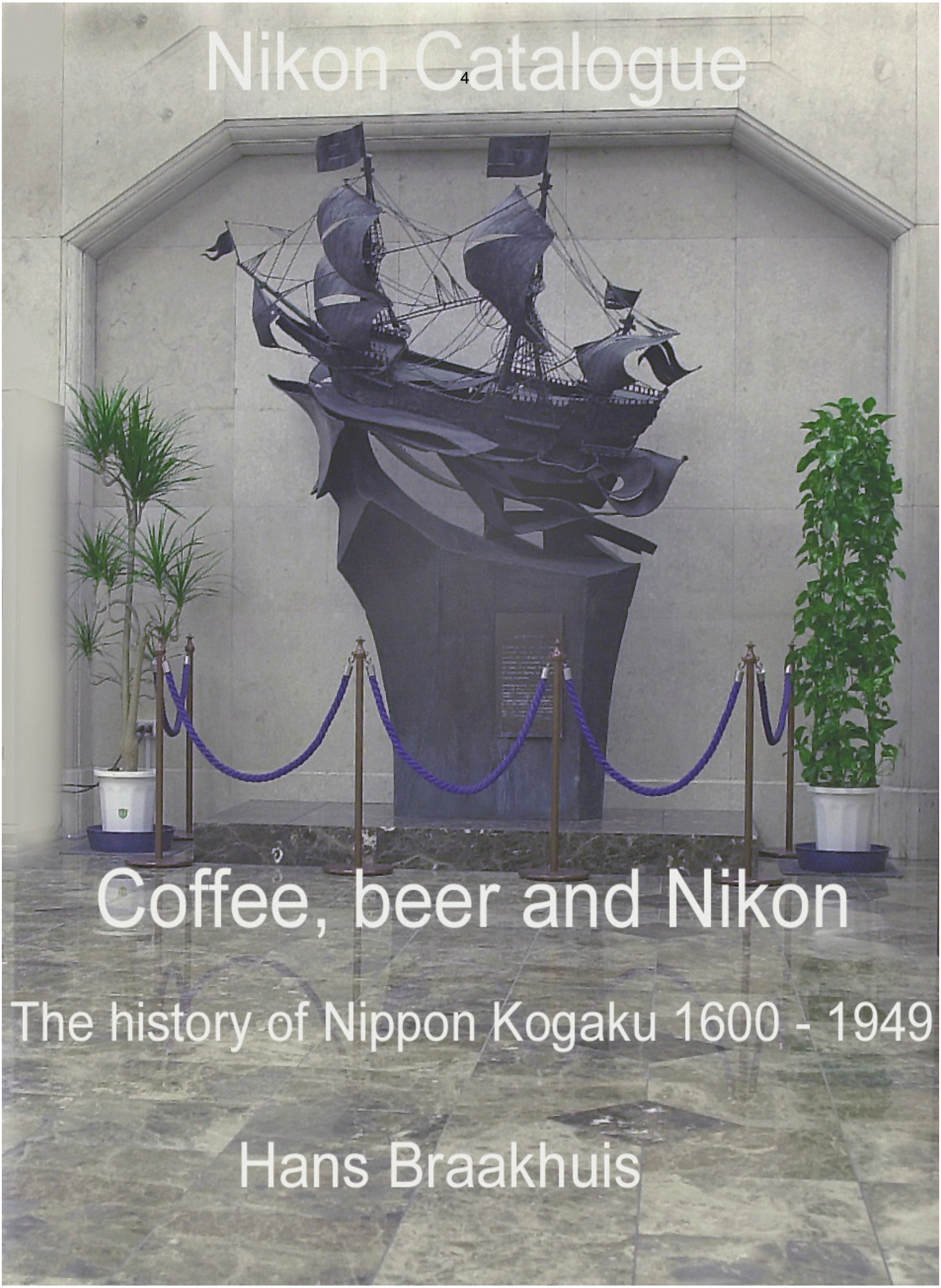
Nikon Catalogue



Coffee, beer and Nikon

The history of Nippon Kogaku 1600 - 1949

Hans Braakhuis

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The History of Nippon Kogaku 1600 - 1949

Coffee, beer and Nikon

for the Nikon Historical Society
9th Convention, at the JCII in Tokyo, Japan
February 22, 2004
updated 2014

for study only

Hans Braakhuis

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Front picture:

A statue of the Dutch V.O.C. vessel “De Liefde” at the entrance hall of the Mitsubishi Building.

but as bowing in the rain wasn’t their favourite daily pursuit, they placed it in the main hall

That particular fact is called to Mitsubishi board member’s minds nearly every day by passing, at the entrance of their main office in Tokyo, Japan, a statue of a model of the first Dutch merchant vessel visiting Japan in 1600, named ‘de Liefde’. Every morning, before going to their work, all officials are bowing in front of that monument. Until recently the monument had its place outside, but as bowing in the rain wasn’t their favourite daily pursuit, they placed it in the main hall.

1 Preface

The Nikon Historical Society's 9th convention was on February 22, 2004 in Tokyo, Japan. Its theme will be: 'Journey to Nikon's birthplace'. This gave me the opportunity to write a publication on the history of Nikon Corporation.

More than likely Nippon Kogaku's official place of birth is the office of Mr. Koyata Iwasaki, who was the fourth president of the Mitsubishi zaibatsu. At the turn of the year 1916 his address was close to the Tokyo Central Railway Station at Marunouchi 2-chome in the Chiyoda-ku district in Tokyo. The present main office of the Nikon Corporation is just one bloc away.
It was Mr. Koyata Iwasaki who took the decision of the merger of the three firms, which gave birth to Nippon Kogaku. And, above all, he raised the corporate starting capital.

Japanese-Dutch cooperation started already in 1600. Since 1635 the Netherlands was the only western country which was allowed to do business with Japan. That fact explains why all optical instruments were brought to Japan by the Dutch V.O.C. (Verenigde Oostindische Compagnie). The V.O.C. also exported Dutch inventions, like the binocular and the microscope, as well as European pre-industrial era products. The V.O.C. wasn't actually focussed on exporting Dutch products but just in doing business.
The Dutch and European industrial developments were of great importance to Japan. Many telescopes, range finders and clocks were sold to Japan. It took a merchant vessel two years to sail to and from Japan. The Japanese were very interested in lots of new products of those tall people with red hair and big noses. For Japanese the Dutch and the Britons are lookalike.

There are a lot of Dutch mysteries in Japan. I cannot explain why the Japanese and the Dutch are the only people on earth who favour raw fish. Neither can I explain why the Japanese and the Dutch are the only ones who can make drinkable coffee and beer. (Update: later I learned that the Belgians can make much better beers)

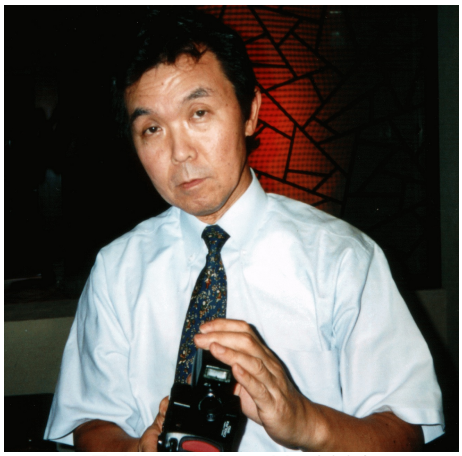
Nowadays only three things in Japan remind us of the Dutch: coffee, beer and Nikon.
In this publication I will explain why the Japanese do have such a wonderful coffee and beer. As a proof I would like to invite one of convention visitors to taste a bottle of this Dutch beer. The Dutch brewery was founded around 1340 and still uses the original recipe. The Japanese brand 'Kirin" with the "Original' beer, is still using an original recipe, too. It is up to the taster to determine differences between the two beers.

Since its foundation Nikon is a division or the Mitsubishi group. I've paid most attention to the history of the Mitsubishi group and some important divisions. The oldest division of the Mitsubishi group is, however, a forge and workplace founded by the Dutch. Without the Dutch neither Mitsubishi nor Nikon would probably even exist. That particular fact is called to Mitsubishi board member's minds nearly every day by passing, at the entrance of their main office, a statue of a model of the first Dutch merchant vessel visiting Japan in 1600, named 'de Liefde'.
Every morning, before going to their work, all officials are bowing in front of that monument. Until recently the monument had its place outside, but as bowing in the rain wasn't their favourite daily pursuit, they placed it in the main hall.

The birth of Nippon Kogaku was a decision of time. That time had some historical, cultural and political aspects. If you'll understand these aspects, than you'll know how Nippon Kogaku was born.

Nippon Kogaku was founded during the first World War at the Japanese army's request. I've made a description of the role of the army and, particularly, the navy in Nippon Kogaku's history.
From various periodicals, like the NHS Journal, many books and also museums, like the local JCII Museum, and other informative sources I've tried to list as many Nippon Kogaku products as possible. The 25- 40- 50- and 75-years anniversary books, published by Nikon Corporation, were of great help. Being unfamiliar with the Japanese language and customs is, however, a handicap. I probably could have listed more products in the overview of the 1885-1949 period. I am waiting for the moment that the Nikon Corporation translate these important documents.
Because not all authors authorized me to quote them and to make use of their materials this publication is limited. On the basis of international copyrights this publication may be used for non-profit and study purposes only.
In this publication one may read two different opinions on the same subject. Quotations of all authors may be found in the appendix.

Finally: I've tried to do my best. It's the first time I've published a text in English, but, moreover, it's the first text ever on the history of Nippon Kogaku in English. Herewith I invite everybody present today to help me to improve this historical survey.



Takayuki Kawai in 2001

Nico van Dijk and Hans Braakhuis

It is obvious that I cannot receive all credits of this work. Many friends assisted me in my research and writing.

In particular I like to mention Nico van Dijk, a professional journalist, board member of the Nikon Club Nederland and editor of its quarterly Magazine and Nikon collector, who did a lot of research and the final editing of the entire text. Particularly chapters 4, 5 and 6 (partial) have been written by him. See also NHS Journal 71 for an article he wrote.

A substantial contribution came from Jeff Alexander [1].

Also thanks to Yoshio Inokuchi, who is working at the JCII Camera Museum.

Thanks for translating some Japanese texts: Wybe Kuitert and Noriko Nakamura.

Others contributors are:

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Peter Lownds and Hans Braakhuis

Akito Tamla in 1996

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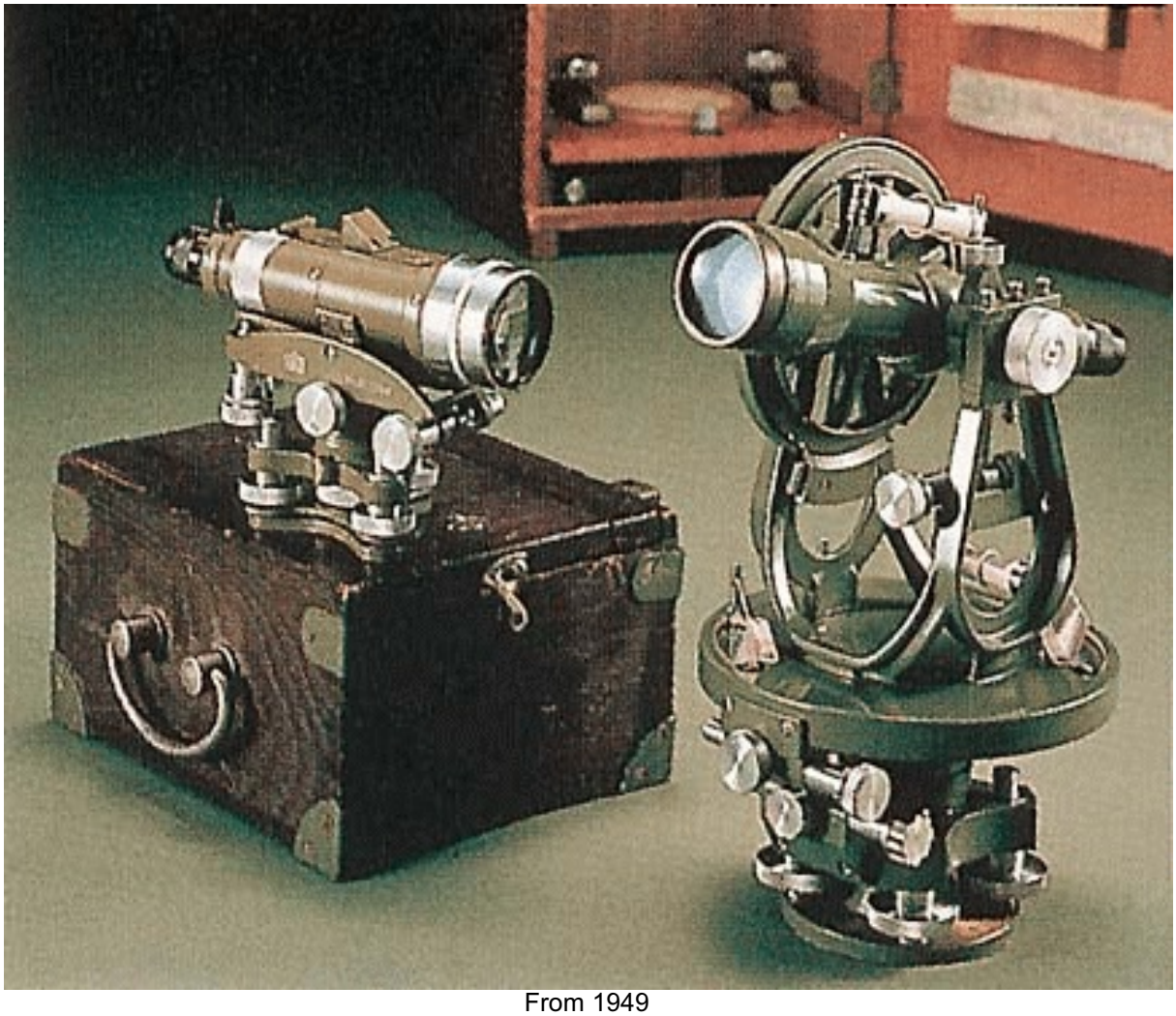
A complete list of used texts is to be found at the endnotes and in the Justification chapter.

Corrections or additions are invited.



From 1949

2 History of Japan in brief

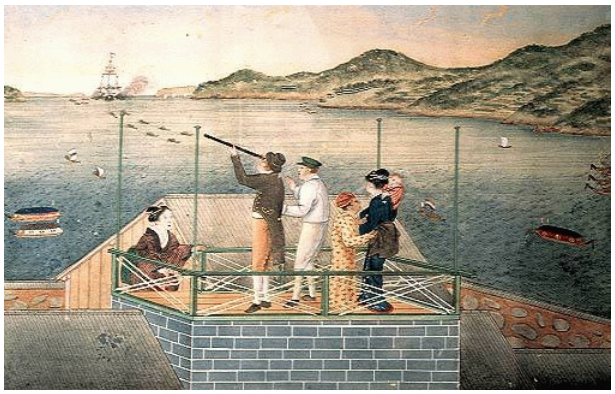
This time line [2] of the Japanese history is completed with some optical and other dates.

"40,000 BC Stone age in Aichi and Tochigi.
14,500 BC Jomon hunting and gathering society.
551-479 BC Start of Confucianism.
239 Chinese kingdom of Wei records the visit of an envoy from Himiko, queen of Yamatai.
400 Use of the Chinese character for writing.
500 Start of Buddhism.
700-900 Japan under influence of Chinese culture and politics.
710 Nara becomes the capital of Japan.
794 Kyoto becomes the capital of Japan.
1274 Mongol invasion.
1281 Second Mongol invasion.
1542 Firearms introduced by shipwrecked Portugese.
1549 Francisco de Xavier lands at Kagoshima to promote Christianity.
1585 Dirck Gerritsz on board a Portuguese ship is the first Hollander to visit the country.
1592 Hideyoshi sends army to Korea.
1600 First Dutch merchant boat "De Liefde" arrives at Nagasaki [3].
1603 Tokugawa Shogunate divides people into hereditary classes: lords (daimyo), samurai, farmers, artisans, merchants.
1603 Most of the Dutch merchants merge to one company: the United East-Indies Company (V.O.C.) It was allowed to erect offices, houses and cargo stores at Deshima, an small island in the Nagasaki harbor.
1614 Christianity banned.
1635 Interaction with foreigners restricted to Nagasaki.
1641 All foreigners, except Chinese, Korean and Dutch, are banned.
1720 Yoshimune removed the ban on Western learning. In 1736, he ordered the importation and eventual translation of Dutch astronomical literature.
1853 Commodore Matthew Perry steams into Edo (Tokyo) Bay and demands trade.
1868 End of the Shogun-Bakafu-System. Restoration of imperial rule (Meiji Restoration 1868 - 1912); Tokyo becomes capital.
1894-5 War with China.
1904-5 War with Russia.
1910 Annexation of Korea.
1911 During the civil war in China after the Chinese Revolution this country was in chaos. Japan occupied lands north of the Chinese wall.
1914 Start of World War I. Japan joined the allied forces against Germany and therefore it could occupy Shantung and all other islands north of the equator colonised by the German.
1927 The Chinese, by general Tsjang Kai Tsjek, re-occupied some of their countries.
1931 Japanese army invade Manchuria".
1941 Japanese army attacks Pearl Harbor.

This time line shows that Japan has been invaded by other countries several times. That's why the Japanese opened and closed their doors for foreigners several times in their history. By the way, the Chinese are also foreigners for them. And China, almost next door, is a large country with many inhabitants. So keep your door well closed.

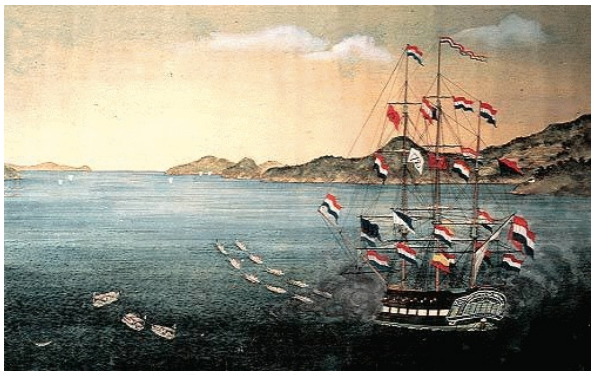
From the sixth century up to the end of the sixteenth, Japan was strongly influenced by China. Buddhism, the script, technology and the arts, all derived from the mainland. Yet over the course of time all these attainments acquired a specifically Japanese character.

The first Europeans - the Portuguese - first arrived in Japan in 1543, during a period of civil wars. In 1600 national unity was restored, but shortly after this, interference on the part of Catholics once more endangered the country's political balance. As a result Japan was formally closed to the outside world in 1639. The only diplomatic contacts were with China, Korea and Ryukyu (Okinawa Islands), and the only western influence permitted came from the Dutch trading post of Deshima. Two centuries later, in 1854, The United States compelled Japan to open its doors to American merchandise. This ended a long period of peace and relative prosperity.


Dutch ship enters harbor

Living on a relatively small island, the Japanese knew that an successful industrialised country

need food, cole, iron, oil, etcetera. Colonisation was ‘not done’ anymore but annexation could be useful. Under emperor Mutsuhito (1867 - 1912) a political system was formed that gave all formal power to the emperor. But in fact the real power was given to the civil servants. These civil servants were highly influenced by the zaibatsu’s. Iwakura made a report in 1873 including a future outline of all sciences and for the use of these sciences from mining till medical treatment.



Dutch ship departs

In 1930 the Cherry Society was founded, which was a kind of a nationalist party. It believed in the emperor’s absolute power and was striving to end the Western influence in Japan. It asked for a military occupation of the northern Chinese province Manchuria. That was the place were most of the food, coal and iron came from. On September 18, 1931 the Japanese troops occupied, without an authorization of the Japanese government, the Chinese town Moukden and later entire Manchuria. After the Manchuria occupation all political parties in Japan were forbidden. All power came to civil servants who listened whatever the zaibatsu’s whispered in their ears.

By 1937 the production of industry and agriculture doubled. High benefits to the heavy industry increased the production of military goods. At the end of World War II Japanese influence was widened. If one take the Philippines as the centre and draw an circle starting from just above Australia it will include Dutch New Guinea, French Indo-China, Bangladesh, Beijing, Nanjing, Guangzhou, Shanghai in China and Manchuria.

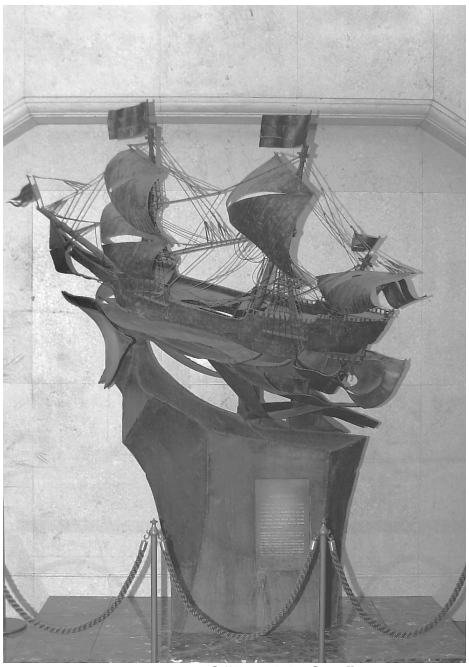
After the World War II the United States wanted Japan to become an allied force in their fight against communism. That’s why they spend a lot of money in starting up normal live in Japan. In 1951 the US spent $ 600 million, which was increased in 1953 to $ 800 million. US support to e.g. Burma ($ 200 million) and the Philippines ($ 550 million) was given under the condition that these countries should spend that money in buying Japanese goods.

3 Relations Japan - Holland

Probably the Portugese where the first foreign visitors to Japan. They where looking for an other route to America, but evidently got lost. The Portugese, who tried to sell goods and Christianity, passed the 'roadmap' to the Dutch who were just interested in trade. That's probably why the Dutch were allowed to stay.

3.1 Dutch influence in Japan

The life in Japan after the visit of the first Dutch merchant ship "De Liefde" is illustrated below [4].



statue of "De Liefde"

"In 1600, a Dutch ship called the Love (in Dutch, De Liefde) landed in Usuki Bay in Bungo Province (now Oita-ken [prefecture]). The arrival of the Liefde marked the beginning of relations between Japan and the Netherlands, which commemorate their 404th anniversary this year. The surviving crew of the Liefde included two people who went on to earn important places in Japanese history: William Adams and Jan Joosten van Lodensteyn.

Adams, an Englishman, was employed by a Dutch trading company to participate in the exploration of eastern trade routes. Upon his arrival in Japan, he met with Tokugawa Ieyasu, who was on the verge of establishing the Tokugawa shogunate, and became Ieyasu's advisor on diplomacy and trade. Adams was given a residence in Edo (now Tokyo), as well as lands in Hemi in Yokosuka, Kanagawa-ken that yielded 250 koku of rice a year (one koku equalled about 180 litres in the Edo period). Adopting the Japanese name Miura Anjin, he was granted the social rank of a samurai. A stone monument commemorating the site of Adams' residence still stands in the Nihonbashi district of Tokyo today. Anjincho is named after Adams. Also, the Anjin Festival is held every year in April in Hemi, where a memorial tower stands near the grave of Anjin's Japanese wife, Oyuki.

Jan Joosten van Lodensteyn became Tokugawa Ieyasu's advisor on military affairs, and reportedly taught Ieyasu how to use the cannons onboard of the Liefde. Like Adams, he was given a Japanese name (Yayosu) and a residence in Edo, close to Edo Castle (where the Imperial Palace stands today). A metal objet presented by the Dutch government and decorated with a likeness of the Liefde now marks the site where Joosten's residence once stood. Joosten's neighbourhood came to be called Yayosu, a name derived from Joosten's Japanese moniker, and that name survives today in a slightly modified form as Yaesu, the district on the eastern side of Tokyo Station [5].

In 1633, the Tokugawa shogunate adopted a policy of national isolation that continued until the signing of the Kanagawa Treaty 221 years later in 1854. During that time, Japan maintained contact with only three countries: China, Korea, and the Netherlands.

The Dutch were restricted to an artificial island called Deshima that was built in 1634 [6] by the shogunate in Nagasaki Harbor. This narrow pipeline provided the only access to "Western Learning" (or, as it was more commonly called during this period, rangaku, "Dutch Science"). The first area of interest to Japanese scholars was Western medicine.

In 1771, Genpaku Sugita, Ryotaku Maeno, and other Japanese physicians and scholars attended the dissection of a criminal's body at the Kotsukahara execution grounds in Edo. Comparing their observations with the Tafel Anatomia, a book of anatomical tables written in Dutch, they were deeply impressed by the accuracy of the work and immediately set about translating it into Japanese. In an era when no Dutch-Japanese dictionaries existed, they worked doggedly for three years, beginning with the names of body parts and extrapolating from there with the greatest of difficulty. In August 1774, they completed their five-volume magnum opus, Kaitai shinsho, thus initiating the era of Western Learning in Japan. The site in present-day Tokyo's Tsukiji district where Sugita and

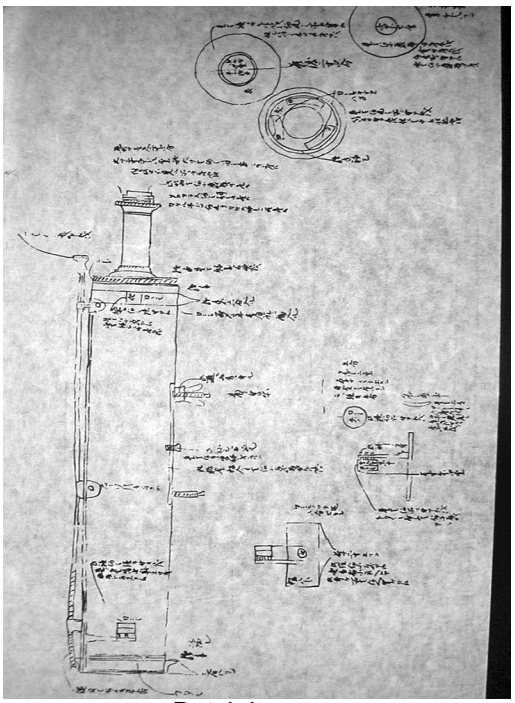
his colleagues worked is marked with monuments that identify it as the birthplace of Western Learning and Western medicine in Japan.


Deshima after Japanese woodblock 1780

Sugita's pioneering work was continued by others at various boarding schools dedicated to Western Learning, including Narutaki School (founded outside Nagasaki by the German / Dutch doctor Phillip Franz von Siebold), Teki School in Osaka, and Juntendo School in Chiba. Beginning in 1857, Japanese understanding of Western medicine was given a more orderly and systematic form by Johannes Lydius Catherinus Pompe van Meerdervoort, a Dutch naval medical officer who arrived in Japan aboard the Kanrin maru, a ship that the Tokugawa government had ordered from the Netherlands.

Medicine was not the only branch of Western Learning that captured the interest of the Japanese. By the end of the nineteenth century, they had assimilated an impressive body of knowledge in such fields as physics, chemistry, photography, astronomy, calendar studies, gunnery, castle construction and fortification, shipbuilding, navigation, and military science, and had built the foundations for Japan's modern navy and national defence.

There were three doctors employed at a Dutch trading post in Deshima who had a particularly strong impact on the relationship between Japan and the Netherlands: the Germans Engelbert Kaempfer and Phillip Franz von Siebold, and the Swede Carl Peter Thunberg. Kaempfer came to Japan early in the Edo period (1603-1867); Thunberg in the middle years; and Siebold near the end. Besides teaching medicine, all three taught natural history focussing on Japan's flora and fauna, and all three became well known in Europe for their work in disseminating their knowledge of things Japanese, including its plants and animals, among their countrymen. Siebold's written works, including Japan, Fauna Japonica, and Flora Japonica, are particularly noteworthy for their contribution to the systematic dissemination of Japanese studies in Europe. As the foregoing illustrates, doctors of different nationalities came to Japan in the service of the Dutch East India Company.


Dutch lessons

In 1853, Commodore Mathew Perry, a US naval officer, arrived in Edo Bay (now Tokyo Bay) with a squadron of four gunboats and demanded that the Japanese open their country to the outside world. This led to the signing of the Kanagawa Treaty in 1854, the following year. Once the Americans had broken Japan's policy of seclusion, which had been in place for more than 220 years, other countries, including Great Britain, Russia, the Netherlands, and France soon flocked to Japan to sign treaties of amity and commerce of their own.

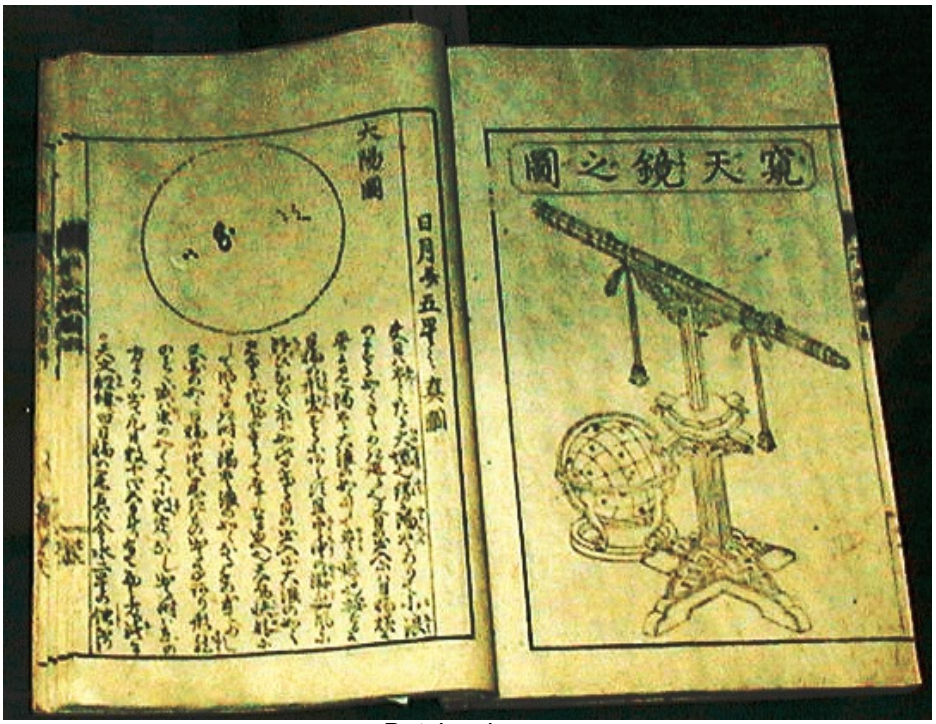
Although Japan did not open its doors until Perry's gunboats sailed into Edo Bay, the Dutch had been advocating a policy of free interaction for many years prior to Perry's arrival. In 1844, the Netherlands King Willem II, acting on advice received from the repatriated Siebold, sent a letter urging the Japanese to adopt an open-door policy. The letter was delivered to the magistrate's office in Nagasaki, and was forwarded to Edo, where it was ignored. Beset by internal rebellion, the Tokugawa government feared that it would be toppled if it allowed foreigners into Japan.

It was a curious move for the Dutch to advocate openness, since it would mean the loss of their monopoly over European trade with Japan. Willem's recommendation was based on the recognition that continued isolation would work against Japan's best interests and might even lead to the same

type of colonization by Western powers that was already evident in the rest of Asia. When the letter was sent, Great Britain and France had al-ready occupied and colonized Hong Kong, Burma, Vietnam, and other countries.

In 1852, Jan Hendrik Donker Curtius, the head of the Dutch trading post at Deshima, warned the Japanese of Perry's arrival in one of the reports on the status of foreign countries that he regularly sent to the central government. He had heard that Perry's squadron had been seeking news of Japan in India and Indonesia, and that they were preparing to sail to Japan.

Meanwhile, Western Learning had been disseminated throughout the country, and Japanese nationals who advocated opening to the West had grown more active beneath an ostensibly calm surface. The combination of this internal movement and reports received from the Dutch made it possible for the Tokugawa shogunate to avoid what would have been a disastrous war with the United States. Unlike its Asian neighbours, Japan was thus spared the fate of colonization and embarked on the road to modernization.



Dutch science

From 1868 on, Japan turned its energies to overtaking and surpassing the West through modernization. In the early Meiji period (1868-1912), the newly established Japanese government invited foreign experts from the US, Great Britain, France, Germany, and other countries to teach.

From the Dutch, they learned irrigation and civil engineering techniques, two areas in which the Dutch excelled, as might be expected from people who live in a country called "Netherlands," which means "Low Country." (One-quarter of the Netherlands land area is below sea level, and one-third is reclaimed land.) It was Dutch engineers who oversaw the first civil engineering projects on Japan's main rivers and harbors.

The Asaka Canal, which runs from Inawashiro-ko (lake) (the fourth largest lake in Japan) through the Koriyama Basin in Fukushima-ken, was designed by the Dutch engineer Cornelis Johannes Van Doorn. The irrigation obtained from this canal enabled the Japanese to plant rice fields, thus creating Japan's second most productive rice-growing area. The canal also permitted the development of hydroelectric power that spawned industry and transformed the village of Koriyama (which had a population of 5,000 before the canal was built) into a thriving regional city of 350,000. The people of Koriyama erected a monument to Doorn on the lake shore to express their gratitude.

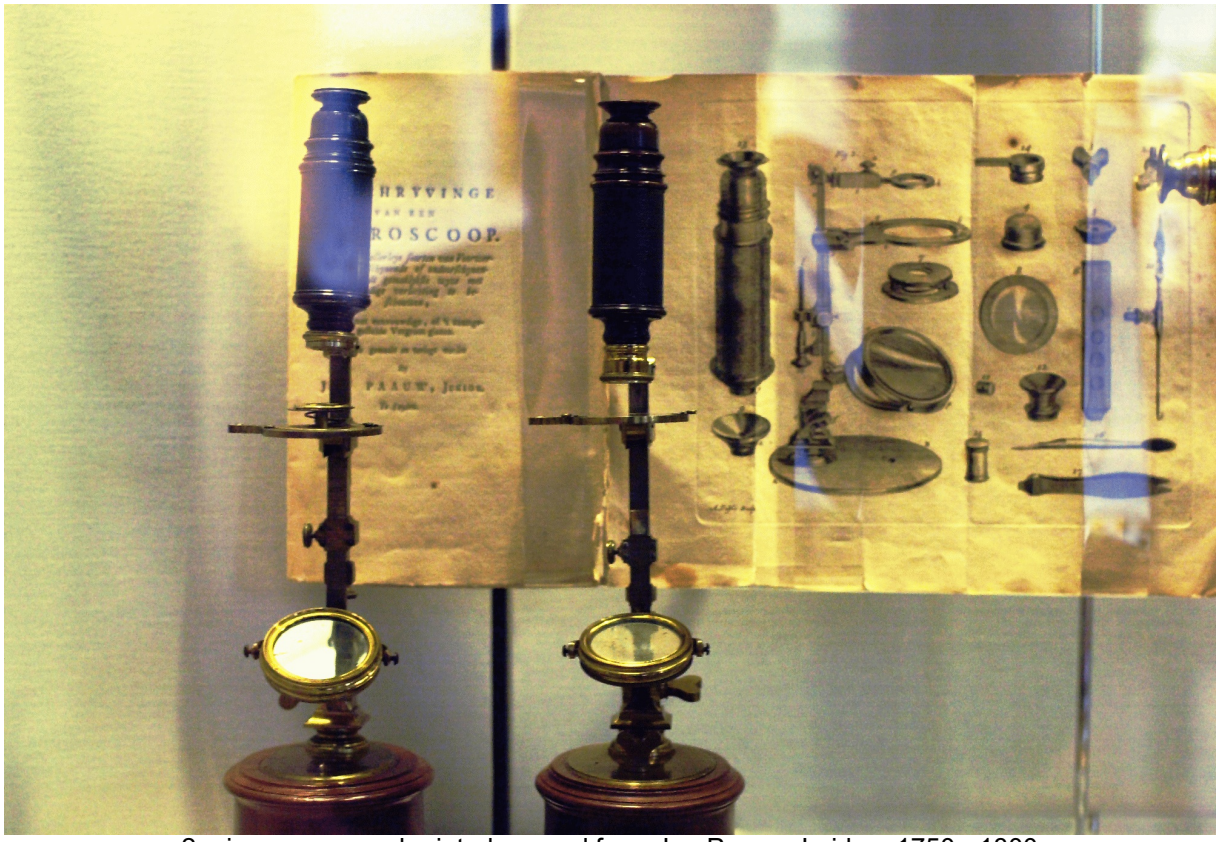
Another Dutch civil engineer, Rouwenhorst Mulder, was responsible for the construction of the eight-kilometre canal that connects Kashiwa-shi (city) and Matsudo-shi in Shiba-ken. By opening a water passage between the Tonegawa (river) and Edogawa, the canal enabled much faster and safer shipping from northeastern Japan to Tokyo. Although it is no longer in use, both sides of the canal have been made into a waterside public park, with a monument erected with private donations commemorating Mulder's work.

Near the centre of the Japanese archipelago, there are three rivers (the Kiso, Nagara, and Ibi rivers) that converged in a single estuary, giving rise to frequent floods. Despite massive efforts on the part of the Tokugawa shogunate to prevent flood damage, the problem was never completely solved. It was up to the Dutchman Johannes de Rijke, who was a resident in Japan for nearly 30 years from 1873, to direct a construction project that separated the lower reaches of the rivers into three separate beds. Today, the area at the lower reaches of the Kiso river contains one of Japan's largest nationally

administered parks, where citizens can come to relax. In the park's central area, a bronze statue of de Rijke was unveiled with great ceremony in 1988 in the presence of de Rijke's grandson and his wife.

Dutch influence even extends to Tokyo Station, which was built in the heart of the capital city 90 years ago. The architect, Kingo Tatsuno, toured throughout Europe and is said to have taken the central station in Amsterdam as his inspiration for the design. Both stations were built on low-lying, soft ground, and both have a foundation reinforced by over 10,000 black-pine pilings. Plans to demolish Tokyo Station's beautiful brick building because of its age and decrepitude met with fierce public opposition, resulting in a restoration project in 2000.

Many Japanese think that the modernization of their country was achieved chiefly with the help of countries such as the US, Great Britain, France, and Germany, but the Dutch were providing Japan with a continuous link to Western culture long before these other countries entered the scene. It is legitimate to say that the Netherlands is the founding father of Japan's modernization.



2 microscopes and printed manual from Jan Paauw, Leiden, 1750 - 1800

Many Dutch words have made their way into the Japanese language, including kohi (koffie; coffee), biru (bier; beer), orugoru (orgel; music box), zukku (doek; canvas), hukku (hoek; hook), koppu (kop; drinking glass) and buriki (blik; tin). Lacking equivalents for these and other terms in their own language, the Japanese simply incorporated them as foreign loan words and continue to use them today".

3.2 How the coffee came to Japan

In 1615, the first shipment of coffee arrived in Europe at Venice from Turkey. Coffee houses quickly spread through Italy and to Vienna, then on to most of Europe. In the meantime the Dutch had obtained coffee seeds from Malabar in India and planted them in their colony at Java. At that time coffee was available from Mocha the main port of Yemen or from Java, giving rise to the famous blend of "Mocha-Java." In 1715 Louis XIV of France was given a single coffee tree brought from Java to Holland, and then to Paris for him by the Dutch. The first greenhouse in Europe was then constructed to house the single tree, where it flowered and bore fruit. Around 1720 the first sprouts from this single tree reached Martinique, a French dominion in the Caribbean, and the plant spread from there throughout Central and South America, notably to Brazil which today supplies over one third of the world's coffee.

In North America, European settlers brought tea to the New World. The Dutch had brought tea to New Amsterdam (Manhattan and Staten Island) before the British bought the colony from the Dutch and

renamed it New York. When the British government imposed a tax on many items in America and the famous 1773 Boston Tea Party made tea drinking unpatriotic, coffee came into favour.

It is not difficult to find good coffee in Japan. Though it has more of a reputation as a country of tea drinkers, coffee is very popular in Japan. There are many small coffee shops selling a variety of coffees and teas. Cans of coffee are also available at literally millions of vending machines all over the country. Japan, traditionally a tea-consuming nation and home of the green tea that is fast proliferating in tea markets across the West, might not naturally be considered a coffee-loving nation. But coffee is in fact more popular in both volume and value terms. Canned coffee, a Japanese invention, commands the biggest single share of the domestic soft drinks market at about 30 percent. Canned coffee producers are: Coca-Cola (Japan) Co Ltd (Georgia); Kirin Brewery Co. Ltd.; Asahi Breweries Ltd. and Suntory Ltd.

"It is known that coffee was transmitted to Japan by trade at Deshima in Nagasaki in early stages of the Edo period. Doctor Siebold who came to Japan in the last stage of the Edo period introduced coffee as a medicine. But Japanese people didn't like coffee very much those days and coffee didn't spread. At last, people of an upper class drank coffee in early time of the Meiji period. They liked drinking coffee. Then, coffee generalized as a personal taste in Taisho and Showa" [7].

3.3 How the beer came to Japan

It's reported that even in the Edo Period, a good number of people had already come into contact with Dutch beer. From that time, that taste for beer spread widely throughout the general population, most likely through the army. In 1853, it is said that beer was first test-brewed in Japan by Koumin Kawamoto, a doctor of Dutch medicine, following a description in a Dutch book. Soon thereafter, in 1879 the Spring Valley Brewery, nowadays Kirin Brewery, part of Mitsubishi, started to brew Japan's first beer.

Kirin Original Beer

3.4 How the camera came to Japan

The Dutch V.O.C. delivered a lot of goods to Japan. The V.O.C. was the world's first multi-national (stock holder's) company! They started at March 20 1602. In this pre-industrial time zone, they shipped a lot of Western inventions. In the next, far from complete, list you'll find an overview of only optical items the Dutch brought to Japan. From Japan the Dutch brought, among others, a lot of silk to Europe. For the V.O.C. the Holland - Japan trade was extremely profitable.

The first foreign telescope arrived in 1613 in Japan, when H.M.S. Clove (a British merchant vessel) arrived in Hirado; its Captain John Saris presented a telescope to 'Tycoon Ieyasu'.

"In 1636, spectacle sales by the Dutch in Japan totalled 19,425, increasing to 38,421 in 1637. Japanese opticians (megane-ya) became widespread in the 1700s, selling 'Dutch glass merchandise' (Oranda gyoku shinajina), including telescopes, magnifiers, spectacles, mirrors, flasks & glasses. As lens making skills spread during this century, many of the goods sold as 'Dutch' were in fact of local manufacture" [8]

The following V.O.C. merchant vessels made the long trip from Europe to Japan:

"1725 the "'t Casteel van Woerden" brought from Amsterdam four telescopes (each of four inches in length) to the Governors of Nagasaki.
1726 the Japanese requested a telescope with eleven or twelve elements and a range of twelve miles, noted in 1728 by the Dutch as not procurable.
1728 the "Rijgersbroek" brought a four inch telescope to the Governor of Nagasaki.
1729 the "t Casteel van Woerden" again brought an eight foot telescope from Holland, for steward Saguemondonne.
1737 the "Enkhuysen" brought three telescopes of four foot length each, and the "Abbekerk" brought three telescopes of five foot length each; all of which were a four-element telescope.
1741 the "Crabbendijke" brought two 6-inch telescopes to Governor Coeboeta.
1743 the "Polanen" brought an ivory telescope from Amsterdam to Governor Mattasiro Awa no Cammi Samma.

1747 the "Westcappel" brought two small telescopes to Japan, the "Beukesteyn" brought from Amsterdam to Japan two ***cameras obscura****, and the "Maarseveen" brought two telescopes to Awa no Cammi Samma.*

1749 the "Witsburg" brought from Amsterdam four telescopes of five inches length each, to Awa no Cammi Samma.

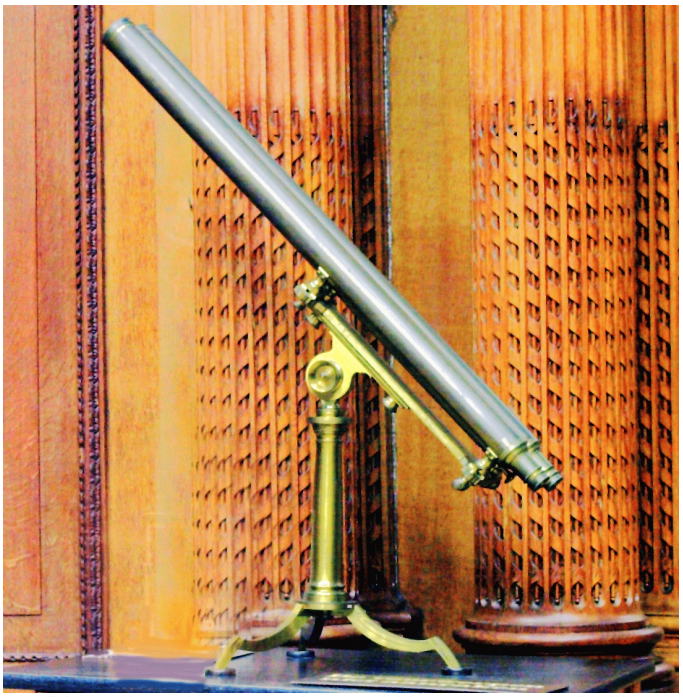
1749 the "Geldermalsen" brought to Kawachi no Cammi Samma, the Governor of Nagasaki, three telescopes of eight inches length, four telescopes of seven inches length, and three telescopes of six inches length.

1754 the "Vlietlust" brought to the Shogun and the Crown Prince six telescopes made of black ivory, and three other telescopes.

1756 the "Radermacher" brought for Sacquemon Samma four copper telescopes of four inches length and four black ivory telescopes of four inches length.

1757 the "Tulpenburg" brought two telescopes for a 'Burgomaster'.

1759 two ivory telescopes of 2 1/4 Rhineland feet (1 Rhineland foot = 0.314 m.) length, and two ivory telescopes of 4 ½ inches length, were delivered to Awa no Cammi Samma.



Binocular telescope, Jan and Harmanus van Deijl, Amsterdam 1789

1762 the "Overnes" brought a copper telescope, seven feet in length, for the 'Burgomaster' Setsje Dajou Samma.

1765 the "Burgh" brought ten small telescopes, requested in 1758, five from Hoorn in North Holland and five from Amsterdam.

1771 again the "Burgh" brought from Amsterdam two copper telescopes of eight feet in length each to the Chief Commissioner of the Money-Chamber in Nagasaki.

1794 the "Erfprins" brought a telescope for the Shogun.

1795 the "West Capelle" brought a telescope for the Shogun.

1800 the "Massachusetts" brought two telescopes for the Governor and one for the Shogun.

1801 the "Margaretha" brought a 'sun telescope with a steel mirror', and an 'object-telescope' for the Governor of Nagasaki.

1802 the "Samuel Smith" from Baltimore, Maryland brought a 'most beautiful telescope, for day and night'.

1803 the American merchant vessel "Rebecca" brought three telescopes.

1804 the "Maria Susanna" brought for the Governor Fita Bungo no Cammi Samma, three large telescopes and another, probably smaller sized telescope.

Early European clocks in National Science Museum, Ueno, Tokyo

1806 the "Amerika" brought a 'large, splendid telescope' for the Shogun, three telescopes for other authorities, and two small telescopes for the College of Interpreters.

1807 the "Mount Vernon" brought a telescope for authorities in Nagasaki.

1809 the "Rebecca" brought six telescopes.

1809 Japanese authorities requested that the shipment of 1810 include these items: The Shogun requested a telescope conforming to a drawing submitted 13 years previously. The Governor of Nagasaki, Magari Boeti Kay no Cammi Samma, asked for three telescopes conforming to a drawing given three years previously, two day & night telescopes, and another telescope. The Governor Tsoetia Kie no Cammi Samma requested two day & night telescopes. The College of Interpreters requested a telescope. The 'Head-Burgomaster' Takasima Sviobij Samma

requested a book on the construction of telescopes and tools for polishing glass for telescopes; both of Takasima's requests were repeated in 1814, 1818, 1819, and 1820.

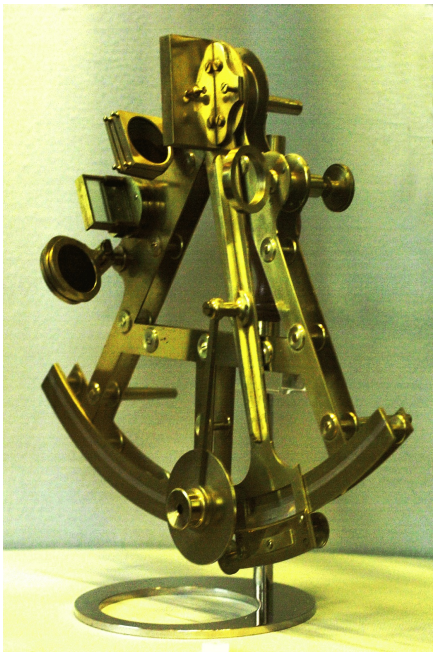
1813 the "Charlotta" brought the Shogun a telescope.

1813 Magariboete Kay no Cammi Samma received seven telescopes, the Governor of Nagasaki Tsotsia Kie no Cammi received two telescopes, the College of Interpreters received one telescope; and further note is made of a splendid telescope of four feet in length, two splendid telescopes with concave and convex mirrors, and another telescope.

Records for 1814 to 1824 include 44 telescopes, including an 'astronomical telescope' in 1819 for the Governor of Nagasaki.

1832 the Governor-General of the Dutch East Indies requested 10 telescopes and 12 opera glasses, to be used as gifts to the Japanese.

1835 a Japanese client requested that a telescope be sent for repair to the Netherlands, which was fulfilled and returned to Japan in 1837".



Double frame nautical sextant, J.M. Kleman and Son, Amsterdam 1800 - 1825

3.5 Cameras imported by the Dutch

The Daguerreotype process of photographic reproduction discovered by Louis Daguerre in 1829. In 1848 the first Daguerreotype equipment came on a Dutch ship to Nagasaki. Mister Shunnojô Tsunetari Ueno (1790 - 1851) was the merchant who ordered this camera. The father of the photographer Hikoma Ueno (1838 - 1904) bought this first camera set. He did not received the order. By mistake, the equipment in the ship freight was not unloaded. So, later in the year 1848, the same camera set came for the second time to Japan. Probable the set was then sold to Samurai Daimyo [9] Nakaria Shimazu. The first Japanese photographers with an Daguerreotype camera were:

Nariakir Shimazua from the Satsuma clan;
Daimyo Tokugawa Nariaki;
Sakuma Zôzan from Matsushiro - Daimyat in 1850;
Iinuma Yokusai from the Oogaki clan in 1852 and
Furakawa Shunpei from Fukuoka Daimyat in 1856. [10]

In 1857 a Dutch medical officer [11] started a school for medical and photographical science in Nagasaki. One of his students was Hikoma Ueno who studied Chemic and Photography. At that time pictures with collodion were possible. In 1862 Hikoma Ueno wrote a text book about chemistry. One chapter in this book deals with photography.

"Relatively little is known about photography in Japan before 1868, which is the first year of the Meiji Dynasty and the actual start of "modern" Japan. Daguerreotype cameras were imported, and there are records of wet plate cameras in Japan around 1857, but the country was isolated from the West during much of the industrial revolution, under a policy of the Tokugawa Shogunate. Photography was practised by a small group of "Dutch scholars", Japanese intellectuals who pursued the western sciences imported by Dutch merchant ships" [12].

Deshima drawing by Keiga Kawahara 1810

The Dutch were allowed to set up a small trading post at Deshima, an island in the Nagasaki Harbour. It was connected to the mainland by small dike. That dike was fenced with a door and a wall, which had two small holes. Through the first hole the Dutch were able to look to the Japanese and trough the second hole the Japanese could look to the

Dutch. At Leiden University in the Netherlands one can read the “Siebold papers”, in which the author describes what he saw in Japan [13].

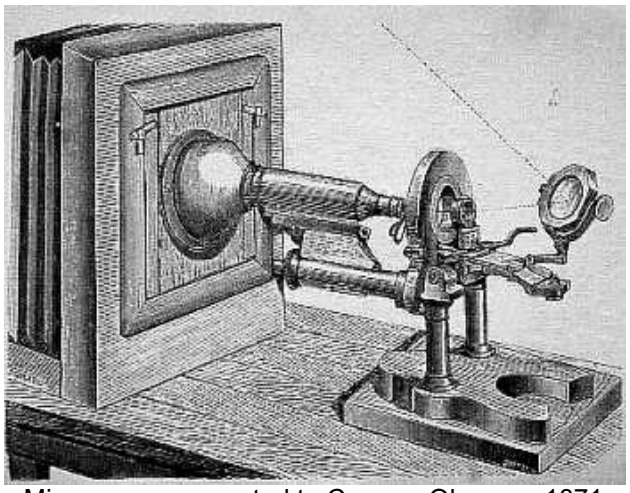
As one can read in an earlier chapter the Dutch brought the first camera, telescope, binoculars, microscope, etcetera to Japan. The study of Western science and technology was called "Dutch science" by the Japanese. The term refers to the years before the restoration, when the Dutch were the only Westerners in Japan, thus being the main source of Western knowhow.

3.6 Dutch time line in Japan

Dutch influence on the first Japanese photographers [14]*:*

“1646 The camera obscura arrives in Nagasaki via the Dutch settlement.

1788 Gentaku Otsuki, an apprentice of Genpaku Sugita, describes in an essay the camera obscura, hitherto called a "donkuru-kaamuru" in Japanese, based on the Dutch pronunciation. He also uses the term "shashin-kyo" (photo mirror) as a Japanese translation for "camera obscura."



Microscope connected to Camera Obscura, 1871

1815 In a Dutch studies publication he issued, Genpaku Sugita translates "camera obscura" as "anshitsu shashin-kyo" (darkroom photo mirror).

1843 In Nagasaki, Shunnojo-Tsunetari Ueno (1790-1851) (father of Hikoma Ueno), a trader, brings a daguerreotype to Nagasaki, but it was not unloaded. (The daguerreotype was first introduced in Paris in Aug. 1839.)

1848 In Nagasaki, Shunnojo-Tsunetari Ueno (1790-1851), a trader, imports Japan's first daguerreotype camera from Holland (his second attempt), the only Western country Japan could trade with.

1849 Lord Nariakira Shimazu, daimyo of the Satsuma Clan in southern Kyushu, acquired a daguerreotype from Shunnojo-Tsunetari Ueno and experimented with it. He did not succeed so well because the camera was probably defective. In 1858, Lord Shimazu perhaps took a collodion photograph of three women, titled "Three Princesses." The image is kept at the Shimazu family museum (Shoko Shu-seikan) *in Kagoshima.*

1856 American consul Townsend Harris and Dutch interpreter Henry Heusken arrive in Japan. Until 1859, they are the only Western foreigners living in Japan outside Deshima, Nagasaki. Heusken teaches basic photography to Shimooka Renjo in Shimoda. Shimooka later moved to Yokohama and opened a photo studio in 1862.

1857 Naval doctor Julius L. C. Pompe van Meerdervoort starts teaching photography at the Medical Institute in Nagasaki, the centre of Dutch learning. Among his students were Hikoma Ueno, Kuichi Uchida and Genzo Maeda. Meerdervoort and other foreigners introduce the wet-collodion process around this year and up to 1859. The three treaty ports of Yokohama, Nagasaki, and Hakodate become the centres of photographic learning in Japan.

1862 Hikoma Ueno (1838-1904) (father Shunnojo Tsunetari Ueno), after learning photography and chemistry under Dr. Pompe van Meerdervoort, publishes the treatise, Seimikyoku Hikkei which described photographic techniques and the wet collodion process. Hikoma Ueno becomes one of the first professional Japanese photographer by opening a photo studio in Nagasaki called Ueno Satsuei-kyoku”.

universal geometric instrument Wytze Foppes Leeuwarden Netherlands 1751

4 Industrial revolution in Europe and Japan

4.1 Industrial revolution in Europe

Until the 17th century in Europe one could hardly find large scale industries. Most enterprises were small and family run businesses. The owners were united in guilds which made them powerful. In many churches all over Europe one can find, sometimes bombastic, altars erected with funds from various guilds. Napoleon however dissolved almost all guilds around 1809.

Gregorian reflecting telescope, P and J Dollond, London, pre 1789

The accelerated development in technology and economy in the period of 1760 - 1830 lead to a concentration of industrial production in factories. The stunning invention of steam machines, - boats and - trains made a centralisation of the production possible. The most important boost was given in the British textile industry, where in the given period quite a number of technical inventions (e.g. power loom) improved the production process; the British steel industry came next and gave its spirit to continental Europe during the 19th century. By the end of that century industrial revolution started in Russia and Japan, while Great Britain got engaged in a competition with Germany and the United States.

The production of iron was improved by the use of cokes. And iron made the production of railway bridges possible, which improved the transport and distribution of various goods. The clothing industry flourished and made cheap cotton accessible for all citizens. This so called industrial revolution changed society radically. Home work came to an end. Around factories cities arose and the workman's class was growing. This industry proletariat became later a breeding ground for communism.

Especially Great Britain was in a privileged position. It had cokes, steel and cotton. While continental Europe was in war Great Britain expanded its influence in Africa and Asia.

Famous British inventions of that time were the steam machine of Newcomen, the blast furnace of Abraham Darby, the shuttle of John Kay, the spinning machine of Hargreave and Samuel Compton, the loom of Edmund Cartwright, the first steam locomotive of Richard Trevithick and the electrical telegraph of William Cooke.

Barr & Stroud, Glasgow, range estimator 2

Also in other parts of continental Europe (Southern Sweden, Germany, Poland, Bohemia, Belgium, France and Northern Italy) steel-, textile- and food industries arose. Famous inventors like Diesel, Daimler, Benz, Von Opel (car industry), Jacobsen, Poupe, Heineken, Artois, Sedlmayr, Dreher (brewery), Von Thyssen, Cockerel, Mannesmann, Puch (steel), Siemens, Philips, Faraday, Marconi (electricity) and many others gave European industry an enormous boost.

The industrial revolution also influenced various sciences (medicine, psychology, chemistry and sociology) and arts (music, opera, sculpture and painting), but also war related industries. Most optical industries were working for quarrelling European despots, producing telescopes, binoculars and other optics for their army and naval forces.

The invention of the cinematographic film and camera's lead to the production and refinement of lenses for camera's, enlargers and projectors. But for that we had to

wait until the 20th century, as the first projection of a celluloid film was organized in Paris in March 1895 by the Lumière Brothers.
One year later, on June 9, 1896, the first 'Cinématographe Lumière' (film cinema) was opened in the 'Palais de Dance', next to the 'Kurhaus' in the seaside resort Scheveningen, the Netherlands. Nine years later the first 'Biograph Cinema' was opened in Wilton Road in London.

In the Netherlands agricultural revolution joined the industrial revolution. Steel works, coal mines and ship yards were established in the second half of the 19th century.

As you may read in the chapter on 'Optical industries in the Netherlands' modern glass production and research was mainly seen in the German speaking part of Europe (Germany and Austria), although one should not underrate developments in France and England.


Leeuwenhoek microscope 1670

4.2 Industrial revolution in Japan

Industrial revolution in Japan started after the last shogun handed in his resignation in 1867.
The Japanese shogun dynasty, the so called Tokugawa, came to an end. Since the 17th century Japan was only accessible for Dutch and Chinese merchants. In 1867 the Japanese emperor took up his residence in Tokyo (Meiji-restoration). During the regime of emperor Mutsjito (1868-1912) Japanese industry was modernized. Feudal conditions were abolished, education was reformed, the first railroad (Tokyo-Yokohama) was opened (1872), Gregorian calendar (1873) and general conscription (1873) were introduced as well as the first political parties (1882) and a new constitution (1889) were accepted. Although around the turn of the century a war with China and with Russia delayed the development of Japans industry, the optical industry made the most of it. The Meiji-restoration gave ardent reformers power to readjust Japan in a tearing rush. Old Japan was dismantled literally, a brand new Japan was put into place.


Mitsubsihi building # 1

In Asia, Japan became the first industrial nation. In fact, the Japanese liked the idea of industrialization so much that the government made it a national goal in the late 19th century.
The Japanese economy is dominated, however, by a system which doesn't exist in the Western world.

The 'keiretsu' (Japanese for 'money clique') are the great family-controlled banking and industrial combines of modern Japan. The leading zaibatsu (called keiretsu after World War II) are Mitsui, Mitsubishi, Dai Ichi Kangyo, Sumitomo, Sanwa, and Fuyo. They gained a position in the Japanese economy with no exact parallel elsewhere. Although the Mitsui were powerful bankers under the shogunate, most of the other zaibatsu developed after the Meiji restoration (1868), when, by subsidies and a favourable tax policy, the new government granted them a privileged position in the economic development of Japan. Later they helped finance strategic semiofficial enterprises in Japan and abroad, particularly in Taiwan and Korea (a keiretsu in Korea is called a 'chaebol'). In the early 1930s the military clique tried to break the economic power of the zaibatsu but failed. In 1937 the four leading zaibatsu controlled directly one third of all bank deposits, one third of all foreign trade, one half of Japan's shipbuilding and maritime shipping, and most of the heavy industries. They maintained close relations with the major political parties. After Japan's surrender (1945) in World War II, the breakup of the zaibatsu was announced as a major aim of the Allied occupation, but in the 1950s and 1960s groups based on the old zaibatsu reemerged as keiretsu. The decision on the part of these groups in the post-World War II era to pool their resources greatly influenced Japan's subsequent rise as a global business power. Nikon Corporation is member of the Mitsubishi-group.


Mitsubishi building # 2

Elsewhere in this publication you may read the history of the Japanese optical industry which, just after the World War II became one of the world's leading optical industries.

5 Optical industry in Holland

Little has been published on Dutch optical glass industries. Many Dutch scientists, however, were involved in the development of optical glass, microscopes and telescopes.

Since 1270 the so-called “reading glass” was produced in the Arno Valley in Italy. Although the techniques of making glass were kept secret by Venetian producers, due to the very good relations between the Netherlands and Venetia glass production in the Netherlands started as early as the 14th century. Spectacle lenses were among the first products. It is recorded that locally produced spectacles were used by intellectuals in Haarlem around 1300. After 1500 the social status of a spectacle was changing as to take a spectacle stressed the physical handicap of the wearer. Wearing spectacles in the presence of a noble person was even impolite. In the 19th century the tide was turning and wearing spectacles was no disgrace.

In the Netherlands one has to wait until the 17th century to find written proof of optical inventions.

1595 Zacharias and his son Hans Janssen from Middelburg produced their first compound microscope (which is a microscope that uses two or more lenses) and sold it in their spectacle shop. It is recorded that they were instructed by an unknown Italian soldier.
1602 Foundation of the United East-Indian Company (Verenigde Oostindische Compagnie - V.O.C.) in the Netherlands, the world’s first multinational stock company, to coordinate trade activities with Asia. The company was dissolved in 1798. Many optical instruments were exported and sold in Japan by the VOC.
1608 Hans Lippershey (1570-1619) applied for a patent on a telescope with concave and convex lenses. His patent on a binocular instrument was denied as Jacob Metius from Alkmaar (and later others) claimed to be the inventor.
1621 Astronomer Willebrord Snell van Royen - also known as Snellius (1580-1626) introduced his refraction principle.
1636 Spectacle sales by the Dutch in Japan totalled 19,425, which figure was doubled a year later.
1654 Johan van der Wijck (a famous glass grinder from Delft) supplied Christian Huygens with special grindstones.
1655 Christian Huygens (1629-1695) produced 2 telescopes; one with a focal length of 4 metres and one with a focal length of 7 metres; he discovered Titan (6th moon of Saturn) and the structures of Saturn. Christian also discovered and described spheric lens aberrations, although he did not know how to avoid them.

Christian Huygens is said to be less well known than his father, Constantijn Huygens, a gifted poet and brilliant figure in the literary history of the Netherlands. Rembrandt, Hals, Spinosa and Descartes were family friends. The last had a profound influence on Huygens and drew him into mathematics and Science. This is also the reason that there is now a famous self-portrait from Rembrandt and his Nikon rangefinder camera, first published at the NHS Utrecht Convention in 1994, in the Netherlands. Around 1650 Christian Huygens was just an unknown whizz-kid. But after Christian send some of his first microscopes to Japan with a vessel of the VOC, once a present came back. Including a small note: with this machine its possible to make drawings with light. Christian did not know what to do with this very, early rangefinder camera. So he thought, drawing with light, I’ll give it to Rembrandt, he is also a gifted drawer.

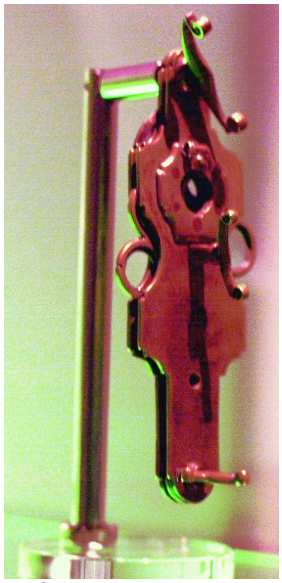
1656 Establishment of glass melting furnace in Den Bosch.
1665 Christian Huygens went to Paris and became a founding member of the French Academy and was granted a pension and an apartment. This pension is the only salary Christian ever earned.
1668 Anthonie van Leeuwenhoek (1632-1723) - the Father of Microscope - learned to grind and polish glass and started making simple microscopes; he is known to have made more than 500 microscopes in his lifetime. His microscopes were able to magnify up to 300 X!
1670 Jan Swammerdam (1637-1680) produced optical systems, like a single lens microscope (using so-called bead-lenses).
1672 Christian Huygens introduced his ray of light principle.

1673 Anthonie van Leeuwenhoek began corresponding with the English Royal Society which published 375 of his papers over the next fifty years.
1676 Samuel van Musschenbroek (1639-1681) introduced the use of a diaphragm to improve image quality.
1678 Christian Huygens used a condenser lens, which was improved by Nicolaas Hartsoeker and - later - used by the British microscope producer Wilson.
1679 Nicolaas Hartsoeker (1654-1725) set up as an optical instrument maker and wine merchant.
1680 Christian Huygens became member of the prestigious Royal Society in London.
1685 Christian Huygens published a technique of grinding glass manually.
1690 Johan van Musschenbroek (1660-1707) introduced a focussing method using a barrel with ball bearings (later known as the Musschenbroek Nuts).
1694 Nicolaas Hartsoeker published his 'diopter essay'. In that same year he invented the so-called screw barrel telescope.
1770 Jan van Deyl (1715-1801) invented the achromatic microscope lens.
1798 Liquidation of the V.O.C.


Anthonie van Leeuwenhoek

Little was done to improve the microscope and other optical instruments until the middle of the 19th century when great strides were made and quality instruments like today's microscope emerged.

1770 Glass production on an industrial scale started in Leerdam and later in Maastricht, Delft and Schiedam.
1878 Merchants Jeekel and Mijnssen set up a glass factory in Leerdam. Still known for its bottles and artistic glass.
1889 The first Dutch camera was build by Abraham Dirk Loman.
1904 Johan Steenbergen started a small camera factory in 1904 in Meppel. In 1908 he moved to Dresden to study optics. As an apprentice he gained experience at the Ernemann camera works. In 1913 he founded IHG (Industrie und Handels- Gesellschaft) in Dresden, which factory produced various camera's. At the Leipziger Messe in 1936 he presented the world's first single lens reflex (SLR) camera, the Kine-Exakta. Since 1972 the factory became state property (German Democratic Republic) and used the name Pentacon. After the unification of both Germany's in 1990 Pentacon was liquidated and its brand name Praktica was taken over by Jos. Schneider Precision Mechanics Co. In 1998 Pentacon GmbH took over (or back) the production of Praktica camera's.
1924 The micro-cinematographic artist Jan Cornelis Mol based his film on blood circulation on the findings of Van Leeuwenhoek.
1938 Frits Zernike (1888-1966) was a professor at the University of Groningen from 1915 to 1958. In a study of diffraction gratings, he noted that he was able to discern materials of different refractive indices despite their transparency, and discovered the phase contrast principle. Zernike built a microscope based on that principle and received the Nobel Prize in 1953.
1939 The optical industry (Optische Industrie de Oude Delft) was established. Dr. Albert Bouwers, director from 1941-1968, improved (in 1941) the mirror lenses and invented the Super Technirama 70 millimetre wide-angle film projection (by a self designed anamorphic lens), used by Walt Disney in 1959 at his premiere of the cartoon 'Sleeping Beauty'.


Christian Huygens microscope, Den Haag 1689

In the late 1940's, just after World War II, many camera producers in the Netherlands, were (re)established, like

Foka/Fodor Alberts), Rotterdam
Nefotaf (Nederlandse Fotografische Apparaten Fabriek), Weert
Nedinsco (Nederlandse Instrumenten Compagnie), Venlo,
Philips, Eindhoven
Prinsen, Amsterdam
Tahbes, Den Haag
Vena, Amsterdam.

They tried to present their products on the European camera market, but none of them survived (as a camera producer).
However, Maus Gatsonides, a gifted engineer and rally driver since the early 1950's, became famous all over Europe with his Gatsometer camera: a special camera linked with a speedometer for checking speed. Gatsometer also produces red light camera systems and traffic enforcement systems using Nikon camera technology.

The Netherlands nowadays does not have a serious and therefore competitive national optical industry. Nevertheless it hosts famous Japanese producers of fine optics, having their European Headquarters in the Netherlands, like

Nikon Corporation
Canon
Hoya.

5.1 From craft to industry

It was not until the latter stages of the Industrial Revolution, however, that mechanical technology for mass production and in-depth scientific research into the relationship between the composition of glass and its physical qualities began to appear in the industry.
A key figure and one of the forefathers of modern glass research in the world was the German scientist Otto Schott (1851-1935), who used scientific methods to study the effects of numerous chemical elements on the optical and thermal properties of glass. In the field of optical glass, Schott teamed up with Ernst Abbe (1840-1905), a professor at the University of Jena and joint owner of the Carl Zeiss firm, to make significant technological advances.
Another major contributor in the evolution towards mass production was Friedrich Siemens (1826-1904), who invented the tank furnace. This rapidly replaced the old pot furnace and allowed the continuous production of far greater quantities of molten glass.

The history of the manufacture of Optical Glass can be divided into three epochs:

Pierre Louis Guinand's (1748-1824) discovery of the stirring process in 1798 and perfected in 1805;

The work of Ernst Abbe and Otto Schott circa 1882, and

The development in England during the Great War (WWI).

The method of manufacture is practically the same at the present time as in Guinand's day, any improvement being one of degree rather than of kind. Thus the glass is melted in special pots and furnaces, stirred after founding, and allowed to cool in situ. When cold it is broken up and examined. Defective glass is rejected, and the good glass is moulded into slabs, prisms or lenses, and finally annealed. Optical glass has to conform to a rigorous specification. It must have certain specified optical constants, must be free from striae, bubble, strain, and colour, and must be durable.
The manufacture of optical glass is based upon continuous research into the properties of glass. The effects of composition upon density, refractive index, melting properties, durability, freedom from colour, and de-vitrification tendencies, have to be studied upon a small scale, and the results translated into terms suitable for works practice. The whole manufacture indeed is research upon a manufacturing scale.

Carl Zeiss microscope
1878

6 Optical industry in Japan

In 735 a group of merchants sent from Japan to China returned with astronomical instruments. In 875 an observatory, which possibly may be the earliest astronomical observatory in Japan, was established at Asuka in the Nara Prefecture.

Old astronomical observatory

In the Genna era (1615-1623) Tohichi Ikushima made a telescope, which caused the Tokugawa Shogunate to prohibit telescope manufacturing because of its possible military applications.

During the Kioho era (1717-1735) Nizayemon Mori, an optician in Nagasaki, made an astronomical telescope, and/or a Sokugohyogi (type of transit instrument) for the eighth Shogun Yoshimune Tokugawa.

In 1859 observation towers were built on the coast at Kosetoura, Nomo and Noroshi Yawa, equipped with telescopes to view the arrival of foreign ships.

6.1 Early telescopes

"In the early 1700s, Japanese manufactured telescopes were becoming more common, and the general public would have seen only domestic models, but quality was inconsistent and imported telescopes were preferred, although Mitaku Yorai indicated that not all imports were so favoured: 'China has failed to supply any of outstanding quality', continuing, 'every now and again an inability to see much with a Japanese one is to be marked...Nagasaki plays the leading role (supplying telescopes to) show the moon up close'. In the 1770s, Swedish scientist Charles Thunberg described how lookouts were given telescopes and placed on mountains near the sea to spot distant ships.

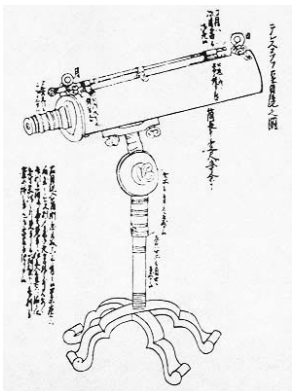
Early Japanese telescope, National Science Museum Ueno

Circa 1790, Iwahashi, Zenbei, from Kaitsuka, Izumi, made an astronomical telescope, using an octagonal tube, circumference 27 centimetre, length about 270 centimetre, installed in the Government observatory, and reported to be as good as or better than imported models. By 10th moon of 1795, he had a larger telescope. Zenbei was an optician who became an active astronomer, observing the sun and other objects, and is also noted for making telescopes for a famous cartographer, Tadataka Ino.

Circa 1800, Goryu Asada ground lenses for a telescope that he used to observe the satellites of Jupiter. His 'Asada school' used European methods & modern instruments to obtain data, using specialized instruments, such as a transit to measure longitude and a quadrant to measure latitude. In the early 1800s, Japanese artisans mastered lens production and telescope building, and the range of Japanese made instruments expanded to include transits, quadrants, and further telescopes, with relatively few Dutch imports of telescopes and sextants. Smoked glass was made in Japan after 1800, and in the 1830s, solar observer Kunitomo Tohbei made an astronomical telescope judged better than any of the Dutch imports.

Kunitomo telescope

Tohbei Nootoo Kunitomo, (1778-1841) was a famous gunsmith in Omi, 14th heir of a gun smithing business, and a telescope maker and amateur astronomer. He first used a telescope circa 1821-2, a Dutch instrument owned by a nobleman (Iba describes it as a Gregorian reflector at the Tokyo Observatory). In 1832, he began work on a Gregorian of 7 centimetre aperture, fabricating all parts except the brass tube, with a parabolic mirror, completing it in 1833 after many difficulties, and beginning observation & sketching of the sky (an image of the telescope is found in Yamamoto). Kunitomo made many speculum mirrors, studying the metal in old mirrors and deciding on an alloy of 65% zinc and 35% copper, and using a grindstone that was oval in shape. He fabricated eyepiece lenses of quartz crystal, using split bamboo tools and pine rosin.



Kunitomo drawings

1836 was a year of famine in Japan, and Kunitomo sold some of his telescopes and drawings of the sun to assist his neighbours. He fabricated 'many' telescopes, which were given and sold to friends and patrons.

Hazama, an astronomer at Osaka, bought a Kunitomo telescope and found it to be 'twice as efficient' as a Dutch telescope. A Kunitomo telescope and various parts survived in the home of a descendent as of 1937; where K. Nakamura of Kwasan Observatory tested two mirrors and found them excellent. However, the eyepieces he used caused chromatic aberration which Kunitomo was unable to correct.

The 1874 transit of Venus was photographed by Hikoma Uyeno in Nagasaki on December 9, which is considered the first celestial photography in Japan.

In the late 1800s, assistance from Western nations was provided for the astronomical measurements used to determine latitude and longitude for mapping. The Japanese Navy built Kanshodai Observatory in 1874". [15].

The National Science Museum [16] in Tokyo (at the Ueno Park) has a special department with early optical instruments. It shows some early Japanese telescopes and observatory instruments. In August 2004 it will open a new annexe with more optical items. I learned in this museum that the making of telescopes in Japan in the Edo period lagged far behind European countries, some of the first skilled telescope makers were Mr. Kunitomo and Mr. Iwahashi.

Admiral Togo on the bridge of batlleship Mikasa, He has an Zeiss binocular. On the background an Barr & Stroud rangefinder (picture 75 Year history)

6.2 The start of the photographical industry

Barr & Stroud 4½ Feet Type FA2 Range Finders became well known in the 19th century. They were introduced by Barr & Stroud (optical instrument engineers in Glasgow, UK since 1860) [17] in 1888 and the very high tech oriented Japan Navy immediately ordered them. The first one, bearing serial number 4, was installed on a Japanese battle ship in 1894. By May 27, 1905, every single battle ship of Japan's Imperial Navy was equipped with this range finder, in fact every single cannon! So this will have cost Japan a lot of Yen.

"Delving far back in to the records, it turns out that lens polishing was being done in feudal Japan in the ancient days of the Tokugawa Shogunate, before Commodore Perry knocked this island nation's doors open to the Western civilization. Production on an industrial sale started in 1907 with the establishment of the Fujii Lens factory which manufactured binoculars for the civilian market as well as for use by the Imperial Japanese Navy. But it was not until the First World War that the optical industry really began spreading its roots. By this time the Navy had launched its own production of sextants, periscopes, and other optical precision instruments. The Navy also established its own research laboratory.

Admiral Togo on the bridge of batlleship Mikasa, He has an Zeiss binocular. On the background an Barr & Stroud rangefinder

Probably the biggest factor spurring the industry on at this time was the abrupt stoppage of lens glass imports because of the German

wartime blockade. The industry had until the relied solely on these imported raw materials for the manufacture of finished products. In desperation, optical instrument manufacturers searched far and wide for other sources and, to their pleasant surprise, found an abundant source right in their own backyard; this was in 1921.

Five years later, with several firms already in the lens-making business in addition to Fujii, yet another new establishment hung to sign that was to become one of the most famous names in the industry both at home and abroad. It was Nippon Kogaku, makers of the post-World War II Nikon cameras, Nikkor lenses, and a wide range of diversified optical instruments.

Up this point we have been talking about the beginnings of lens and optical instrument making. It wouldn't be accurate to trace the origins of the camera industry as such this far back, although, for the record, a handful of Japanese began dabbling experimentally in camera making in the 1880s.

The first camera bearing the made-in-Japan tag hit the market in 1903. Several years before Henry Ford came out with his Model T. It was named the Cherry Camera (Cherry Portable) and it was an Meishi [18] *format box camera, manufactured by the Konishiroku Photo Industrial Company, Limited* [19]*, a firm generally recognized today as the oldest Japanese manufacturers in the industry not only of cameras but of a complete line of photographic film and printing paper. One of its best-known products today is the Konica 35-millimetre camera. Konishiroku Shasin Kogyo Kabushiki Kaisha was founded in 1873. It was also known as Rokuosha. In 1928 they produced a four element lens in Tessar style. In 1931 they produced with Jena glass an 135 millimetre f/4.5 lens called Hexar. The design was a success, some said equal of the Zeiss Tessar"* [20].

6.3 Japanese optical history

This time line contains information based on a variety of sources [21]*:*

"1857 Naval doctor Julius L. C. Pompe van Meerdervoort starts teaching photography at the Medical Institute in Nagasaki, the centre of Dutch learning. Among his students were Hikoma Ueno, Kuichi Uchida and Genzo Maeda. Meerdervoort and other foreigners introduce the wet-collodion process around this year and up to 1859. The three treaty ports of Yokohama, Nagasaki, and Hakodate become the centres of photographic learning in Japan.

1862 Hikoma Ueno (1838-1904) (father Shunnojo Tsunetari Ueno), after learning photography and chemistry under Dr. Pompe van Meerdervoort, publishes the treatise, Seimikyoku Hikkei which described photographic techniques and the wet collodion process. Ueno Hikoma becomes one of the first professional Japanese photographer by opening a photo studio in Nagasaki called Ueno Satsuei-kyoku.

1864 Kokichi Kizu opens a photo studio in Hakodate (Hokkaido), one of the ports which were opened to foreigners.

1865 Kuichi Uchida, who studied under Hikoma Ueno, and Shinsuke Nakagawa both open a studio in Osaka.

1865 Yohei Hori (Masumi) opens a photo studio in Kyoto.

1866 Rihei Tomishige opens a photo studio in Yanagawa, Fukuoka Kyushu.

1870 The number of professional photographers in Japan exceed 100.

1871 Tokichi Asanuma establishes Asanuma Shoten, a photo supply shop in Nihonbashi, Tokyo.

1873 Matsugoro Asakura is sent to Austria by the Japanese government to study the manufacturing of optics. He returned to Japan in 1875 and started to build a lens factory with government approval. Matsugoro died before finishing the factory, which was completed in 1876, producing ophthalmic lenses using imported glass. His son, Kametaro Asakura, developed a photographic lens after 1883, exhibiting it in 1890, the first known Japanese made multi element photographic lens (there were earlier singlet objectives).

1873 Konishi-ya, forerunner of Konica, is established in Kojimachi, Tokyo. It later moves to Honcho in 1876 and changes its name to Konishi Honten.

1876 Students of Matsugoro Asakura complete the lens factory and start to produce ophthalmic lenses with imported glass. (Glass melting technology was still undeveloped in Japan.)

1877 The number of professional photographers in Tokyo alone exceed 100.

1879 "Shashin Shimbun," a weekly photo by Zenshin-sha, is published with albumen prints pasted on. Publication ceases after 10 issues.

1883 Matsugoro Asakura's son, Kametaro Asakura, developed a photographic lens at his factory in Yotsuya Denmacho and displayed the lens at the 3rd National Industrial Exhibition in 1890 where it won 1st prize. This was the first photographic lens produced in Japan, except for simple single-element lenses.

1892 Take a look at a row of Japanese cameras an you'll notice shutters bearing the name of "Seikosha". This firm opened for business in 1892 as a manufacturer of watches and clocks, and its scale of operations and exports today make it easily the biggest of its kind in the Far East. In 1930 they started making shutters, and today almost all Japanese cameras are equipped with Seikosha shutters.

1902 Konishi Honten establishes Rokuoh-sha in Tokyo, a division dedicated to produce photosensitive materials (dry plates, etc.) and later photographic equipment.

1903 The Cherry Portable, the first portable Japanese camera, is made by Konishi Honten (forerunner of Konica). The box-shaped camera used a magazine which held twelve 2 1/4x3 1/4 inch dry plates. Konishi Honten went on to make various other cameras. Paper-backed roll films were still not made in Japan. Only sheet film and glass plates were being made in Japan. Imported roll films were still very expensive and usually arrived in poor condition because there were no refrigerated cargo holds.

1903 Japan's first photographic paper, the Sakura Hakkin type paper, is marketed by Konishi Honten.

1907 Kuribayashi Seisaku Sho, the forerunner of Petri Camera, is founded as an photographic accessory manufacturer. The first camera was made in 1919, the first lens in 1942. There was an bankruptcy in 1977, closed down in 1979.

1907 Konishi Honten markets Japan's first single-lens reflex camera, the Sakura-reflex Plano with a Tessar f/6.3 lens. Priced 225 yen.

1908 Ryuzo Fujii establishes the Fujii Lens Seizosho factory. Ryuzo was a Mechanical Engineering major at the Tokyo Institute of Technology and became a naval engineer. He was sent to Europe for three years to study optical design and lens manufacturing in Europe (mainly Germany). He returned to Japan in 1901 and quit the navy in 1908 to start his company. His younger brother Kozo joined the company after quitting his job at the Aichi Cement Company. They studied the production of prisms and lenses in a rented dirt-floored entrance hall of a house. In March 1909, they moved to a new factory in Shiba, Tokyo and equipped it with the latest lens manufacturing equipment from Germany. It became Japan's first modern lens factory.

1909 The Japanese Army had in this year already established an optical research laboratory [22] in Tokyo, and in 1909 a repair facility was further established in order to service optical weapons belonging to the Japanese army. Combined with the experience gained in maintaining instruments such as field binoculars and cameras, the facility also began producing telescopes and microscopes for a variety of applications. Shortly thereafter, production expanded to include prisms for binoculars and even lenses for photographic cameras. By the outbreak of the First World War in Europe, however, the question of self-sufficiency in optical munitions had yet to be seriously considered. Japan's armed forces were almost entirely dependent upon overseas suppliers of optical weapons, and this supply was sharply limited during the war as the combatant powers suspended their exports of munitions in general.

1911 Rokuoh-sha markets Japan's first pocket-size camera called the "Minimum Idea." Its relatively affordable price of 9 yen and 50 sen creates a Minimum Idea boom among amateurs.

1915 The Japanese Navy starts to develop optical glass manufacturing since glass imports from Germany stopped due to World War I.

1917 Nippon Kogaku K.K. (forerunner of Nikon) was established in Tokyo as a munitions optical instrument shop to meet the needs of the Imperial Japanese Navy. The company was a consolidation of three companies: Tokyo Keiki Seisaku-sho's optical division, Iwaki Glass Seisaku-sho, and Fujii Lens Seizo-sho.

Nippon Kogaku head office building ca 1917

1918 The significance of this over-dependence upon foreign suppliers was not lost upon the army or navy, which made serious efforts after 1915 to address the problem of domestic production of both optical glass and optical munitions. In 1918 navy researchers at the Tsukiji Arsenal, south of Tokyo, began to produce seven types of optical glass in quantities of up to 300 kilogram melts in an effort to compensate for the interruption of German imports—theretofore Japan's primary supplier.

1919 Asahi Kogaku Goshi Kaisha (forerunner of Asahi Optical Company, Ltd., maker of Pentax cameras) is established in Tokyo by Kumao Kajiwara as a manufacturer of ophthalmic lenses. Although it was not until much later that it added cameras to its line of products. In 1923 Asahi produced their first photographic optic, the Aoco motion picture projection lens. In 1929 Asahi began to manufacture lenses for still photography and by 1943 the company was a major supplier of lenses for other camera manufacturers, like Minolta and Konishiroku. After the war, most of the factories where destroyed. In 1948 Asahi Optical reopened with manufacturing binoculars for export.

1919 Takachiho Seisaku-sho, the forerunner of Olympus Optical Co., Ltd., is established as a microscope manufacturer. In 1936 Olympus made its first photographic lens, a 75 millimetre f/4.5 copy of the Zeiss Tessar. Olympus also made lenses for Mamiya, Elmo, Aires and Walz.

1920 Shigejiro Nishimura & Sons, in Kyoto, began by making reflectors, managed by K. Nakamura of Kyoto Imperial University. As of 1931, Nishimura had produced one 10 inch f3.8 photographic reflector, three 8 inch, three 6.5 inch, twenty five 6 inch, and over two hundred 5 inch & smaller reflectors, all with mirrors by K. Nakamura. In 1929, Nakamura made a 6 inch refractor, on a mount designed by Nakamura, which was the first equatorial refractor built in Japan (followed closely by a Nippon Kogaku 6 inch equatorial of Zeiss design)".

1921 The Osaka Industrial Material Testing Laboratory starts research on optical glass melting. Completely independent from the Navy, this Laboratory belonging tot the Department of Agriculture and Commerce. Prior to this time optical glass was imported from Germany, France and England.

1921 Nippon Kogaku Kogyo K.K. hires eight German engineers and scientists on a 5-year contract. They worked on optical design, product design, and lens and prism grinding and polishing. One

of them, Heinrich Acht, extended his stay until 1928. He produced samples of photographic lenses, the first ones to come from Nippon Kogaku. Kakuno Sunayama took over lens design after Acht and improved upon Acht's 50 centimetre f/4.8 lens in 1929, calling it "Trimar." In the same year, he later produced the "Anytar" 12 centimetre f/4.0 lens based on the Carl Zeiss Tessar lens.

1922 *The Astronomical Herald published articles by Masamitsu Yamazaki on making reflecting telescopes, which resulted in an amateur telescope making movement, numbering over 200 by 1931. (The Herald is the monthly of the Nihon Tenmon Gakkai, Japan Astronomical Association)*

1924 *Masashige Tomioka founded Tomika Kogaku Kenkusho in the Shinagawa district of Tokyo to develop photographic lenses. In 1932 the laboratory became a manufacturing facility, Tomioka Kogaku Kikai Seizosho, and made original lenses for camera companies. Today they produce most Yashica lenses.*

1925 *In June, Konishiroku Honten Co. introduces the Pearlette camera, an imitation of the highly successful Vest Pocket Kodak. It had a bellows and an imported lens and shutter. It used 127-type roll film. The Pearlette line was in production for 20 years and was improved over time.*

1926 *Seizo Goto founded Goto Optical, in Komazawa, Tokyo, in August of that year.*

1928 *Kazuo Tashima establishes the Nichi-Doku Shashin Shokai company, the forerunner of Konica Minolta Camera Co. The corporate name was changed to Molta Goshi Kaisha in 1931 and to Chiyoda Kogaku Seiko K.K. in 1937 when the company began lens production. The name also changed to Chioda Kogaku Seiko Kabushiki Kaisha. The first Minolta Rokkor lens was an 200 millimetre f/4.5 for an portable aerial camera in 1940. By order of the Imperial Japanese Navy, Minolta started to develop and produce optical glass at Itami, near Kobe. In 1942, the company was ordered by the Imperial Japanese Navy to manufacture optical glass near Kobe. The 75 millimetre f/3.5 Rokkor lens, modelled after the Carl Zeiss Tessar lens, fitted on the Minolta Semi IIIA camera in 1946 was the first Japanese lens with anti-reflection coating.*

1931 *Nippon Kogaku Kaisha, in Shiba, Tokyo, had produced hundreds of refractors by 1931, as large as 8 inches, on equatorial mounts. Prototype 20 inch fork mounted reflectors had been made.*

1931 *Hirowo Mohri of Konishiroku Honten Co. produces a f/4.5, 4-element H-type lens with Jena glass. The lens, named "Hexar," was based on the Carl Zeiss Tessar lens. "Hex" is for Rokuemon Sugiura where "Roku" means six. The lens was a success and claimed equal performance to the Tessar lens. The "Hexar" label was used on Konishiroku's top-quality lenses up to 1959, when the lenses were renamed Hexanon.*

1931 *Military & Naval optical instruments were made by Government Optical Works.*

1932 *Nippon Kogaku Kogyo K.K. manufactures its first Nikkor photographic lens. This was later mounted on the Hansa Canon camera in 1936. All lenses from Nippon Kogaku were labelled "Nikkor" from this year on. And all pre-World War II Canon cameras were fitted with Nikkor lenses..*

1932 *Tokyo Optical (Tokyo Kogaku Kikai Kabushiki Kaisha) began in 1932, under the direction of the Imperial Japanese Army. The optical division of the Seikosha factory of Hattori Tokei, a clock and watch manufacturer , was merged with Katsuma Kogaku Kikai Seisaku Sho. The new company was formed to manufacture photographic lenses and precision optical and mechanical instruments* [23]*. By 1934, it had produced two triplet photographic lenses, the State and the Toko, in f/6.3 and f/4.5 apertures. The designer, Ryoii Tomita, made an 50 metre f/0.7 design in 1944, which was later sold to the US Occupation forces. After the WWII they made Topcon single lens reflexes and Topcor lenses.*

1933 *In November, Seiki Kogaku Kenku Sho (Precision Optical Instruments Laboratory), the forerunner of Canon Inc., is established by Goro Yoshida (1900-1993) and Saburo Uchida (1899-1982). They are soon joined by Takeo Maeda and they produce the prototype Kwanon 35 millimetre camera six months later. The production model introduced in 1935 was called "Hansa Canon." It used a Nikkor lens from Nippon Kogaku. Yoshida left Seikos Kogaku in the fall of 1934, less than a year after setting up Seikos Kogaku.*

1934 *Fuji Photo Film Company (Fuji Sasin Film Kabushiki Kaisha) is established in Jan. to produce photosensitized materials. In 1938, it announced that it would develop all photographic equipment including the melting of optical glass and lenses. During World War II, it made aerial cameras and lenses. After the war, it concentrated on optical glass and studio camera lenses, named Rectar. In 1954, all lenses were named Fujinar or Fujinon.*

1935 *In April, the "Super Olympic" with a lens shutter is marketed by Asahi Bussan (forerunner of Ricoh). This is the first 35 millimetre camera made in Japan.*

1935 *In May, Mitsubishi Paper Mills and Konishiroku complete joint research to develop Japan's first practical fiber-based photo paper.*

1935 *In June, Takachiho Seisaku-sho, forerunner of Olympus Optical Company, makes its first photographic lens, a 75 millimetre f/4.5 modelled after the Carl Zeiss Tessar lens. "Zuiko" was the name chosen by the company for its lenses.*

1935 *In July, the Semi Minolta, Japan's first 6x4.5 centimetre format camera using 120 roll film is marketed by Molta Goshi Kaisha.*

1936 *The Riken Optical Industries Limited established. Heir mass production method for making Ricoh's and Ricohflexes today provide part of the reason why it is Japan's largest manufacturer of popular priced cameras.*

1936 *In September, the Hansa Canon, Japan's first 35 millimetre rangefinder camera with a focal-plane shutter is produced by Seiki Kogaku Kenkusho (forerunner of Canon) and sold by Omiya Photo Supply Co., Ltd. It had a Nikkor 50 millimetre f/3.5 lens and a pop-up viewfinder. The Hansa Canon was an imitation of the Leica II. The name "Hansa" was a trademark of Omiya Photo Supply Co., Ltd. Seiki Kogaku, a virtually unknown company, still had no distributor for the camera so it gave sole distribution rights to Omiya and permission to incorporate the "Hansa" trademark.*

Hansa Canon

1936 *In November, Japan's first 2 1/4 square (6x6 centimetre) format camera, the Minolta 6, is marketed by Molta Goshi Kaisha.*

1937 *In August, Canon forerunner Seiki-Kogaku Kenkusho (Precision Optical Laboratory) incorporates into Seiki-Kogaku Kogyo K.K. (Precision Optical Industry Co., Ltd.). This is Canon Inc.'s official year of founding. The new company is headed by Saburo Uchida one of the original founders of the Laboratory.*

1937 *Konishiroku Honten changes its name to Konishiroku Co., Ltd. and began making aerial cameras and X-ray photographic equipment.*

1940 *In January, the Leotax camera is sold by Showa Kogaku Seiki. It was a copy of the Leica 35 millimetre camera except for the rangefinder which was not coupled to the lens.*

1940 *On July 7, camera production was restricted for military purposes only, stunting the growth of the Japanese camera industry.*

1940 *In September, Mamiya Koki Seisakusho produces the first Mamiya Six camera.*

1941 *In July, the Zenkoku Shashin Kikai Seizo Kogyo Rengokai association of photo equipment makers is formed to negotiate with the government on photography equipment matters such as official pricing revisions and equipment procurement and exportation.*

1941 *Mamiya Camera Co. was founded, and earned its first laurels with the Mamiya Six, a folding type camera whose most outstanding recent innovation is a device which permits the back of the camera to move back and forth for focussing instead of the traditional lens-movement focussing".*

1944 *Due to a military supply company law enacted in Dec. 1943, most of the major Japanese photo equipment and materials manufacturers are forced to co-operate in the war effort.*

1945 *During the first few years after the war ended in 1945, Japan faced severe shortages of raw materials. Camera companies were short on materials and capital to rebuild. They had to think about sheer survival rather than developing new cameras. Thus, the first Japanese cameras after the war were pre-war carry over.*

1945 *In December, the domestic manufacturing of film and cameras was restarted. However, the production volume was still low and most of the output went to supply the Occupation Forces, leaving little for the rapidly-increasing domestic demand. In large cities, a black market for film and cameras appeared.*

1947 *Camerabug American soldiers of the Occupation Forces commented that there were too many names to remember with regard to Canon cameras: lenses by Serenar, cameras by Canon, and the manufacturer was Seiki-Kogaku Kogyo. Company president Takeshi Mitarai took this to heart and changed the corporate name to Canon Camera Company Ltd. on Sept. 15, 1947. This name was later modified to Canon Camera Company Inc. in early 1951. The present corporate name of "Canon Inc." was adopted in 1969.*

1948 *Chinon Industries, Inc.'s forerunner, Sanshin Seisakusho, is established by Hiroshi Chino to manufacture lens barrels and mounts for cameras such as Olympus, Ricoh, and Yashica. It started manufacturing lenses from 1959. The corporate name was changed to its current one in Jan. 1973. After being dissolved after the war which destroyed most of the factory, Asahi Optical Co. was restarted. It made binoculars for export.*

1949 *In April., Canon Camera Company markets the Canon IIB 35 millimetre rangefinder camera having a viewfinder which could switch magnifications to match the field of view for the 50 millimetre, 100 millimetre, and 135 millimetre interchangeable lenses. This useful and unique feature helped to establish Canon's reputation for the following 10 years. The camera remained in production for 3 years.*

1949 Takachiho Seisaku-sho is renamed Olympus Optical Company, Ltd. (Olympus Kogaku Kogyo K.K.)".

6.4 An example of military influence in 1931

"Domestic lens manufacturing in 1931 was a goal of both the photographic industry and the Japanese military. Under official auspices, a number of firms were engaged in optical research including:

Nippon Kogaku Kabushiki Kaisha;
Konishiroku Honten / Rokuosha;
Oriental Shashin Kogyo;
Takachihi Kogaku Kikai Seisakusho, now Olympus;
Tokyo Kogaku Kikai K. K.;
Molta Goshi Kaisha, originally Nichi Doku Shashinky Shoten, now Minolta;
Tomioka Kogaku Kenkusho;
Asahi Kogaku Goshi Kaisha;
Inoue Kogaku and
Yamazaki - Shuzando.

The first lenses were shown with the first Japanese between-the-lens shutters. In 1931, Konishiroku Honten / Rokuosha produced with German glass, what is generally considered the first Japanese photographic lens [24]*, the Hexar 105 millimetre. F/4.5 a four element lens in the configuration of the Tessar. In the same year, Nippon Kogaku completed a 120 millimetre. Anytar lens for the 6.5x9 centimetre. format. which was never commercially produced. That year Asahi Optical completed a three element triplet, the Coronar 105 millimetre f/4.5, which was sold by Molta Goshi Kaisha with its Eaton and Happy Hands cameras. Asahi Optical had begun in 1929 to prepare photographic lens production; by 1934 it had become a specialized lens producer, and is believed to have made the lens for the Pearlette, the first camera of complete Japanese manufacturer"* [25].

7 Birth of Nippon Kogaku

Before Nippon Kogaku was born, its parents, brothers and sisters already belonged to the Mitsubishi zaibatsu. The start of that zaibatsu is described below.

7.1 The Mitsubishi zaibatsu

In 1857, at the request of the Tokugawa Shogunate Government, a group of **Dutch engineers**, bringing their own tools and machines, arrived at Nagasaki and started with the construction of a foundry: Nagasaki Yotetsusho. Nagasaki Yotetsusho was the first naval and merchant ship repair plant in Japan [26]. Nagasaki Yotetsusho is nowadays the oldest firm inside the Mitsubishi zaibatsu.


Nagasaki Seitetsusho 1870

In 1860 this foundry was redesigned into ironworks and was renamed "Nagasaki Seitetsusho." This ironworks was completed by the Dutch in 1861. In 1868 the ironworks Nagasaki Seitetsusho, was taken over by the Meiji Government and put under the control of Nagasaki prefectural judiciary. On July 4, 1884 the Mitsubishi Company leased the works from the Japanese Government. Three years later, in 1887, the Mitsubishi Company purchased the whole works from the Japanese Government. In 1893 the works was renamed Mitsubishi Shipyard of Mitsubishi Goshi Kaisha. In 1917 the works was transferred to the control of Mitsubishi Shipbuilding & Engineering Company, Ltd.


Yataro Iwasaki

"Mitsubishi founder Yataro Iwasaki was born in 1834 in the village of Inokuchi on the island of Shikoku. Yataro started a shipping company in October 1870 under the name Tsukumo Shokai, and that was the beginning of Mitsubishi. The company grew rapidly while undergoing a number of name changes: to Mitsukawa, Mitsubishi, Mitsubishi Steamship, Yubin Kisen (Postal Ship) Mitsubishi.

In 1885, Yataro Iwasaki lost control of his shipping company in the wake of a political struggle that had buffeted Japan's marine transport industry. The company merged with a rival and became Nippon Yusen (NYK Line), which would return to the ranks of the Mitsubishi companies in later years.
Though Yataro lost his shipping company, he had established other businesses that formed the foundation for the Mitsubishi organization. One, Mitsubishi Kawase-ten, was a financial exchange house that also engaged in warehousing business. It was the forerunner of today's Mitsubishi Bank and Mitsubishi Warehouse & Transportation. Yataro Iwasaki also had purchased a coal mine and a copper mine and had leased a Nagasaki shipyard from the government. He had participated in establishing the insurance company that now is Tokio Marine and Fire. He even headed up the school that became the Tokyo University of Mercantile Marine.

Yataro Iwasaki died 1885. Yanosuke Iwasaki succeeded his older brother, Yataro, as the head of the Mitsubishi organization in 1885. The following year, he incorporated the Mitsubishi operations as a modern corporation. Yanosuke set about rebuilding the organization around its mining and shipbuilding businesses. He also expanded the organization's positions in banking, insurance, and warehousing and thus laid the foundation for future growth and development.


Hisaya Iwasaki

Yanosuke Iwasaki ceded the Mitsubishi presidency to Yataro's son, Hisaya Iwasaki, on the occasion of a reorganization of the company in 1893. Hisaya Iwasaki divided the Mitsubishi organization into semi autonomous divisions. Those divisions were banking, marketing, coal mining, metals mining, real estate, shipbuilding, and administration. Among the Mitsubishi companies established while Hisaya was president were businesses that now are Mitsubishi Paper Mills, Asahi Glass, and Mitsubishi Cable Industries.

Some of Hisaya's private investments are part of today's


Yanosuke Iwasaki

Mitsubishi companies. He purchased the Kobe Paper Mill, which is today's Mitsubishi Paper Mills. And he backed the founding of Kirin Brewery.


Toshiya Iwasaki

His cousin Toshiya Iwasaki founded Asahi Glass, Japan's first successful manufacturer of plate glass. Mitsubishi management modernized further when Yanosuke's son Koyata succeeded Hisaya as president in 1916.

Koyata Iwasaki, a graduate of Cambridge University, incorporated the divisions as semi autonomous companies. He steered Mitsubishi to leadership in such sectors as machinery, electrical equipment, and chemicals. The companies that later became Mitsubishi Heavy Industries developed automobiles, aircraft, tanks, and buses. And Mitsubishi Electric became a leader in electrical machinery and in home appliances."
[27]

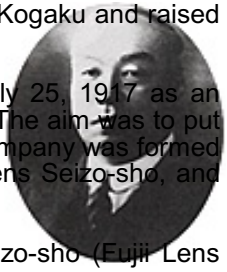
Other Mitsubishi companies before 1920

year	name	later names	founder
1857	Nagasaki Yotetsusho Foundry	Nagasaki Shipyard & Machinery Works	Dutch engineers; Yataro Iwasaki
1868	Spring Valley Brewery	Japan Breweries Co. Kirin Beer Corp.	William Copeland + Emile Wiegand; Hisaya Iwasaki
1868	Takashima Coal Mine		Goryota; Thomas Glover; Hisaya Iwasaki
1870	Tsukumo Shokai	Mitsukawa, Mitsubishi; Mitsubishi Steamship; Yubin Kisen (Postal Ship) Mitsubishi	Yataro Iwasaki
1875	Kobe Paper Mills Co.	Japan Paper Making Co., Ltd.; Mitsubishi Paper Mills	Thomas and John Walsh; Hisaya Iwasaki
1879	The Tokio Marine Insurance Co., Ltd.		Hisaya Iwasaki
1880	Yokohama Specie Bank Limited	The Bank of Tokyo	Hisaya Iwasaki
1881	Meiji Life Insurance	Meiji Fire Insurance; Tokio Marine	Taizo Abe; Hisaya Iwasaki
1884	Mitsubishi Mail Steamship Co.	Mitsubishi Honsha, Ltd.	Hisaya Iwasaki
1884	Nagasaki Shipyard	Nagasaki Zosensho	Hisaya Iwasaki
1887	Tokyo Warehouse	Mitsubishi Logistics	Yanosuke Iwasaki
1888	Nippon Oil Company Limited		Hisaya Iwasaki
1907	Nippon Cable Co., Ltd.		Hisaya Iwasaki
1907	Asahi Glass Co., Ltd.		Toshiya Iwasaki;
1911	Tokyo Cable Mfg. Co.		Hisaya Iwasaki
1916	Tokyo Steel Works	Tanaka Iron Works; Yahata Steel Works; Wanishi Iron Works; Japan Iron & Steel Co.,Ltd.; Mitsubishi Iron; Fuji Steel; Kyusyu Steel; Tokyo Steel; Mitsubishi Heavy Industries, Ltd.; Mitsubishi Steel Mfg. Co. Ltd.	Hisaya Iwasaki; Koyata Iwasaki
1917	Nippon Kogaku Kogyo Kabushiki Kaisha	Nippon Kogaku; Nikon Corporation	Koyata Iwasaki
1918	Edogawa Barium Industry Co., Ltd.		Koyata Iwasaki
1921	Mitsubishi Electric Corporation	Mitsubishi Heavy Industries, Ltd.	Koyata Iwasaki
year	name	later names	founder

So the Mitsubishi zaibatsu was able to offer the Japanese Government a variety of Japanese goods, like steel, coal, oil, glass, means of transport, munition, etc.

7.2 The birth of Nippon Kogaku

Mitsubishi zaibatsu's fourth president, Mr. Koyata Iwasaki, decided to form Nippon Kogaku and raised the necessary funds for an operating capital of 2,000,000 ,= Japanese Yen.



Koyota Iwasaki

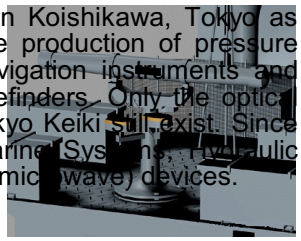
The **Nippon Kogaku Kogyo Kabushiki Kaisha** was started up in Tokyo on July 25, 1917 as an optical instrument shop in order to meet the needs of the Imperial Japanese Navy. The aim was to put an end to the import reliance of the Japanese industry and army in this field. The company was formed through the consolidation of three smaller firms: Iwaki Glass Seisaku-sho, Fujii Lens Seizo-sho, and the optical division of Tokyo Keiki Seisaku-sho.

The Nikon Corporation is stating nowadays that the acquisition of Fujii Lens Seizo-sho (Fujii Lens Works) took place after that Iwaki Glass and Tokyo Keiki merged.

7.2.1 Iwaki Glass Seisaku

The Iwaki Glass Seisaku-sho [28] had been operating since 1881 [29]. In 1885 they made a mirror for a searchlight. And designed 60 centimetre and 75 centimetre (hobutsenankio) searchlights for the Imperial Japanese Navy in 1914 and 1915 respectively. In 1914 Iwaki Glass started experiments to produce optical glass. After that they had also the capability of melting optical glass. Another part of Iwaki Glass stayed in business after 1917. Since 1955 it was working together with Asahi Glass (founded in 1907 by Toshiya Iwasaki, the second son of the second president of Mitsubishi Corporation). Iwaki Glass has for many years set the pace with innovative specialty glass products, especially heat resistance glass as its core business. On January 1, 1999 Iwaki merged with Toshiba Glass, one of leading glass manufacturers, to form "Asahi Techno Glass" (ATG [30]). Maker of headlight glass, bulbs, electronic and industrial glass materials, cookware, and ceramics.

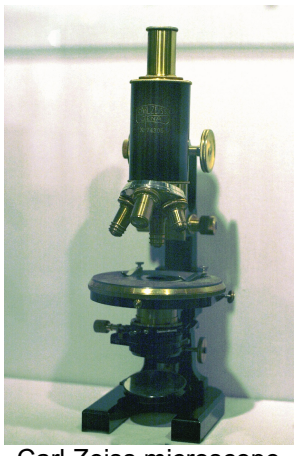
7.2.2 Tokyo Keiki Seisaku-sho



Tokyo Keiki Seisaku-sho, a metal factory, has been established in 1896 in Koishikawa, Tokyo as Japan's first measuring instrument manufacturing plant. It started with the production of pressure gauges, followed in 1901 by compasses, depth sounders, and other navigation instruments and equipment. Since 1913 the optical branch of this firm also produced rangefinders. Only the optical department of Tokyo Keiki became part of Nippon Kogaku. Even today Tokyo Keiki Still exist. Since 1990 they are known as Tokimec [31]. Nowadays they are producing: Marine Systems, Hydraulic Equipment, Fluid Measurement Equipment, Web Inspection System and RF (microwave) devices.

7.2.3 Fujii Lens Seizo-sho

In 1909 [32] Fujii Lens Seizo-sho opened a factory (after renting a dirt floor room in a residence, for research work) in Tokyo. Ryuzo Fujii graduated in mechanical engineering from Tokyo Institute of Technology and became a naval engineer. Assigned to study science in Europe, he spent three years in Germany studying optical design and lens fabrication. His younger brother Kohzo (or Mitsuzo) graduated from Tokyo Imperial University in applied chemistry, and became director and manager of the Aichi Cement Company. In 1908 the two brothers started their own company, which they called Fujii Lens Factory. In March 1909, they created Japan's first modern optical plant in the Shiba district of Tokyo, which they equipped with German fabrication equipment and Zeiss measuring instruments. In 1909 Fujii Lens began repairing military products. The Fujii Brothers were the first binocular manufacturer in Japan, producing their first model with prism in 1911. This was the Fujii Brothers Victor 8x20 [33] [34]. This binocular was sold to the Imperial Navy. Galilean field glasses might also have been made. The Imperial Army and Navy placed enormous orders for telescopes and binoculars, with which one was able to measure exact distances. The WWI brought on difficulties in obtaining the German optical glass used in these early models, but production continued. 6x15 and 6x20 binoculars were exported to Russia and England.



Carl Zeiss microscope 1925

"During the first year it performed optical research. As it happened, Fujii´s brother Kohzo, who had earned a degree in chemistry, became interested an soon left his job to join the new Fujii Lens Seizo Sho company. They had a new plant constructed in the spring of 1909

Fujii Bros. Victor 6x30

located on a lot nearly 13,000 square feet in Tokyo´s Toshima-ku section. It was a modern two-story building with an total work area of 1279 square feet. To equip their new plant they imported lens grinding and polishing equipment from Europe, and optical measuring instruments made by Carl Zeiss. The first floor featured the metal fabricating and rough lens grinding shop. The final assembly and repair shop, with the two lens polishing and one lens element rounding and centering machine, was located at the second floor.
During the first two years Fujii Lens specialized in fixing imported optical instruments for the Japanese Army. In addition to Ryuzo´s training in Germany, the company gained much knowledge about construction methods and design foreign-made optical instruments. It is important to understand that at this time Fujii Lens did not have the equipment or skills necessary for the production of optical glass. Their emphasis was on grinding and polishing lens elements , as well as the fabrication of related metal parts. For projects requiring optical glass, Fujii Lens uses glass imported from Germany or made by the Japanese company Kato Kogaku located in Tokyo. In 1910 Fujii Lens designed and made prism binoculars which were placed on the market the following year. Produced in a test run, these binoculars had an 8x20 field and were called `Victor`. It is assumed that they were sold to the Japanese military.
There are indications that in the same year Fujii experimented with photographic lenses. As it is now understood, the company never actually manufactured any of these lenses. The probable reason for this was that the demand for domestic binoculars was greater than the need for photographic optics. I n Japan at that time photography was not widespread, and besides, any Japanese made lens would have to compete with high quality lenses imported from Germany.
With the successful test run of Victor binoculars, the Fujii Brothers decided in 1912 to venture int the mass production of optical instruments. Their production of binoculars was to be increased, and they planned also to begin melting optical glass. The new glass shop was a direct result of the experience and knowledge gained by the company. To house these activities, a much larger second building was constructed.
In 1913, with its increased manufacturing capacity, Fujii Lens brought out a variety of prism and Galileo-type binoculars. These binoculars were called (interestingly enough!) "Nihongo", and had 6x24 and 8x24 fields for the prism models. Later in the same year the company introduced a refractive-type telescope" [35].

"An earliest NK binocular is marked: Fuji Bros. Tokyo. On the Left marked: "S.I." Magnification 6, No. 75213. It appears to be 6X21 or 6X22 design. Marked with British broad arrows on front prism covers. I have not heard of Fuji Bros. or NK supplying England with binoculars in the early years, but it is interesting to speculate based on this one example. Have you seen others with the British military marking?" [36].

7.2.4 Nippon Kogaku Kogyo Kabushiki Kaisha

The activity of the three factories covered fields such as measurement techniques, manufacturing of optical glasses and lenses, in fact three basic branches necessary to manufacture optical equipment. Having been founded in the late 19th century, the three companies had by then adequate manufacturing experience.


Yoshihara Wada

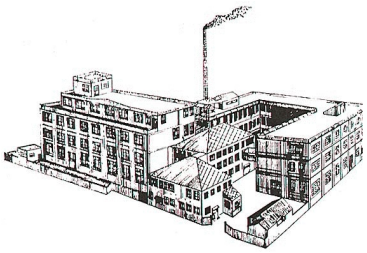
The newly consolidated company Nippon Kogaku Kogyo Kabushiki Kaisha started up with some 200 employees and produced optical equipment. It had to fulfill the optical needs of the Imperial Japanese Navy as well as the Army. Its first products were also used in the scientific and industrial world. By the time the Ohi plant (still being the main plant of the conglomerate) became fully operative in late 1918, World War I came to an end, but it did not changed the government's intention to establish an independent optical industry.

Mister Yoshihara Wada was the first president. But Jeff Alexander says that: Kahei Wada, the head of Keiki Seisaku-sho, was selected during the incorporation to stand as the combined firm's first president.

It is not affordable to stop the production capacity of Tokyo Keiki, Iwaki Glass and the later joined Fujii Lens. Because of the huge number of employees, there must be an big production. And there was no import of German glass. So I suppose, that with the optical glass production of Iwaki Glass a lot of binoculars and other optical instruments could have been made since 1917. But Richard Lane [37] says that Nippon Kogaku started with optical research and production first began in 1918,

7.2.5 The Ohi plant

Ohi factory 1996



Shiba factory 1923

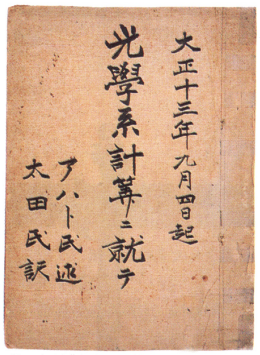
In 1918 it opened the Ohi factory in Shinagawa, south of Tokyo. In the same year Nippon Kogaku build an experimental glass melting furnace, which lead to the start of the production of optical glass. The research and design department nowadays still uses these premisses. In 1922 Nippon Kogaku bought a Naxos-Union optical grinder in Germany. Nippon Kogaku established a glass research facility on the same Ohi premisses in 1923. It also built a glass melting furnace with a capacity of 350 kilo, followed by a glass melting furnace with a capacity of 500 kilo in 1927. In 1920 a BOA tester, a device to test the axle of a cannon barrel was made. In 1924 Nippon Kogaku built and installed a concussion machine for testing, with forces up to 10 G. The first successful experiments with melting with the use of electricity were performed in 1930. In the basement of the factory No. 1 a deep freezer was installed in 1935.

7.3 European contacts

Ryuzo Fujii travelled in 1918 to Europe, mainly to Germany. He had contacts with Carl Zeiss Jena and the glass factory of Schott Bros. To form a joint venture with Carl Zeiss wasn't a success, although even today Nikon Corporation is still buying Schott glass. According to some sources Nikon Corporation tried twice in its history to buy the Schott company.

In 1921, eight German scientists & engineers were hired by Nippon Kogaku K.K. for five years:

Heinrich Acht, (the principal engineer) product design and drafting;
Ernst Bernick, mechanical engineering;
Hermann Dillmann, optical computing;
Max Lange, optical design;
Albert Ruppert, prism grinding and polishing
Adolf Sadtler, lens grinding and polishing;
Otto Stange, product design and drafting and
Kurt Weise, lens grinding and polishing [38].



Heinrich Acht and notes about an optical plan written on 1924-06-04 (picture 75 Years History)

Max Lange and Adolf Sadtler died in Japan, five others went back to Germany in 1926, but Heinrich Acht stayed in Japan until 1928. The Germans did an efficient job in different fields ranging from organisation to optical design. Heinrich Acht extended his contract for another three year period and he was in charge of managing optical design until the end of his stay.

In those days there was in fact just one very good optical firm in the world: Carl Zeiss (including Schott) from Germany. I've never discovered where these eight German engineers worked before they came to Japan. They received their invitations in 1919, which is one year after the World War I and at that time Germany was facing a high unemployment rate.
There is no personal record of these 8 gentlemen. Because two of them died in Japan and the others went back rather quickly most of them might have been older than 50 or 60.
As we can read in several books of Nippon Kogaku's history (50 & 75 years) and other documents Nippon Kogaku was and is still very proud of its German engineers. This proud may lead to the assumption that the Germans might have been former employees of Carl Zeiss, as one isn't proud to employ some unemployed German engineers but one will be proud to steel them from the "horses mouth". There are two other sources:
"*I know Zeiss sent a team out to Nippon Kogaku in the 1920s*" [39]: Stephen Sambrook.
"*It is interesting to consider if N.K. obtained the production rights (or license) from Zeiss to produce this artillery telescope in the early 1920s*" [40]

表1-7 アハト設計の写真レンズ

名称	タイプ	口径比	焦点距離(cm)
アニター Anytar		1 : 4.5	7.5, 10.5, 12, 15, 18
ドッペル・アナスチグマート Doppel anastigmat		1 : 6.8	7.5, 10.5, 12, 15, 18
ダイアリト・アナスチグマート Dialyt anastigmat		1 : 6.3 1 : 4.5	7.5, 10.5, 12 12.0
フリーゲル・オブジェクティブ Flieger objektiv		1 : 5.4 1 : 4.8	50 50
ポートレート・オブジェクティブ Porträt objektiv		1 : 3.5 1 : 3.0	30 24
プロジェクションズ・オブジェクティブ Projektions objektiv		1 : 2.0	7.5

Lenses made by H. Acht (picture 75 Years History)

One of the first tasks for the group was redesigning Nippon Kogaku binoculars, resulting in the Luscar, Mikron and Atom models of 1921. The German group also helped Nippon Kogaku in 1921/22 to design and produce some refractor type telescopes, like the 5 centimetre, 10 centimetre and an 50 centimetre reflector models, for astronomical use. In 1922 they constructed another telescope with an 50 centimetre mirror. The German team also assisted in the production of photographic lenses. The first was an 50 centimetre anastigmatic triplet lens.
In that same period, Kakuya Sunayama started up as a engineer for optical items. With help of the German team he became the most promising candidate for the optical design department.

In 1928 Kakuya Sunayama visited for a period of 8 months several optical industries in Germany, France, England and the Netherlands. Maybe he has been assisted on parts of this tour by Heinrich Acht, as Mr. Acht travelled back to Germany on the same ship. After his return to Japan Mr. Sunayama became head of the commercial photographical lenses design department.

In 1929 Sunayama designed and improved a 50 centimetre f/4.8 aerial lens, called the Trimar, and a first experimental version of the 12 centimetre f/4.5 Tessar type for 6.5x9 plate cameras, called Anytar.

7.4 Co-operation with Canon

"Goro Yoshida (1900-1993) was one of the two founders of Seiki Kogaku Kenkyusho in 1933. Mr. Yoshida was the first person to turn his attention to the production of Japanese small precision cameras. Despite of several Leitz patented ideas, Mr. Yoshida had various ideas in order to develop new focal distance adjusting mechanism. The first idea was "a camera with an attached rangefinder" with registration number 220536. In November 1936 Yoshida registered more ideas: 230748; for a device on a camera that adjust the position of the object lens according to the shooting distance. 245135; a device on a camera that adjust the object lens automatically to the shooting distance. 254037; a device that adjust freely the ratio of the rangefinder movement and the ratio of the focussing movement of the lens in the middle of the coupling section. These last three ideas were made in a period that Yoshida already left Seiki Kogaku. His ideas were not used by Seiki Kogaku.

The other founder of Seiki Kogaku was Saburo Uchida. They were soon joined by Takeo Maeda and they produced the prototype Kwanon 35 millimetre camera in 1934. Also in 1934 Saburo Uchida consulted his older brother Ryonosuke Uchida, about getting hold of high performance lenses for small precision cameras and solving the problem of focus adjustment mechanism. Ryonosuke, a graduate of the Naval Academy at Edajima, had been a navy officer and was an expert on gunnery. When he was making fuses for shells at Nippon Kogaku, he was the supervisor in that division at the Ohi factory. He recommended that Uchida seek assistance from Nippon Kogaku on this matter. By the end of the summer in 1934, Uchida, together with Maeda Takeo, visited Nippon Kogaku. They took with them the prototype Kwanon camera in a nice silver box. At Nippon Kogaku, Shigeji Yamamoto, the sales section manager, and Noboru Hamashima, the chief of the civilian supplies, received the Uchida party. Later Sunayama, the design division director, joined the meeting. Uchida asked for co-operation and Sunayama agreed. Sunayama must have been eager to give full support to the realisation of the first Japanese 35 millimetre camera, which Seiki Kogaku was about to perfect. Sunayama had been pouring his passion into developing lenses for 35 millimetre cameras. The Nippon Kogaku lens that had no prospect of selling, finally found a marketing channel" [41].

Nippon Kogaku agreed to co-operate with the company which was later named Canon. It designed and manufactured coupled rangefinder mechanism, which were mounted in cameras. Those cameras were already fitted with shutters, so Nippon Kogaku in fact did the finishing touch. Nippon Kogaku had already succeeded in designing and manufacturing 35 millimetre camera lenses, and thus, by installing its lens, was able to complete the camera that Yoshida had dreamed about.

In Arakawa's "Forty Years" there is a remark saying that "with support from our

company, Seiki Kogaku was founded in November, 1933. After a considerable struggle it succeeded in manufacturing a small camera" [42].

Eiichi Yamanaka, who entered Nippon Kogaku in 1931 and who worked in the civilian supplies design department, was given the task to design the focus adjustment mechanism. This marked the beginning of Nippon Kogaku's involvement in of 35 millimetre cameras mechanism.

Yamanaka's idea brought about the unique focus adjustment mechanism that distinguishes the Hansa Canon camera. The application for a patent on this invention was submitted on June 27, 1935, in the name of "a device which adjusts the position of the object lens in a camera to accommodate the shooting distance". The inventor was Eiichi Yamakana, the applicant was Nippon Kogaku, and the registration number was 229211".

"Nippon Kogaku, at that time, had already established its position as the largest optical equipment manufacturer in Japan with advanced manufacturing system specializing in military equipment. Since Saburo Uchida's brother, Ryonosuke Uchida, was once an auditor at Nippon Kogaku, Saburo Uchida was introduced to Toyotaro Hori, the executive vice president and the counsel of Nippon Kogaku.

Those days, under Nippon Kogaku's policy to enter the civilian product market, Hori was in charge of studying non-military products. He was interested in the application of high-grade lenses for civilian use. The timing of the request for co-operation by Precision Optical Instruments Laboratory was perfect. Recognizing benefits on both sides, Precision Optical Instruments Laboratory and Nippon Kogaku came to an agreement to develop the "Hansa Canon (Standard Model with Nikkor 50 millimetre f/3.5 lens)" with the full support of Nippon Kogaku. The first Canon camera under this joint development was introduced to the market in February l936 (although some have said that the actual date was October l935). In manufacturing the "Hansa Canon," Nippon Kogaku was responsible for the lens, the lens mount, the optical system of viewfinder and the rangefinder mechanism, while Precision Optical Instruments Laboratory was responsible for the main body including the focal-plane-shutter, the rangefinder cover as well as the assembly of the camera body. The "Hansa Canon (Standard Model)," became Canon's first commercial camera. Later, the name of the "Kwanon" changed to "Canon" [43].

Why would Canon choose a lens made by its rival for their first camera? The simple fact is that half a century ago Canon and Nikon weren't rivals. Back then, it took both companies to produce a quality camera. So the lenses produced by Nippon Kogaku K.K. were the first lenses (made in Japan) ever capable of replacing high quality foreign-made lenses. Although the know-how and the technological aspect of the lens design came from Europe. A legacy of lens-making technology left by Heinrich Acht, an engineer who came to Nikon from Germany in the 1920s - which enabled Kakuya Sunayama, the head of Nikon' s Design Departments to attempt to develop a camera lens. After innumerable trials, Mr. Sunayama finally succeeded in creating a high quality lens in 1932 [44].

"When in 1935 Seiki Kogaku started manufacturing their own cameras, Nippon Kogaku began supplying them with finished optical lenses in metal tubes. Seiki Kogaku placed these tubes into lens mounts ready for mounting onto the required cameras. Early in 1939. Seiki Kogaku purchased 2 lens generators, 5 lens polishing machines and an lens checker or Vertometer. Mr Ryozo Furukawa, a lens designer was transferred to Seiki Kogaku from Nippon Kogaku. Mr. Furukawa's job was to help set up these optical machines in the Nakane-cho Meguru factory. He had previously worked at Nippon Kogaku under Mr. Kakuya Sunayama, their chief lens designer" [45].

Robert Rotoloni mentions in his article about "Who made what?" in NHS Nikon Journal [46], that he thinks that Nippon Kogaku also provided Seiki Kogaku with lenses after 1947. The common 5 centimetre f/3.5 Nikkor on most of the Canon S-II body's before 1947 are similar with the later 5 centimetre f/3.5 Serenar on Canon S-II body's between 1947 and 1949.

The first lens for a 35 millimetre film format camera, a 5 centimetre f/3.5 - was produced in July 1935 by Nippon Kogaku, and built in the Hansa Canon camera. Somewhat later a 5 centimetre f/4.5 was produced.

In August 1937 a 5 centimetre f/2 Nikkor lens, and later in January 1939 a 5 centimetre f/1.5 Nikkor lens were produced for the Canon cameras.

There is an nice article about "the earliest Nikkors"from Hayato Ueyama in NHS Journal 22.

In 1939 Seiki Kogaku made its first lens, an 50 millimetre f/1.5 Seiki Serenar for an X-ray camera. Then in 1940 Seiki Kogaku made an 75 millimetre f/4.5 lens for military purpose.

At this moment, the Canon Corporation says on their web site [47]: that the Serenar 35 millimetre f/3.5 (1950) was the first photographical lens they made.

"Before joining Seiki Kogaku in 1939, Ryozo Furukawa worked under the head lens designer at Nippon Kogaku, Mr. Kakuya Sunayama. During this period of time, the 5 metre f/3.5 Nikkor was designed for

the Kwanon, which was renamed the Hansa Canon camera. In June 1934 Seiki Kogaku presented Nippon Kogaku with an German 5 centimetre f/3.5 Elmar lens, which was examined by Sunayama. The first 5 centimetre f/3.5 was completed in December 1934. Made entirely from glass melted at Nippon Kogaku, it was patterned after the Zeiss Tessar. In January 1935, Furukawa checked the performance of the then new 5 centimetre Nikkor against that of the 5 centimetre Elmar and found the performance of the German optic to be better than that of the new Nikkor lens. This comparison came as a surprise to Sunayama and Furukawa, since they believed that their Nikkor was the world's number one copy of the original Zeiss Tessar lens. This situation was complicated even more by the fact that the Tessar-based Elmar was the product of a much smaller company: Ernst Leitz from Wetzlar. Subsequent improvements in optical glass allowed this situation to be corrected in May 1937, when Nippon Kogaku improved the performance of its 5 centimetre f/3.5 Nikkor. It has been thought that because Sunayama was really never satisfied with the optical performance of the original 5 centimetre f/3.5 Nikkor, he went on to design the sharp 5 centimetre f/4.5 Nikkor. Not introduced until 1939, this lens and its companion 5 centimetre f/2.8 Nikkor were designed during 1935-36 before the performance of the 5 centimetre f/3.5 was improved as a sharper alternative"[48].

7.5 E-mails

Onderwerp: RE: permit for publication
Datum: Tue, 20 Jan 2004 11:42:14 +0100
Van: "Leigh R." <leigh@nikonbv.nl>
Aan: Hans Braakhuis <hans.braakhuis@planet.nl>
CC: Schaefers

Dear Mr Braakhuis, Many thanks for your continued efforts in promoting Nikon. Actually your request should firstly be directed to us via Inca BV Haarlem, plus my colleague here at Nikon Europe BV., Ms Yvonne Schaefers handles such requests & matters. I will pass on your request, however please contact Inca BV and Yvonne later (now on vacation until next week), on how we can proceed & assist you with your request. Thank you in advance & best regards, Richard Leigh (Nikon Europe)

-----Original Message-----
From: Hans Braakhuis [mailto:hans.braakhuis@planet.nl]
Sent: maandag 19 januari 2004 20:45
To: Leigh R. (Nikon Europe)
Subject: permit for publication

To Richard Leigh,

Dear Sir,

As you might know the Nikon Historical Society's 9th convention will be held on February 22, 2004 in Tokyo, Japan. On that occasion I am working on a publication about the history of Nippon Kogaku, covering a period between 1600 and 1949.
This publication won't be a commercial product but just a convention handout. For illustration purposes only I would like to ask your permission to use approx. 10 pictures from the Nikon 75 Year History (1993) book. I also would like to make use of some quotes from that book and the Nikon 50 Year History book (1968). Both pictures and texts can be scanned from both books, which are in my library. I will certainly make a special note in my publication about your permission and possible additional information.
I would like to thank you in advance.
sincerely yours, HB. (enclosed: table of contents and chapter 7 and 8 without pictures)

No permit received. HB.

Onderwerp: Re: permit to use some text
Datum: Mon, 24 Nov 2003 16:53:08 -0600
Van: Jason Gregory Zorbas <jgz816@mail.usask.ca>
Aan: Hans Braakhuis <hans.braakhuis@planet.nl>

Dear Hans Braakhuis, Unfortunately the copyright remains with Jeff, so as the editor of Gateway, my hands are tied. The best thing to do would be to track Jeff down and I'm sure that he would be very pleased with your interest. If I can help in any other way, let me know. Sincerely, Jason Zorbas, B.A., M.A. Ph D Candidate, University of Saskatchewan, Editor, Gateway, jgz816@mail.usask.ca, (306) 966-1843

Onderwerp: Re: Nikon Article
Datum: Fri, 05 Dec 2003 22:56:43 -0800 (PST)
Van: jwscott <jwscott@interchange.ubc.ca>

Aan: hans.braakhuis@planet.nl

Dear Hans, Many thanks for your message and your inquiry. I have seen the NHS web site and I was impressed by the members' passion for Nikon's history and its products. I would be pleased to permit you to reprint passages of my article in your publication - but you will also need the written permission of a company that later published the article in a print journal. The journal "Japanese Studies", out of the University of Melbourne, Australia, published an updated, edited, and corrected version of the article in Winter 2002, and their parent company, Carfax Publishing Inc. requires written permission for any reproductions. I would prefer if the JS version of the article was used in your publication. Academic articles are not typically published in more than one place, however, Carfax and JS did not have any difficulty with my article appearing in a graduate-student online journal such as the BC Asian Review as well, which was very accommodating. I have included the bibliographic details below, as well as links to the Japanese Studies web site and the Permissions web page. You shouldn't have any trouble finding a copy of the journal at a university library near you, and I think copies can also be purchased online through the JS web site, but I'm not sure. I would send you a reprint, but I am in Japan right now, and I don't have a copy handy.
Please let me know how your article is coming along, and its themes, etc. Anytime you feel comfortable sending me a draft, I would be pleased to see it. Also, can you send a few details about the JCII museum? Many thanks. Your project sounds very interesting.

Best regards, Jeff Alexander, Ph.D. Candidate, Dept. of History, Affiliate, Centre for Japanese Research, University of British Columbia, Vancouver, BC, Canada, jwscott@interchange.ubc.ca

Bibliographic Entry: Nikon and the Sponsorship of Japan's Optical Industry by the Imperial Japanese Navy, 1917-1945, Japanese Studies, Vol.22, No. 1, 2002.

Japanese Studies Web Site: http://www.tandf.co.uk/journals/customer.html

JS Permissions Web Site: "Requests for permission to photocopy or republish material must be received in writing via mail, fax, or online submission. For further information, please visit: "http://www.tandf.co.uk/journals/permissions.html.

"I did a request for permission on December 22, 2003, but received no answer yet: H.B."

Onderwerp: Re: NHS Convention in Tokyo
Datum: Sun, 23 Nov 2003 06:16:22 -0500 (EST)
Van: CARRLANE@aol.com
Aan: hans.braakhuis@planet.nl

Hello Hans, I would certainly approve your including the information from the previous issues of the journal. Since the articles were published by Bob Rotoloni, I would get his permission to use the information from the previous issues as well. I saw your previous list of binoculars forwarded from Peter Abrahams. Did you receive my input I sent to Peter? I'm looking forward to you list. I would appreciate a copy of your list produced so far. Regards, Rich Lane

---

Onderwerp: Re: Nikon 250
Datum: Mon, 24 Nov 2003 20:13:39 -0800
Van: Peter Abrahams <telscope@europa.com>
Aan: Hans Braakhuis <hans.braakhuis@planet.nl>

Hello Hans, Is your project only for pre-WWII NK? If yes, then you might have a complete list of binoculars, or at least all the models that I know about. This is because I have never seen a pre-WWII NK catalogue. I've only seen examples of binoculars and some pictures in books. Hopefully the meeting organizers in Japan can help. It is very difficult otherwise. I hope you are not upset when you see the 250. It is not locked up or even in a room, it is at the very top of one of the big stairs, where the public does not go.

Aan: hans.braakhuis@planet.nl
Van: Jason Zoppel <zzopit@yahoo.com>
Ontvangen op: donderdag 1 januari 2004 om 16:57 uur
Onderwerp: Aero Nikkor lens, photos
Bijlage(n): AERONIKKOR1.JPG, AERONIKKOR2.JPG, AERONIKKOR3.JPG

Sorry for the delay, the lens was packed away with my other camera bits. This is the Aero-Nikkor that I mentioned on the Nikon HS website. It was in my Grandfather's estate with some other WW2 items he brought back.

Thank you for the info on the SK-100, this confirms other findings. While at the Nikon HS event in Tokyo I would appreciate if you could ask some of the other collectors what they think this lens may be worth. I hope to determine it's value and perhaps sell or trade it to another collector. Regards, Jason Zoppel.

Onderwerp: Re: Nikon History 1600 - 1949
Datum: Sat, 03 Jan 2004 11:30:16 -0600
Van: Robert Rotoloni <rotoloni@msn.com>
Aan: Hans Braakhuis <hans.braakhuis@planet.nl>

Hans, This is a very interesting paper. This is a very detailed item! I am sure it will be very well received the members at the convention. Yes, you can excerpt from the Journal as long as you credit the author, the Journal and the Society I am OK with that. I would want your paper to be as complete as possible. See you there Hans. take care Robert

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Onderwerp: Re: NHS Convention Tokyo
Datum: Wed, 07 Jan 2004 05:03:57 -0800
Van: John Baird <jbaird> [49]
Aan: Hans Braakhuis <hans.braakhuis@planet.nl>

Hans, Looks great...please use whatever you need. If you need any help, please don't hesitate to contact me. Best regards, John Baird

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Onderwerp: Re: NHS Tokyo Convention
Datum: Tue, 30 Dec 2003 05:47:07 -0500 (EST)
Van: Johnamillham@aol.com
Aan: hans.braakhuis@planet.nl

Hello Hans, Thanks for the E-mail. I'm sorry to say that I can't add much to your history of the Nikon microscope. I do have some comments to make, but it's not a lot! I look forward to the convention and will see you there. Regards - and Happy New Year, John

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Onderwerp: Re: the last 50 days before the NHS Tokyo Convention
Datum: Sun, 04 Jan 2004 14:18:17 -0500 (EST)
Van: TTAbrahams@aol.com
Aan: hans.braakhuis@planet.nl

Hans, impressive list that you put together. I have an addition for you - the 5cm f:3,5. Looking forward to Tokyo and we, Tuulikki and I, will see you there. All the best, Tom A

Onderwerp: NHS Tokyo
Datum: Mon, 05 Jan 2004 11:42:36 -0500
Van: Kraus <Bildot@comcast.net>
Aan: Hans Braakhuis <hans.braakhuis@planet.nl>

Hi Hans, thanks for the message about your planned publication for the convention. I will review it shortly, as asked. Happy New Year, and looking forward to seeing you in Tokyo, Bill Kraus

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Onderwerp: Re: NHS
Datum: Mon, 05 Jan 2004 09:31:19 -0800
Van: "Mike H. Symons" <msymons6456@telus.net>
Aan: Hans Braakhuis <hans.braakhuis@planet.nl>

Hi Hans; Now your messages are getting through. Yes, the bottom JPG is an "Hotaikyo Camera 96 or also known as the Artillery Telescope Camera", and yes, I give you full approval to use any of my text on this camera. PS- Happy New Year by the way! I look forward to meeting you in Tokyo. Cheers, and nice hearing from you. Mike

7.6 Notes

1. Jeff Alexander, a PhD Candidate, Dept. of History, Affiliate, Centre for Japanese Research, University of British Columbia, Vancouver, British Columbia, Canada. On October 26, 2001 he spoke at the Centre for Japanese Research, in the Conference Room of the Institute of Asian Research (CK Choi) Building, 1855 West Mall, Vancouver, Canada. The title was: “Japan's Optical Industry during the 1920s, 1930s, and the Post WWII Era”. Jeff Alexander also made a publication named: Nikon and the Sponsorship of Japan’s Optical Industry by the Imperial Japanese Navy, 1917–1945 . The article was published first in the BC Asian Review (BCAR), this is a refereed on-line journal of research on Asia, number 13 of 2002. The journal "Japanese Studies", issued by the University of Melbourne, Australia, published an updated, edited, and corrected version of the article in Winter 2002 , Their parent company is: Carfax Publishing Inc. Bibliographic Entry: Nikon and the Sponsorship of Japan’s Optical Industry by the Imperial Japanese Navy, 1917-1945, Japanese Studies, Vol.22, No. 1, 2002.

2. See the article from Philip Greenspun: http://www.photo.net/japan/timeline

3. The arrival date of “De Liefde” 19 April 1600 is based on the Julian calendar. It was 29 April of the Gregorian calendar we use today, and 16 March of the 5th year of Keicho in the Japanese calendar.

4. See the complete article from Kono Makoto (look on the www for his book)
The first V.O.C. office was at Hirado on Kijusju Island in 1609. The Deshima office started in 1641.
See: https://nl.wikipedia.org/wiki/De_Liefde_%28galjoen%29

5. Because of the Dutch ambiance, I always use the Yaesu Hotel in this area.

6. On www.voc-kenniscentrum.nl/gewest-japan.html it says that Deshima was build in 1641.

7. From http://www1.tcue.ac.jp/home1/english/students02/class09/group02/History.html

8. Screech, Timon: The Western Scientific Gaze and Popular Imagery in Later Edo Japan: The lens within the Hearth, Cambridge: Cambridge University Press 1996, Chapter 7, pp 212-253, The View From on High. Screech, School of Oriental & African Studies, University of London.

9. Lord.

10. According to: Ryûichi Kaneko in Japanische Photographie 1860 - 1929, page 11.

11. Johannes L.C. Pompe van Meerdervoort.

12. According to Yoshiro Tanaka, in chapter one from The History of the Japanese Camera.

13. See: www.sieboldhuis.org. A lot of Siebold’s papers and collectables can be seen at the Rijksmuseum voor Volkenkunde in Leiden, the Netherlands (http://www.rmv.nl).

14. See the complete article from Philbert Ono at: hppt:/www.photojpn.org.

15. See Peter Abrahams article: The History of the Telescope in Japan.

16. See their homepage at: http://www.kahaku.go.jp/english/.

17. Glasgow based company which is now part of Pilkington Optronics.

18. Meishi format is 57x83 millimetre plate format (2¼ x 3⅛ Inch).

19. Or Konishi Honten, now Konica Minolta.

20. From the April 1957, page 140, in The Japanese Photo Industry Magazine from 1958.

21. from Philbert Ono’s site, the Jeff Alexander article and The evolution of the Japanese camera.

22. 50 Years history of the Nikon Company, page 56. Gojunen no ayumi / 50-nenshi

23. There is an similarity with the founding of Nippon Kogaku.

24. So the Heinrich Acht 1921 lenses for Nippon Kogaku were not seen as Japanese lenses by this author.

25. From the Masao Tanaka and Hajimu Miyabe chapter 5 in The history of the Japanese camera.

26. This is the Dutch connection with the Nikon Corporation.

27. See the article at: www.mitsubishielectric.ca/corporate/our_history.html.

28. They made at that time ordinary sheet glass and no optical glass. I could'nt find any connection between Asahi Glass and the glass melt from Nippon Kogaku. A nice Dutch connection in recent times is that Asahi Glass designed "Huis te Bosch" , a Dutch village at Kyushu, Nagasaki.

29. Other authors say 1878, 1880 or 1883?

30. See: http://www.atgc.co.jp.

31. See for more information about Tokimec: http://www.tokimec.co.jp/english/whats/history.htm.

32. In the Japanese Photo Industry 1958 it says: Production on an industrial scale started in 1907 with the establishment of the Fujii Lens Factory, which manufactured binoculars for the civilian market as well for use by the Imperial Japanese Navy (page 140).

33. The Fujii Bros. Victor No. 5x6 and a prewar Nippon Kogaku "Nikko" Orion or Luscar binoculars have a lot of similarities. See an article at: www.cameraguild.co.jp/nekosan/binos.htm.

34. There is an picture and small article of this binoculars in NHS Nikon Journal 73, page 21 from Bob Thompson.

35. See the complete article from John Baird in NHS Journal 29.

36. Steve Stayton.

37. NHS Journal 82, Nippon Kogaku logos 1918 - 1945, page 6.

38. On other places I found other names: for example Max Lang and Karl Weise.

39. Stephen Sambrook in an e-mail list on the subject of binoculars, by Peter Abrahams.

40. Richard Lane: NHS Journal 82 page 7.

41. Extracted from "The Nikon story" from T. Arakawa, translated in NHS Nikon Journal 47.

42. Arakawa; The founding, chapter 2.

43. See the Canon article: www.canon.com/camera-museum/history/canon_story/1933_1936.

44. See: Canon Lens Serial Numbers in British Photographic World Magazine, May 2003.

45. See: www.mir.com.my/rb/photography/companies/nikon/htmls/nikon_canon.htm.

46. See NHS Nikon Journal 79, March 2003, page 1, 2 and 3.

47. canon.com/camera-museum/camera/lens/index.htm.

48. From John Baird: What If, a reading paper from the NHS 4 Convention in Utrecht, Netherlands in 1994.

49. I changed the email address.