

Timeline of Events related to Elekiteru by Gennai Hiraga	
Year	What
1770	Gennai Hiraga obtained an imported broken Elekiteru device in Nagasaki.
1776	The first Elekiteru device by Gennai Hiraga
1780	Gennai Hiraga passed away
1782	Hashimoto Soukichi (橋本 宗吉, 1763-1836) borrowed an Elekiteru device for his experimentation. This was described in his books written in 1811 (see the entry of 1811 in this table about his books.) Whether this was Gennai's or not is unclear. However, had Gennai not popularized Elekiteru in his life time by his own Japanese-made versions and his many demonstrations, Hashimoto would not have been able to find an Elekiteru to play with in the first place. https://ja.wikipedia.org/wiki/%E6%A9%8B%E6%9C%AC%E5%AE%97%E5%90%89
1785	A description of spectacle using Elekiteru in a big plaza in Nagoya The device was demonstrated as Dutch medical device. English translation of an excerpt from [8]. In the August 1785 entry of the diary of Tadanobu Kouriki (高力種信, a man of literature and art,1756-1831), he described an entertainment using an Elekiteru in front of the Osu Gate in Nagoya. It is described as a “Dutch medical treatment tool, a device that uses medicinal power to perform a variety of healing operations,” and that it can move paper-craft of dolls and sailboats, and other objects, and can also produce fire from persimmons and eggplants as well as human bodies. But it does not mention the internal structure of Elekiteru in front of the Osu Gate. This was from an entry in August of a diary, 『猿猴庵日記』 (Diary of an Enkoan) by Tanenobu Kouriki (高力種信), 猿猴庵 (Enkoan) was his alias as a painter, whose works include the portraits of many events in Nagoya area. Proposers' note: We do not know if the device was made by Gennai. But the interest in Elekiteru certainly grew very much to the point that a public spectacle involving elekiteru was held in a city like Nagoya.
1787	Detailed description of internal diagram of Elekiteru device [4] This appeared in the reference [4], Guide to Dutch studies ("紅毛雜話" in Japanese) published in 1787 by Chūryō Morishima (森島中良, 1756? - 1810). See Appendix IV for English excerpt. Note that the author, Chūryō Morishima, of the reference [4] is a disciple of Gennai Hiraga in the field of literature. So it was no wonder that the description was detailed enough to build a new Elekiteru device. Also, Chūryō Morishima is said to have reverse-engineered a broken Elekiteru device made by Gennai Hiraga after his death. (See the entry of 1814 in this table.) So the description of an Elekiteru device is very detailed and accurate. (But the reverse engineering may have happened after the publication of [4]. Considering the secrecy exercised by many, the proposers are tempted to think that the reverse engineering took place before the publication of [4] in 1787. That is, Gennai Hiraga may have hidden the manufacturing of Elekiteru even to Chūryō Morishima pretty much.)
1788	A recollection of an important demonstration of Elekiteru by Gennai to influential merchant, the Mitsui. The demonstration was done as medical device in Gennai's lifetime. (『鳩溪実記』 卷之三, Kyukei Jikki volume III by an unknown author) English Excerpt from [8]. "(...)" is proposers' note.:

	<p>This is a posthumous account of Gennai (whose painter's pen name was 鳩溪) and his demonstration of the Elekiteru written in 1788 by an unknown author. In the article, titled "Gennai entertained Mitsui," (Mitsui being the very rich merchant of that time) the following is written: "This is a tool to take fire from the human body. If a person with a headache or a fever gets fire removed from his body, he will recover instantly. As the potter's wheel is turned, the gold thread and the gold tongue are rubbed together, and after a while, fire comes out from the tip of the bamboo tube, just like candlelight, but it is blue fire. The people, including Mitsui of course, were all impressed by this truly strange tool.</p> <p>Proposers' note: Being able to demonstrate Elekiteru to a rich merchant, Mitsui family, was only possible for someone like Gennai, whose other talents in natural history had made him a favorite of rich merchants and ruling samurai class VIPs who wanted to promote regional agriculture and mining. Such demonstrations popularized elekiteru in Japan very quickly.</p>
ca. 1789	<p>Documented case of reverse engineering of a Gennai's Elekiteru device</p> <p>This is documented in a story published in 1814. See the entry in 1814 for details. Note that Ch ūryō Morishima, author of the reference [4] was involved in this effort. After the reverse engineering, someone involved in the effort was reported to produce 50-60 elekiterus on his own. Very impressive number. They certainly helped the popularization of elekiterus in Japan..</p>
1798	<p>A figure of Elekiteru demonstration in a sightseeing guide. [17]</p> <p>This is the Illustration-3 in this application. The elekiteru device became popular enough to be sold at a curiosity shop and used to catch visitors' eyes.</p>
1799	<p>Volta's invention of battery</p> <p>This would diminish the importance of elekiteru device, a friction-induced static electricity generator for medical use, etc.</p>
pre-1811	<p>An elekiteru device reported in Soukichi Hashimoto book</p> <p>This Elekiteru is described in an unpublished book "阿蘭陀始制エレキテル究理原" (Treatise on the principle of the Dutch Elekiteru) by Soukichi Hashimoto (1763-1836) written in 1811. So the elekiteru described here existed prior to 1811.</p> <p>English translation of a passage from [8]: This diagram is a replica of one made by a man named Uchu Matsubara (松原 右仲, ???-???) . It was sketched during a trip to the Eastern capital (meaning Edo, i.e. today's Tokyo) by Hashimoto Soukichi (橋本宗吉). ... omission... If you look at it in the dark, it glows like fire..." The flask imported from Holland in this figure was a blue flask in the shape of a kinuta (砧, wooden club used for washing by hitting cloth). He also wrote that he used Kongo sand (possibly powder of garnet) to cut the mouth of the glass.</p> <p>Proposers' note: it is not entirely clear where Uchu Matsubara learned how to make Elekiteru, but Gennai's influence and [4] is likely. Hashimoto Soukichi seemed to have mimicked the design of elekiteru he used for experiments from this elekiteru device.</p>
1811	<p>Two treatises on elekiteru were written by Soukichi Hashimoto (橋本宗吉, 1763-1836)</p> <p>These were considered the first modern writings on static electricity in Japan due to the reason below. Note Gennai Hiraga himself was busy demonstrating the elekiteru devices to his VIP customers and did not leave writings on it in detail. Had he lived a few years longer, he might have done so.</p> <p>Soukichi Hashimoto described 30 experiments involving Elekiteru. Only two of them dealt with the medical use of Elekiteru devices. Others were done to investigate Elekiteru and electricity per se.</p>

He also tried to explain the manufacturing, principle, etc. of elekiteru devices based on the knowledge from then available Dutch books.: One is Dutch encyclopedia "Nieuw en Volkomen Woordenboek van Konsten en Wetenschappen" (1769-1778) edited by Egbert Buys, and the other is "Natuurkundig schoolboek" edited by Johannes Buijs.

Digital archive of the first is available at the following URL:

https://www.dbnl.org/tekst/buys003nieu00_01/

But the proposers could not find any reference to the second book in google search. We could only find the Japanese translation of the book at digital archive of a Japanese museum:

<https://www.edohakuarchives.jp/detail-31411.html>

It is said that Soukichi Hashimoto became interested in the study of Elekiteru seriously around 1809 when he was 40 years old. He had already toyed with Elekiteru borrowed from a certain Yamanaka in 1782.

(Japanese wiki:

<https://ja.wikipedia.org/wiki/%E6%A9%8B%E6%9C%AC%E5%AE%97%E5%90%89>)

Obviously, he knew the demonstrations of and read about elekiteru devices created by Gennai that were emulated and followed up by other researchers by then.

Hashimoto wrote two books:

“阿蘭陀始制エレキテル究理原” (tentative translation of the title, Principles of the Dutch Elekiteru), and 『エレキテル訳説』 (tentative translation of the title, Translated Elekiteru Theory). "Principles of the Dutch Elekiteru" described the thirty experiments of elekiteru, and was guided by the both Dutch books. Translated Elekiteru Theory was the translation of the entry of Elekiteru in Dutch encyclopedia. The permission to print "Principles of the Dutch Elekiteru" was eventually denied in 1813 and it never got published, and thus was handed down by transcript from the original. Since the transcript was misplaced, Hashimoto's work was half forgotten until it re-surfaced about a century later and became widely known in 1912. Proposers' note: Gennai Hiraga's influence on the work of Soukichi Hashimoto is very clear. Hashimoto would not have put his hands on an Elekiteru device in 1782, had Gennai not popularized it earlier. This alone shows the strong impact which the elekiteru device of Gennai Hiraga had on the researchers of static electricity in the late 18th and early 19th century Japan.

1814

Old Story of reverse-engineering of elekiteru device made by Gennai in Tenmei

The reference [8] relates this story.

Toward the end of Tenmei (天明) era (1781-1789), a broken elekiteru made by Gennai was acquired by Hoshū Katsuragawa IV (四代目 桂川甫周, 1751-1809) of the Katsuragawa family who served as the Tokugawa shogun's family physician. His disciple Kanko Takamori (高森観好, 1750-1831, who studied astronomy, physics, etc. via Dutch books) and Hoshū's brother Chūryō Morishima (森島中良, 1756?-1810) reverse-engineered it.

Chūryō Morishima is the author of the reference [4], Guide to Dutch studies, 1787 ("紅毛雑話" in Japanese), which describes the internal of an elekiteru device in detail. (We don't know if the reverse engineering took place before the publication of [4].)

Kanko Takamori is described as making 60-70 elekiterus (!) after the reverse engineering experience.

The original story appeared in Treatise on Elekiteru (野礼機の爾全書) by Horiguchi Tachu (?) (堀口多狆, ???-???, not much is known about this man), a disciple of Kanko Takamori.

Proposers comment: Obviously, the design of Elekiteru device got popularized by the drawing in reference [4] and by reverse engineering activities such as the one reported here. Gennai's Elekiteru devices were “delivered” to rich merchants and ruling samurai class VIP customers and thus they played a very large role in getting the static electricity generator all over Japan.

By the way, the name of 高森観好 seems to be misquoted in [8]. It is preceded by "笠森", but we think it is redundant and incorrect.

1817

A description of elekiteru in a book

The title of the book is 『蘭畹摘芳』, and is read as "Ran'en tekihō".

See digital archive of Kyoto University and its titles. (seven volumes).:

<https://rmda.kulib.kyoto-u.ac.jp/item/rb00008876#c=0&m=0&s=0&cv=0&r=0&xywh=-8451%2C-209%2C22517%2C4160>

It seems this book (in a series) was translated from various Dutch sources but never got published and thus its content was unfortunately not widely disseminated.

The book(s) were not mere translation. Japanese translators added their own knowledge. This is clear from the section about Elekiteru (referred to later).

Although the reference [8] is a bit confusing about this book (it says the book(s) were not published, and then say some of them were possibly published.), some books certainly seem to have been published.

See the existing copies of the seemingly published nicely bound book at Waseda University archive.: https://www.wul.waseda.ac.jp/kotenseki/html/bunko08/bunko08_a0031/index.html

Note that unlike the copy in Waseda University archive (which says three volumes), the one at Kyoto University (seven volumes) does seem manually bound. Its catalog entry also states that it is a transcribed copy. So it *IS* possible that some books did get published but many are transcript copies and kept personally, and the owners may have chosen to bind them as they pleased.

Setting the details of the perplexing publication state aside, the reference [8] explains the book as follows. "(...)"s are proposers' comments.

This book was published in the 14th year of Bunka (文化, 1817), translation by Bansui Otsuki (大槻磐水, 1757-1827, his alias is Gentaku Ohtsuki 大槻玄沢), edited by Genkan Otsuki (大槻玄幹, 1785-1838, the eldest son of Bansui Otsuki) and Saisuke Yamamura (山村才輔, 1770-1807), and written or orally recorded by Ryosuke Yoshikawa (吉川良祐, ???-???) and Sosen Hasegawa (長谷川宗僊 aka 長谷川宗仙, medical doctor, ???-???), and published by Suhara-ya Mohei (江戸の須原屋茂兵衛, a big publisher in then Tokyo, probably Mohei Suharaya, VII, 1776-1838,

<https://ja.wikipedia.org/wiki/%E9%A0%88%E5%8E%9F%E5%B1%8B%E8%8C%82%E5%85%B5%E8%A1%9B>) and Ihachi (伊八 ???-???) in Edo and Kawachiya Gisuke and

Tasuke in Osaka (大坂の河内屋義助・太助, presumably a big publisher in Osaka). The series was a treasure trove of knowledge on various fields of Dutch studies of the period, but because it was not published, or if it was published, it was in 漢文 (Japanese style of Chinese), it was not widely referred to, even though it was excellent in terms of content.

The article in the section on “Elekiteru” clearly indicates in what season Elekiterus can cause sparks, as it says, “According to Hokuetsu Takamine Kouan (北越高峯幸庵, Hokuetsu/北越 means the northern part of 越/Etsu, the central area of Honshu island that faces the Sea of Japan, today's Niigata prefecture, Kouan Takamine/高峯幸庵 is the name of a scholar ???-???, and a disciple of Sugita Genpaku/ 杉田玄白, 1733-1817), when the instrument was tested, it did not cause sparks during the heat of late spring, but fire appeared during autumn, winter, and early spring...” However, it is regrettable that there is no illustration of the Elekiteru known to them.

Proposers' note: So it was reported that dry cool and cold season in Japan was suited for elekiteru experiments while the humid hot season was not suited. This is true in Japan today.

1820

Oersted's law

It seems that the Japanese were not aware of this until later.

1826

Ohm's Law

It seems that the Japanese were not aware of this until later.

1831	Faraday's discovery of electro-magnetic induction
	It seems that the Japanese were not aware of this until later.
1857	Elekiteru in a book, maybe its last glory as medical device
	<p>This probably is a last serious reference to Elekiteru as a viable device for medical use. It was mentioned in the first version of the book, 『内服同功』 (read as Naifuku Doukou) orally presented by Kuudo Ishizaka (石阪空洞, a medical doctor 1814-1899) and transcribed by his disciple, Teijun Yamada (山田貞順, ???-???).</p> <p>The book was intended to introduce then new Western medical treatments by then novel tools were as effective as traditional medicine in Japan (from China mostly). The second version of the book introduced the device based on a coil and Volta battery only four years after the mention of elekiteru in the first version. Obviously, the stable power of Volta battery was much easier to work with.</p> <p>English translation of a quote from [8]:</p> <p>One of them was the “Elekiteru method,” and a friction-induced static electricity generator type equipped with a Leyden jar was used. The Elekiteru was said to be useful for rheumatism, paralysis, deafness, dumbness, convulsions, nerve diseases, and other stubborn and persistent pains. The Elekiteru in this figure (omitted here, see [8] for the figure) has a Leyden jar and a tassel as an electric detector attached in the style of an elekiteru described in 紅毛雜話 (the reference [4] of this application).</p> <p>The other method was later described and it was a state-of-the-art "galvanic electrotherapy machine" described in 1860. It used coils and voltaic electrodes.</p> <p>Proposers' note: Reference [8] mentioned the appearance of "galvanic electrotherapy machine" in the book took place in 1860. But some other sources claim it was four years after the first version. (see. for example, https://www.kahaku.go.jp/exhibitions/vm/past_permanent/rikou/other/naihuku.html)</p> <p>The proposers think the subtle discrepancy is due to the original publication year recorded in then prevalent Japanese lunar calendar and not the Gregorian calendar.</p>
1865	Maxwell equations published
	It seems that the Japanese were not aware of this until later.
1877	The University of Tokyo. the first university in modern Japan, established