

High Technology in 16th-Century Japan

By Noel Perrin

In early January, 1855, the U.S.S. *Vincennes*, an eighteen-gun sloop of war under Commander John Rogers, USN, dropped anchor in the southern bay of Tanegashima Island, at the southern tip of Japan. She had come to begin a survey of Japanese coastal waters. The Japanese were not at all anxious to have foreigners prowling around their islands, but they were powerless to prevent it. Not only did they lack a navy, but just the year before, under the sixty-four-pound guns of Commodore Perry's fleet, they had reluctantly signed the Treaty of Kanagawa, the celebrated "opening of Japan." The treaty specifically authorized this survey.

On January 9th Commander Rogers led an armed party ashore to buy stores. He was poorly equipped for business transactions, having no knowledge of Japanese and no interpreter - having nothing, in fact, but an English-Chinese dictionary. Nevertheless, he did get his wood and water, bargaining for them in sign language. He also got a good look at native life. The thing that impressed him most about the islanders was their almost complete ignorance of modern weapons.

"These people seemed scarcely to know the use of firearms," he noted in his report to the Secretary of the Navy. "One of (my) officers caught the Japanese word for gun with which a very learned man was displaying his knowledge to his companions. It strikes an American, who from his childhood has seen children shoot, that ignorance of arms is an anomaly indicative of primitive innocence and Arcadian simplicity. We were unwilling to disturb it."

In writing his report, Commander Rogers showed himself to be almost as Arcadianly simple as the Tanegashimans. They were innocent about guns, all right, but it was an acquired innocence,

not a primitive one. The ancestors of these islanders had not only used guns but had been the first in Japan to do so, and in the mid-16th century guns were known all over Japan as *tanegashima*. Later the standard word became *teppo*, and this is presumably the word the American officer overheard in 1855. By then the Japanese had moved from swords to guns and back to swords again. They had fought battles in the late 16th century using more guns than any European country possessed.

But of all this Commander Rogers knew nothing. He didn't even know that his survey was repeating one done by the Spanish in 1612. Nor is his ignorance surprising. In 1855 no American knew much about Japan. Suppose Rogers had tried to prep up, and had consulted the great *Encyclopedia Britannica*. That learned work would have informed him that the country was ruled by the descendants of "Jejessama," by whom they unquestionably meant Tokugawa Ieyasu. "Jejes" is an anglicization of "Ieyasu," and "sama" is an honorific. It would be roughly comparable if a Japanese encyclopedia had said that the first president of the United States was a person named "Honorable George" - or better yet "Honorable Joji," since this is how "George" would appear in Japanese.

Of guns, past or present, he would have learned virtually nothing. The whole story of the Japanese adventure with guns, to the extent that it was ever known in the West, had been almost entirely lost over the centuries. Even now it has not been fully recovered.

But one fact is certain. The Japanese were keen users of firearms for nearly a hundred years. They then turned back to swords and spears. Few scholars agree completely on what made them do it, or on how, having gone so far with guns, they were able to retrace their

steps. Contemporary accounts are scarce.

The story begins clearly enough, however. It starts within a mile of where the *Vincennes* anchored in 1855, a little over three centuries earlier. The year was 1543, and a Chinese cargo ship had come into that same small harbor. About a hundred of the crew were Chinese trader-pirates of a type common at the time. Three, however, were Portuguese adventurers, also of a type common at the time. Two of the three had guns and ammunition with them.

Guns were not wholly unknown in the Japan of 1543. As in China, there were a few miserable iron tubes called *tetsuho*, lacking both sights and trigger. But the two Portuguese arquebuses were the first real guns to enter the country. When Lord Tokitaka, the feudal master of Tanegashima, saw one of the adventurers take aim and shoot a duck, a new era in military technology began. Within a month, Lord Tokitaka had bought both arquebuses. Within a year his chief swordsmith had made ten working guns. Within a decade, gunsmiths all over Japan were making the new weapons in quantity. An order for 500 *tanegashima* put in by Lord Oda Nobunaga in 1549 is still on record.

The new gunsmiths, nearly all of them former swordsmiths, did not just copy the Portuguese models. By 1553, a decade after guns arrived, the Japanese arquebus had a new helical mainspring and an adjustable trigger pull and in some armies even an anti-glow device for the burning match of a matchlock, so as to keep it from being visible at night.

This rapid adoption of - and improvement on - a piece of foreign technology has an interesting parallel with something that occurred in England at the same moment. In 1543, as the first Japanese matchlock was being hammered out, the first iron cannon was

UNKNOWN JAPAN

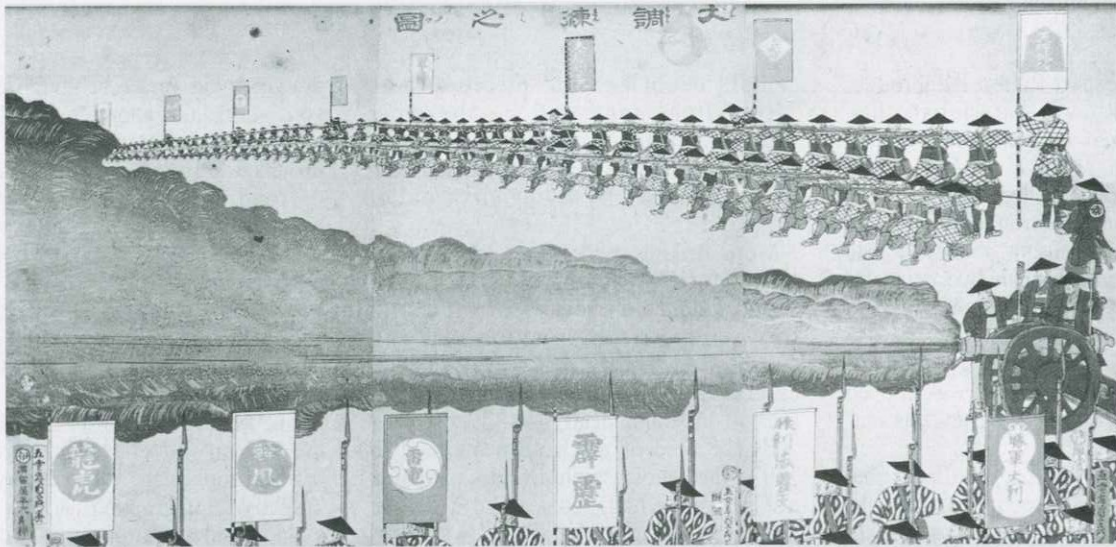


Photo : Bradley Smith Japan : A History in Art

Guns played a decisive role in the Battle of Nagashino in 1575

being cast in England. It was a huge success. England quickly became the recognized prime source of iron cannon - and when the king of Spain was assembling his huge armada to invade England in the 1580's, he armed many of the ships with black-market English cannon.

But how did England come to develop the iron cannon? England didn't. What happened in 1543 was that a French iron-master named Peter Baude arrived to teach the English metal-workers. Technology was then, is now, and always will be international.

By 1575, *teppo*, as they were now called, were decisive in most battles. In the Battle of Nagashino that year, Lord Oda trounced Lord Takeda Katsuyori. Chief reason: of his 38,000 men, 10,000 were armed with guns, and 3,000 of these 10,000 were behind breastworks across the Taki River, drawn up in three ranks of a thousand each. They fired volleys on command. The first rank could be almost reloaded before the third rank fired. Takeda's cavalry bravely but foolishly charged, and were mowed down. A Japanese lieutenant general, writing in 1913, said that in his opinion there had been very little improvement in infantry tactics since Nagashino.

At Nagashino, incidentally, both sides had a few artillery pieces. They were made in Japan, but with the aid of Portuguese advisers, much like Peter

Baude in England. A few months after Nagashino, the first two cannon made in Japan entirely by Japanese metal-workers were delivered to Lord Oda for test-firing at Gifu.

It's also interesting to compare Nagashino with European battles of the time. With, for example, the Battle of Glenlivet fought in Scotland in 1594. That battle was fought between feudal chiefs not wholly unlike Lord Oda and Lord Takeda. On one side was the Earl of Argyll with 10,000 Highlanders. On the other, the Earl of Huntly marched up with 2,000 Lowlanders.

And against those odds he won a great victory. How? By having a few hundred matchlockmen and six artillery pieces. As the Historiographer Royal of Scotland wrote in 1898, the firing of cannon was a sound that "Highlanders long after this period could never hear without panic." If Commander Rogers wanted to see true Arcadian simplicity, he should have been at Glenlivet.

Firearms reached their apogee in Japan in the 1590's. Lord Hideyoshi, who was now the regent, invaded Korea. His plan was to move up the peninsula as American troops were to do three and a half centuries later, go on into China and conquer her, and then as a sort of light dessert, snap up the Philippines. He was attracted by a report that the Spanish garrison would be a pushover, which for his large and high-tech army it

almost certainly would have been. Even the Spanish thought that. A Spanish royal decree of the year 1609 specifically directed Spanish commanders in the Pacific "not to risk the reputation of our arms and state" against Japanese soldiers. On the one occasion when a Spanish commander ignored the decree, he lost.

How high-tech *was* the army? Very. Something over 40,000 of the original invasion force carried matchlocks, and superb weapons they were. Hear the testimony of the authors of the first Korean gun manual, written soon after the war with Japan had ended. During the war, the defending army had occasionally captured a Japanese matchlock, and the best Korean smiths were at once put to work making more. By now these were far larger and more accurate guns than the two brought to Tanegashima in 1543.

"There are no guns like these in China," the authors of the manual say. "We got them from the Japanese barbarians. They are different from all other kinds of firearms. The good ones will go through armor. If you shoot a person, it hits his lungs. One can even hit the hole of a coin, not only just the willow leaf, at 500 feet.... Either from a horse or on foot, a gun is more than ten times better than a spear, and five times better than a bow and arrow."

Hear also the testimony of the modern

American gun expert Robert Kimbrough. Kimbrough knew that Japan had essentially given up guns in the 17th century. (The *samurai* or *bushi* class despised them as a weapon of war, though occasionally using them to hunt birds, or to arm peasant soldiers.) He knew that after more than two centuries of peace, prosperity, and uninterrupted technical development (roughly 1640 to 1850) Japan had taken up guns again. The Tokugawa government was moved by Commodore Perry's visit and his no-so-veiled threats.

Kimbrough was fascinated to learn that many of the old 17th-century matchlocks had survived the long peace, stored in government armories. In the late 1850's, after Perry, these antique weapons were taken out, rebored, and issued to units of the new national army. At the time of the Russo-Japanese war of 1904, many thousands were converted a second time, to bolt-action rifles. In the 1940's Kimbrough was able to examine a number of these 300-year-old relics.

"The author has seen bolt-action rifles which carried names and dates from the mid-1600s, and weapons so converted were for use with modern powder without blowing up!"

It was precisely the fact good bullets will penetrate armor that led to the reaction against guns. For the first 20 or 30 years that guns were being mass-produced in Japan, battles among the 300 feudal lords took place on two levels. On the lower level, peasant soldiers were to fight each other with guns. On the upper level, gentlemen were to fight each other with swords and spears. As long as the guns were of light caliber, this division worked fairly well. Of course young farm-boys with guns would sometimes shoot at the armored gentry, and occasionally even kill them. But more often they would fail. The original *tanegashima* on Tanegashima Island had an effective range of only 80 or 100 yards, and even within that range the bullets often bounced off armor.

But the far more powerful guns that began to be made in Nagahama and Sakai and several dozen other industrial

centers could and did pierce armor. "Hereafter, guns will be the most important arm," Lord Takeda said in 1569. He demonstrated the correctness of his analysis by dying of a bullet wound in 1573.

More striking, perhaps, is the death of Lord Mori Nagayoshi in 1584. Lord Mori, mounted on horseback, was out in front of his troops, getting ready to charge. An enemy matchlockman took careful aim at his head, and knocked him off his horse dead, aged 27.

By the time of the Korean invasion in 1592, the whole samurai class (about a million and a half people) had a double response to guns. They were an excellent killing device - and when China came in decisively on the Korean side, high-tech weapons were a necessity. An urgent letter survives, written by a feudal commander in Korea to his steward back in Japan. The commander had gone over with 1500 archers, 1500 gunners, and 300 spearmen. "Please arrange to send us guns and ammunition," he wrote to his steward. "There is absolutely no need for spears."

Even more striking is a letter written much later in the war. A Japanese nobleman named Asano was holding Yol-San Castle against a much larger force of Koreans and Chinese. He wrote his father to arrange for reinforcements. "Have them bring as many guns as possible, for no other equipment is needed," he said. "Give strict orders that all the men, even the samurai, carry guns." In other words, the knightly retainers of the Asano family were to be dragged, kicking and screaming, into the late 16th century.

But to use guns upset almost every idea about warfare that *samurai* soldiers had. In a real battle, there were hundreds, perhaps thousands of individual combats. Skill and training largely determined who won. Individual glory accrued to the combatants almost as dividends accrue to the owners of stock in a modern Japanese company.

If you were one of Lord Oda's 10,000 gunners, on the other hand, and especially if you were one of the 3,000

drawn up in ranks behind breastworks, you were quite anonymous. Your state of training mattered hardly at all, provided you knew the one simple trick of loading powder and shot into a musket. (Musket: a heavy-caliber, armor-piercing arquebus, by now the most common form of teppo.) Skill had been moved back from the actual fighting man to the technicians who made his weapons. The fighting men did not like this.

The consequence was that as soon as the Korean war ended, an extraordinary reversal took place. The daimyo and the knightly retainers who had been dragged kicking and screaming into the late 16th century proceeded to move quietly back to the weaponry of an earlier time. It is a story almost unprecedented in human history.

There are many reasons why Japan was able to bring about a partial abandonment of guns, beginning with the mere fact that islands are less subject to invasion than mainlands. I wish to concentrate, however, on one factor which I see as the most important of all. Japan was already a high-tech country when the three Portuguese adventurers arrived, and it continued to be a technical innovator throughout the centuries of self-imposed and largely gunless isolation that lasted from 1641 to 1853. In other words, it was not decadence that led to the long hiatus in weapons research and development, and the evidence is that R & D proceeded briskly in numerous other fields.

One touch of background first. Though Japan in the year 2000 is not generally perceived as an exporter of natural resources, she was so perceived in the 16th and 17th centuries. For example, once contact with Europe had been established, Japanese copper put rapidly to sea. Even with the enormously high shipping costs in that age of sail, Dutch merchants could import Japanese copper (which they had bought in Nagasaki for 33 florins per hundred pounds), and sell it in Amsterdam for 59 florins, one florin cheaper than Swedish copper. Most Dutch founders preferred it for use in

the casting of bronze cannon. There was a similar situation with iron. English founders, as the reader may recall, had been taught by a Frenchman how to cast iron into very large shapes: cannon, for example, weighing as much as three tons. By the early 17th century, English iron and steel (steel is just iron with a medium carbon content) dominated the world market, to the extent that one existed. They didn't get far in Japan, though. The British East India Company had opened a trade center in 1613. Among the products the company hoped to sell was Coromandel steel, from India. No takers.

"Coromandel Steel was in no esteem," the English trade chief lamented in his annual report for 1615, "being considered inferior to Japan iron. English iron," he added, "would sell still worse."

Nor was it just heavy industry that thrived. Japan led the world in, for example, paper products. One of the Jesuit missionaries working in the Far East in the early 17th century estimated that there were ten times as many kinds of paper produced in Japan as in Europe. The list extended to paper handkerchiefs, some centuries before Americans suppose themselves to have devised this useful product.

"Some few Japonese we saw in this City," an Englishman named Peter Mundy wrote from Macao in 1637. "They blow their Noses with a certaine sofft and tough kind of paper which they carry about them in small peeces, which having used, they Fling away as a Filthy thing, keeping handkerchiefs of linnen to wype their Faces." Naturally Mundy was impressed. In Europe at the time, most people used their sleeves.

Japan never did give up guns entirely. What she did give up entirely was research and development. The logical

next step beyond the matchlock, which uses a burning match (and sometimes produces a flash in the pan) is the flintlock. It would have been an easy step for Japanese gunsmiths to take. Smoking was common in the 17th century (and was a severe fire hazard in Tokyo). How did a gentleman light his

to turn back the clock the way Japan did - at least not except in a degenerate and failing society. Japan was neither. Development of firearms may have ceased for two centuries and more, but development in other fields moved steadily ahead. Take water supply. As its population neared half a million in the 1640's, Tokyo built first one then a much bigger and longer second aqueduct.

Or take mining. The water-powered crushing mill for gold and silver ore first appeared in 1697. At almost the same moment a new blower (*tenbin-fuigo*) began to be used in iron smelting. Coromandel steel would have done even worse thereafter.

One could go through a long list of improvements made during the Tokugawa era. One could even point out that the Japanese of that period had absolutely no objection to gunpowder - which they had known about long before Tanegashima. Just so it wasn't used in guns.

Blasting to loosen ore in deep mines began in the 18th century, and increased steadily.

In short, Tokugawa Japan is a case study in selective development. And what it shows is that a no-growth economy is perfectly compatible with prosperous and civilized life. In a world that now has 6 billion people, this is a truth we need to know. As we also need to know that if we dislike a piece of technology, it is sometimes possible to get rid of it. People can choose to remember; they can also choose to forget. As people did on Tanegashima.

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The Japanese were keen users of firearms in the 16th century

pipe? With a flint and steel lighter. Some people, such as the firearms expert H.B.C. Pollard, believe that Europeans got the idea for the flintlock gun from the flintlock lighters brought back on Portuguese ships. There's a nice symmetry here, if Pollard is correct. The early Portuguese brought European guns to Japan, and they took Japanese lighters back to Europe.

What clinches the case for the complete abandonment of firearms development is a present made by the Dutch to the shogun in 1636. They gave him a dozen beautifully made flintlock pistols. The shogun did not respond like Lord Tokitaka in 1543. The pistols went into a vault. They were a piece of technology that was no longer wanted.

Many people, both historians and scientists, believe that it is not possible

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