

An Aspect of C. P. Thunberg's Contribution to Medical Care in Japan

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I wish to talk about how Carl Peter Thunberg contributed to medical care in Japan.

He stayed in Japan as a medical doctor attached to the Dutch trading post at Dejima, Nagasaki, and accompanied the Dutch Ambassador to Edo to see the Shogun. He communicated with Japanese doctors and interpreters in Nagasaki, Kyoto and Edo.

Let me briefly review Thunberg's career as a medical doctor until he landed in Japan (Tab. 1).

He studied medicine and natural history from 1761 to 1770 at Uppsala University. At that time, natural history was an essential subject for those who studied medical science. The school of medicine at Uppsala University was developing and expanding when Thunberg studied there. After successfully defending his thesis in 1770, he obtained a scholarship to study in Paris, where he acquired professional skills in different medical fields such as surgery and obstetrics

in the Hotel Dieu and other medical institutions for about 8 months. In 1771, he arrived in Amsterdam, where he was hired by the Dutch East India Company after obtaining a surgeon's certificate. In June 1772, he obtained his doctorate in medicine from Uppsala University. In June 1775, he embarked on a ship for Japan from Batavia as principle surgeon and arrived in Nagasaki in August and stayed in Japan for about 16 months.

Thunberg is considered to have made a great contribution to medical care in Japan through his deep knowledge and clinical experience.

In his diaries (Fig. 1), Thunberg made various observations about medical care and doctors in Japan. He says that he taught European medicine and drugs to Japanese doctors and interpreters in Nagasaki, Kyoto and Edo.

In the section related to his stay at Edo, he says:

Table 1. Thunberg's career as a medical doctor until landing in Japan

1743	11. 11.	Born at Jönköping in Sweden.
1761		Entered Uppsala University and studied medicine
1762	6. 2.	Presented his dissertation "De venis absorbentibus" ("Lymph duct"), Medicine Licentiat
	6. 28.	Defended his doctoral thesis "De ischiade"
	12. 1.	Arrived in Paris and learned clinical medicine, surgery and obstetrics for about 8 months
1771	7. 18.	Left Paris for Amsterdam, where he was hired by the Dutch East India (D.E.I.) Company after obtaining a certificate of Chirurgie Magister
	12. 10.	Embarked on a D.E.I. Co. ship for the Cape of Good Hope as an extra surgeon
1772	6. 15.	Medical doctor
1775	3. 2.	Embarked on a D.E.I. Co. ship for Batavia as an extra surgeon
	6. 21.	Embarked on a D.E.I. Co. ship for Japan as principal surgeon
	8. 14.	Arrived at Nagasaki and stayed as a medical doctor attached to the Dutch Trading Post
1776	3. 4.	Departed Nagasaki to accompany the Dutch Ambassador to Edo to see the Shogun
	6. 30.	Returned to Dejima, Nagasaki
	12. 30.	Left Nagasaki for Batavia

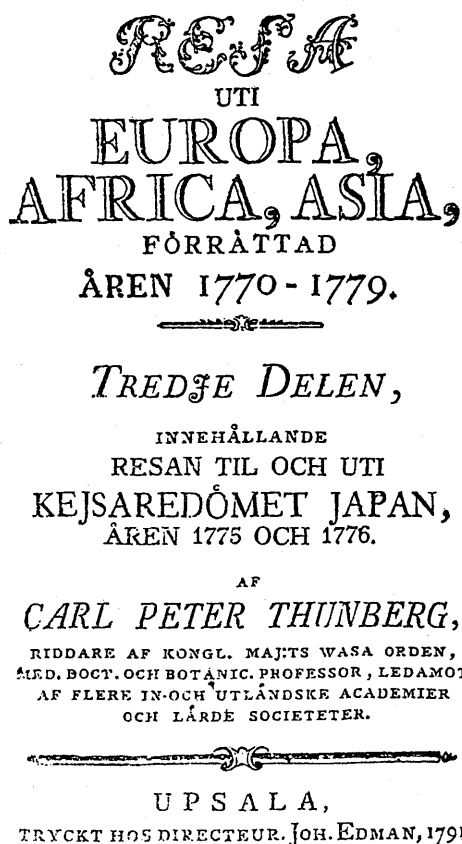


Fig. 1. Title page of Thunberg's "Resa", vol. 3 (1791).

"Before my departure my pupils requested from me a certificate with respect to the instructions I had given them, and the progress they had made. I therefore gave them one written in Dutch."

A copy of one of these certificates (Fig. 2) is now owned by the library of Kyoto University. According to it, Thunberg taught medicine, surgery, natural history, medical botany, pharmaceuticals, anatomy, and knowledge and treatment of internal and external diseases. It therefore appears that Thunberg gave his Japanese students a wide range of European medical and pharmaceutical knowledge. "Sige Sesjemon", who is named in this certificate, is Shige Setsuemon, an interpreter at Nagasaki. A letter from Shige Dennoshin, his son, to Thunberg is preserved in the library of Uppsala University.

One of the things Thunberg taught to Japanese doctors is mercury water therapy for syphilis, which was then a prevalent disease in Japan. In this paper, I wish to focus on this therapy.

Syphilis is believed to have been brought to Japan in 1512 from China. It appears to have spread across the entire country by the time Thunberg arrived in Japan in 1775. Thunberg enthusiastically taught Japanese doctors and interpreters the treatment developed in Europe. Let us review Thunberg's own records on this treatment.

There is a letter dated December 20th, 1776, addressed to Abraham Bäck (1713–1795), a Swedish doctor (Fig. 3). This letter, written on board 2 weeks after sailing out of Nagasaki for Batavia, relates Thunberg's fresh memories of Japan to Bäck. He says: "At present, venereal disease is very prevalent in Japan. So far, it has been treated only with medical decoctions. This year, I enthusiastically taught mercury water therapy for venereal disease to doctors in Edo and Kyoto and interpreters at the Dutch Trading post in Nagasaki. These interpreters treated a large number of patients in Nagasaki according to my teaching. The formula of this treatment is distilled water, mercurius sublimatus corrosivus and sugar or syrup." Bäck was a friend of Carl von Linné, and became rector of the Collegium Medicum in Stockholm in 1752. This letter is now owned by the Karolinska Institute.

Next is a speech entitled "Tal, om Japanska Nationen", or "Speech on the Japanese Nation" he delivered in 1784 to commemorate his retirement from the chairmanship of the Royal Swedish Academy of Science (Fig. 4), a function he assumed after returning to Sweden. He says: "In addition to diseases commonly seen in other countries, venereal disease is particularly prevalent in the Japanese Islands. They have had no treatment other than decoctions used to clean blood. They appear to have learned something about salivation therapy from Dutch surgeons, but

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Fig. 2. A copy of one of the certificates which Thunberg gave his Japanese pupils in 1776 (preserved in Kyoto University).

they have not been able to use it correctly or give appropriate instructions to patients. They accepted the mercury water therapy I taught them with great thanks and pleasure. I am very pleased to be the first man who taught it to them. Several interpreters already used this therapy in 1775 and 1776. They successfully treated a large number of patients from Nagasaki and other towns under my guidance."

Similar statements are found in volume 3 (1791) related to Edo and volume 4 (1793) related to Japanese doctors in Thunberg's diaries.

As we have seen above, there were two treatments for syphilis: salivation therapy and mercury water. Let me briefly describe these therapies.

Salivation therapy consists in giving a mercury preparation, a salivation stimulator, until patients salivate. At present, we know that salivation is a symptom of mercury intoxication, but the objective of this therapy was to wash out pathogenic materials

from the body system by salivation. The more profusely patients salivate, the more effective the treatment was regarded to be. It is not surprising that such therapy aggravated the disease or killed patients. Opposed to this therapy, there was a theory that mercury was not necessary in such high doses as to cause salivation. One thesis presented at Montpellier, France, in 1718, proposed to "substitute the rubbing-in by a judicious treatment of the mouth cavity as soon as salivation shows signs of commencing." Another was presented in the 1750's by van Swieten, a Dutch professor at the faculty of Wien University, who developed after years of effort an improved method, which uses an oral solution of mercurius sublimatus corrosivus, or mercuric chloride. The treatment method taught by Thunberg in Japan is this method developed by van Swieten.

Eisho Yoshio, one of the interpreters who learned this therapy from Thunberg in Nagasaki, mentioned

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Fig. 3. Thunberg's letter to Abraham Bäck dated Dec. 20, 1776 (preserved in Karolinska Institute).

this solution in his book "Kohmoh Hijiki 紅毛秘事記" or "Secret Stories about Western Medicine." Let me present some records left about it by Japanese (Fig. 5).
 Eisho Yoshio (1724–1800, Fig. 6), an interpreter with the pseudonym of Kohgyu. While serving as an interpreter for 53 years in Nagasaki starting in 1737, he learned medicine from medical doctors attached to

the Dutch trading post at Dejima, and was famous as a master of Dutch medicine. He had many pupils from various regions in Japan. He wrote the preface for "Kaitai Shinsho 解体新書", the first full translation of an European textbook in anatomy, and translated several European medical textbooks. Thunberg mentions Yoshio in his diaries as his friend the interpreter



Fig. 4. Title page of Thunberg's "Tal, om Japanska nationen" (1784).

Kosak.

In "Kohmoh Hijiki", Yoshio mentions that mercury water was developed after years of efforts by van Swieten of Leiden, who sympathized with many patients died due to various drugs, that van Swieten tried it in 4,800 patients and he found it very effective, that it spread across Japan after being taught by Thunberg to Japanese doctors in Nagasaki, and that Yoshio Kosaku, Yoshio Sakujiroh and Shige Setsuemon used it according to Thunberg's instructions and "Materia Chirurgica", a reference book on drugs in surgery.

Yoshio indicates the formula used by van Swieten which includes 96 sen of water, 0.0999 sen of mercuric chloride and 1 sen of syrup. He says that it should usually be administered twice or 3 times a day up to 4 sen 3 times a day in the morning, noon and evening, or 12 sen per day and that the dosage should be adjusted according to the age and symptoms of individual patients. One sen equals 3.75g, consequently mercury water in "Kohmoh Hijiki" contains 360g of water, 0.375g of mercuric chloride, and 3.75g of

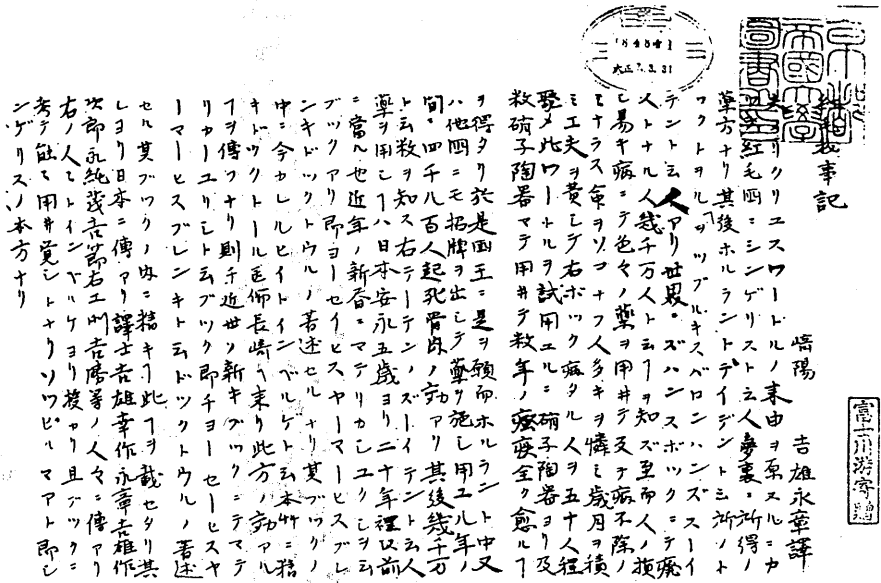


Fig. 5. The first and second pages of Yoshio's "Kohmoh Hijiki".

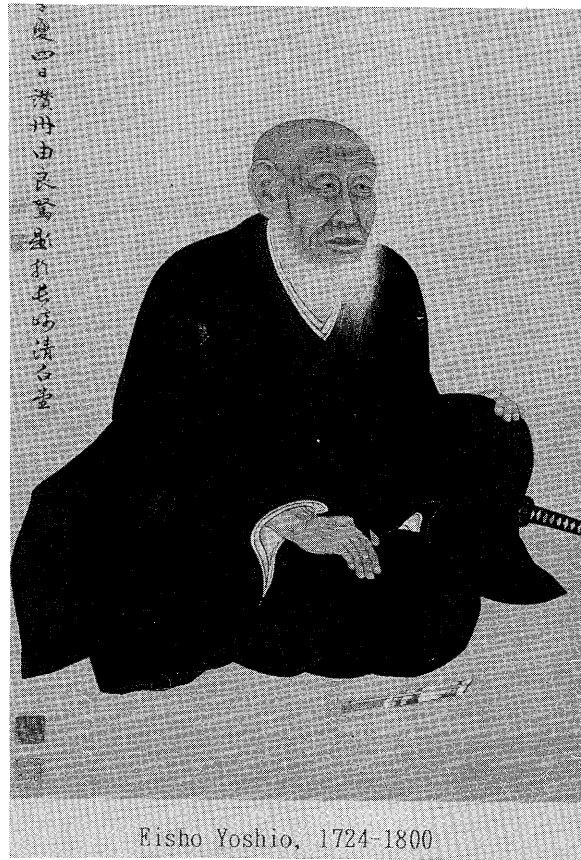


Fig. 6. A picture of Eisho Yoshio.

syrup. Therefore this formula is equivalent to a 0.103% solution of mercuric chloride, and one dose of 15g contains 0.0155g of mercuric chloride. The daily dosage of 30g and 45g contains 0.031g and 0.0465g of mercuric chloride, respectively (Tab. 2).

Now let me review the original formula of mercury water used by van Swieten in the 1750's and the background of its development.

Gerard van Swieten (1700–1772), a medical doctor and pharmacist born in Leiden, Holland, studied for 20 years under Hermann Boerhaave (1668–1738) and was invited by the queen of Austria, Maria Theresa as her court physician. In 1748, he reorganized the faculty of medicine of Wien University and established a clinical teaching method based on ob-

servation. He also introduced clinical research on drugs into Wien. He clinically studied various drugs for about 20 years starting in 1754, one of which was this mercury water called later by his name, van Swieten liquid.

He first learned about it in 1742 in a letter from Ribeira Sanchez (1699–1783), a Russian imperial physician, in 1742 and tried it in his patients for 12 years. He decreased the dose of mercury and used it in an oral dosage form which makes it possible to accurately determine and control the mercury dose. In 1754, he published this formula after confirming that it does not cause excessive salivation or any other unforeseen symptoms in 128 patients in St. Mark's hospital. It rapidly spread throughout Europe thereaf-

Table 2. The formula of mercury water in "Kohmoh Hijiki"

ワートル	96銭	Water	96	sen	360	g
メルクリウス	9厘9毛9	Mercuric chloride (HgCl ₂)	0.0999	sen	0.3746	g
メルリス	1銭	Syrup	1	sen	3.75	g

1 sen = 3.75 g

0.103% solution of HgCl₂

	Solution	HgCl ₂
One dose	15 g	0.0155 g
Daily dosage	×2	30 g
	×3	45 g
		0.0310 g
		0.0465 g

ter. During 1754 to 1761, the formula was tried on 4,880 patients in St. Mark's hospital.

All these facts indicate that van Swieten carefully determined the optimal dose of his formula paying close attention to its safety in clinical trials in a large

number of patients.

Now, let us see the dosage and administration method of the van Swieten mercury water. Van Swieten indicated his formula in his letter to a physician in Rotterdam in 1755 (Fig. 7). According to that letter,

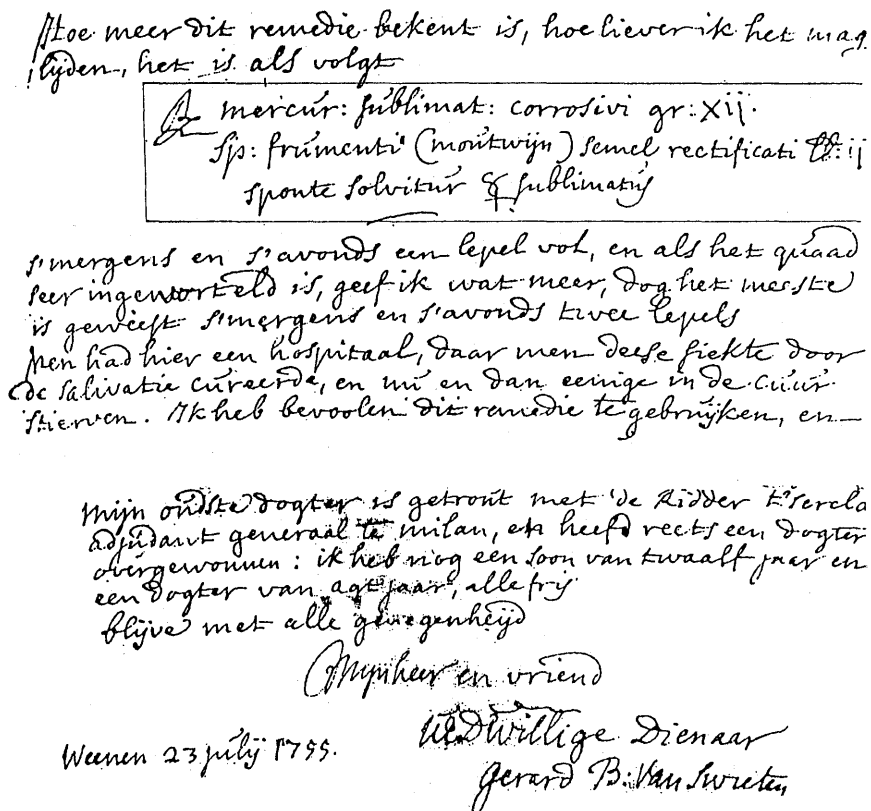


Fig. 7. Gerard van Swieten's letter of July 23, 1755 (preserved in Medical History Institute of Wien University).

Table 3. The formula used by van Swieten

Rx. Mercur. sublimat. corrosivi. gr. xij.	12 grains	0.778 g
Sp. frumenti (malt wine) ℞. ij.	2 pounds	746.58 g
Sponte solvitur ʒ. sublimatus		

A tablespoonful (15.00) to be administrated morning and evening.

0.104% solution of HgCl₂

	Solution	HgCl ₂	Maximum dose
One dose	15 g	0.0156 g	0.0312 g
Daily dosage	30 g	0.0312 g	0.0624 g

12 grains, or 0.778g of mercurius sublimatus corrosivus was dissolved in 2 pounds, or 746.48g of purified malt wine and one tablespoonful, or 15g of the solution obtained was administered in the morning and evening. The dose could be increased up to twice this dose, if necessary. This solution corresponds to a 0.104% solution of mercuric chloride, and one dose, or 15g, contains 0.0156g of mercuric chloride, or 0.0312g per day (Tab. 3). This original formula is very similar to the formula in “Kohmoh Hijiki” indicating that the therapy was very accurately introduced into Japan by Thunberg.

The exact date when “Kohmoh Hijiki” was written is unknown, but it is believed that Yoshio wrote it while Thunberg was still in Japan or shortly after his departure. Books published in 1806 and 1808, which describe how mercuric chloride is prepared, specifically state that Yoshio used mercuric chloride water as an oral drug. Furthermore, Toki (Tohjun) Murakami wrote in 1808 in his book “Baisoh Hiroku Bekki 徽瘡秘録別記”, “Secret Stories about Syphilis”: “Sublimate corrosive is a Western drug. It has recently been used by so many people, that whenever called water drug, it means this mercury solution. It is very effective for persistent symptoms of syphilis” (Fig. 8). This indicates that this drug had spread widely across the country by that time.

It seems to have been widely used in European and other countries for a long time. The original formula developed by van Swieten was modified subsequently by its user, so that the mercuric chloride concentration was 0.1% in distilled water and alcohol. Later on, alcohol was excluded from the solvent and only distilled water was used to dissolve mercuric chloride. In fact, it was listed in the Pharmacopoeias of different countries as van Swieten Liquid until the 1930’s.

The author sent a questionnaire about this drug to countries where the literature indicates that it was listed in the Pharmacopoeia. The Table 4 shows countries from which answers were obtained. This indicates that van Swieten Liquid was commonly used for the treatment of syphilis in various countries until Salvarsan, an arsenic drug, was developed and came into common use.

Dr. Johan Almkvist, former professor of syphilology at the Karolinska Institute, described in his thesis that van Swieten Liquid with reduced mercury content represented true progress in syphilis therapy at that time. Thunberg regarded highly this safer formulation, which delivers an optimal dose of mercuric chloride, enthusiastically introduced it into Japan and was very satisfied about being the first to teach it to the Japanese. He made his efforts just at a time when Japanese interest in Western medicine was

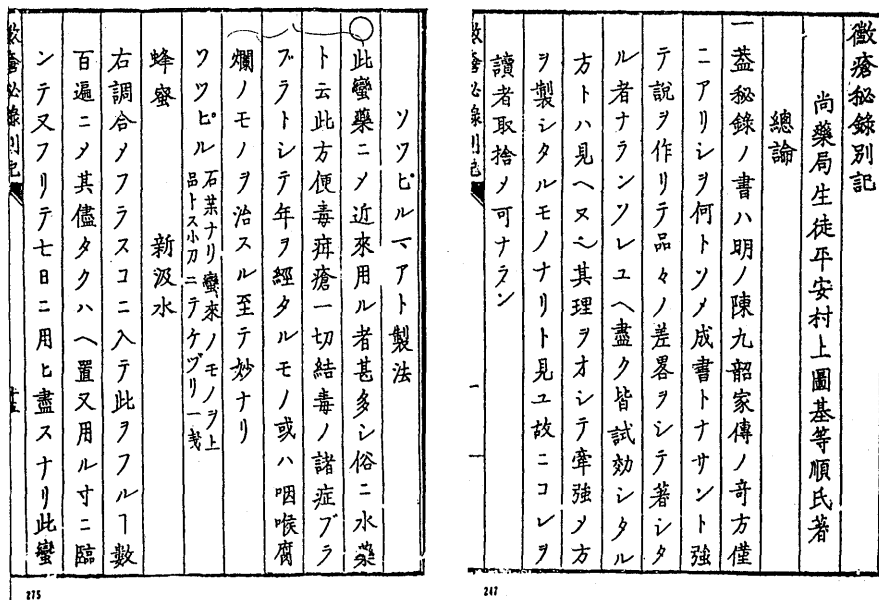


Fig. 8. The first page of “Baisoh Hiroku Bekki” and the page containing the chapter about mercuric chloride solution. (Facsimile of 1980).

Table 4. Van Swieten liquid listed in Pharmacopoeias

Country	Years of Publication				
France	1837	1866	1884*	1908*	1937*
Spain		1865	1884	1908	1930
Portugal	1835		1876		1935
Belgium		1854	1885	1906	1930*
Argentina				1898	1928*

*HgCl₂ and water.

increasing rapidly following the publication of “Kaitai Shinsho”. This, coupled with its great utility, helped the drug spread rapidly in Japan via the doctors and interpreters who came into contact with Thunberg and their pupils.

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