 1908 Sahachiro Hata (1873–1938) went to study in Ehrlich’s own research laboratory. Hata examined the anti-spirochete effects of thousands of chemical compounds. *Treponema pallidum* had only been discovered in 1905, but as early as 1909, Hata discovered that compound No. 606 was effective against syphilis *Treponema pallidum*. This compound, arsphenamine, was put on sale under the name of Salvarsan in 1910. After that, Ehrlich in Germany and Hata in Japan worked to introduce and improve this new medicine.

In addition, Umetaro Suzuki (1874–1943), who had been studying the nutritional value of rice, solved the mechanism of beriberi, and succeeded in extracting oryzanin (vitamin B₁) from rice bran in 1910.

The Life of a Hero, Hideyo Noguchi

Hideyo Noguchi (1876–1928, Fig. 9) is more popular than Shibasaburo Kitasato, and more famous than Sahachiro Hata. Many biographies of him have been written and bronze statues of him can be seen in many places in Japan.

Noguchi was the son of a poor farmer in Aizu, and was born in 1876. At the age of one and a half years, he put his left hand into the fire by mistake and severely burned it. He went to Tokyo in 1896 and eventually graduated from the Saiseisha medical school. However, clinical activities were difficult with his damaged left hand. Therefore he specialized in microbiology. He entered Kitasato Research Institute of Infectious Diseases in 1898, but all the other staff were graduates of Tokyo University and Noguchi felt like an outsider. One day, an American researcher visited the institute. Noguchi got on well with him, and in 1899, the 23-year-old Noguchi got on board ship to America. He spent all his time working at the research laboratory, and people were always asking, “When does Noguchi sleep?” He became a director of the Rockefeller Research Institute as a result of his studies on snake venom and the syphilis spirochete. He succeeded in the demonstration of the existence of syphilis spirochetes in the cerebral tissue of a neurosyphilis patient, which is considered his greatest achievement.

In 1915, Noguchi returned to Japan. The Japanese victory in the Russo-Japanese War had led to the rise of nationalism, and Noguchi’s world-beating achievements made him a hero in Japan. However, when he visited America again, America was fighting with Spain, and



Fig. 9 Hideyo Noguchi in 1920 (44 years old).

more American soldiers died of yellow fever than in the war itself in Cuba. The pathogen of this disease is actually a virus which passes through bacterial filters, and it could not be seen with Noguchi's optical micro-

scope. So, Noguchi, looking for a new challenge, went to Accra in Africa, where yellow fever was endemic. This brought Noguchi's life to a close at the age of 53, because he himself got yellow fever. His last words were, "I don't understand." The following sentence was written on Noguchi's tombstone in New York.

THROUGH DEVOTION TO SCIENCE
HE LIVED AND DIED FOR HUMANITY

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