The seaside Village of the Jomon Period

National Historical Site

Satohama Shell Mounds
About the Satohama Shell Mounds

Waste Dump of the Jomon People

The shell mound was a waste dump of the Jomon people. Many things were thrown away including large amounts of shells, food waste from eating animals/birds/fish as well as broken earthenware and tools made of stones/bones/horns/shells.

Time capsule from the Jomon Period

Usually a human skeleton will decay completely in about hundred years, as the soil is very acidic in Japan. But bones and horns are well preserved in the shell mound, as the calcium from shells neutralizes the acidity of the soil. It provides valuable information to find out more about the Jomon period, for example physical appearance of people, their eating habits, and the environment.

Sacred Place of Departure

Other objects found in the shell mound are skeletons of carefully buried humans and dogs. The shell mound was not a food waste dump as we imagine it now. It is considered that the shell mound was a "place of departure", a place of prayer for peaceful rest and rebirth of the dead and disused tools.

Matsushima, "Shell Mounds Park"

Shell mounds of the Jomon Period

There are about 2,400 shell mounds in Japan. They are located mainly on the Pacific coast, from north to south. The sites include coastal areas of Sea of Okhotsk, Uchiura, Sanriku, Sendai, Iwaki, Kasumigaura, Tokyo, Ise, Sea of Setouchi, and Ariake Sea.

Matsushima Bay Coastal Shell Mounds Cluster

Miyagi Prefecture has the third largest number of shell mounds in Japan, after Chiba and Ibaraki. There are about 210 known shell mounds. Within these, roughly 70 mounds are located along the coast of Matsushima Bay, well-known for the unique concentration of shell mounds.

The shell mounds along the coast of Matsushima Bay consists of Miyato Remains Cluster (1), centered around Satohama Shell Mounds, Matsushima Remains Cluster (2) centered around Dochinahama Shell Mound and Nishinohama Shell Mound and Shiogigaehama Remains Cluster (3), centered around Daigajikou Shell Mound and Nigade Shell Mound. Although Matsushima Bay is small, extending 10 kilometers west to east and 8 kilometers north to south, it is thought that these Jomon villages coexisted here. The boundaries (territories) of these villages circled around each of these large-scale remains of permanent inhabitation, with radius of three to four kilometers.
# History of Research at Satohama Shell Mounds

In 1877, the first research of shell mounds in Japan, the excavation of Omori Shell Mound in Tokyo, was carried out by Edward S. Morse. Satohama Shell Mounds was also among the first to be researched. By early twentieth century, it was known all over Japan. Significant findings such as fishing tools made of bones and rare belt accessory made of deer antlers were introduced in publications such as Prehistoric Japan by Neil G. Munro and Prehistoric Fishing in Japan by Kamakichi Kishinouye.

First academic research of Satohama Shell Mounds was carried out in 1918 and 1919 by two researchers from Tohoku Imperial University, Hikoshichiro Matsumoto of the Faculty of Science and Kotondo Hasebe of the Faculty of Medicine. Their excavations based on strata not only laid foundation for chronological research based on earthware typology but unearthed many skeletons of Jomon people allowing them to carry out substantial research on Nihonjiru (research on Japanese national and cultural identity) and environmental archaeology.

Since then, the Satohama Shell Mounds has been continuously researched by various organizations including the Miyato Remains Research Team lead by Takashi Kato and Katsuhiko Goto and by Tohoku History Museum with Kunihiko Fujimura and Michio Okamura as researchers. The researches carried out in Satohama Shell Mounds have led to important findings in earthware chronology, research of bone tools, and reconstruction of life and food of the Jomon people.

## History of Major Researches at the Satohama Shell Mounds

<table>
<thead>
<tr>
<th>Year of research</th>
<th>Main researchers</th>
<th>Research areas</th>
<th>Keywords</th>
</tr>
</thead>
<tbody>
<tr>
<td>1897 - 1907</td>
<td>Tameji Takashima</td>
<td>Unknown</td>
<td>Surface collection, amber fish tool, clay figures</td>
</tr>
<tr>
<td>1918 - 1919</td>
<td>Tohoku Imperial University, Hikoshichiro Matsumoto, Ichiro Hayakawa, Kotondo Hasebe</td>
<td>Tanoshitakagai</td>
<td>First academic excavation, Mass grave (excavation of human skeleton, 18 bodies in 46 sqm), Excavation by strata (foundation for earthware typology based chronology), Animal remains analysis (reconstruction of ancient environment)</td>
</tr>
<tr>
<td>1952 - 1962</td>
<td>Tohoku University Faculty of Education, Miyato Remains Research Team</td>
<td>Daigakoi, Tanoshitakagai, Hatanaka, Nashinoki, Sodekubo</td>
<td>Late Jomon, Middle Jomon, bone fishing tools/accessories, Final Jomon/Yayoi, mass grave (28 human skeletons)</td>
</tr>
<tr>
<td>1979 - 1984</td>
<td>Nishihata</td>
<td>Nishihata-kiita</td>
<td>Final Jomon salt work remains, Nishihata-kiita, Daigakoi-chobai, Nashinoki-Higashi, Daigakoi (Kazakoshi)</td>
</tr>
<tr>
<td>1984 - 1986</td>
<td>Tohoku History Museum</td>
<td>Nishihata-kiita</td>
<td>Late Jomon bone fishing tools/accessories</td>
</tr>
<tr>
<td>1986 - 1987</td>
<td>Nishihata-chobai</td>
<td>Nishihata</td>
<td>Late Jomon - Middle Yayoi, salt work remains, Early/Late Jomon pit layer (Reconstruction of vegetation, Early Jomon chestnut forest)</td>
</tr>
<tr>
<td>1989 - 1990</td>
<td>Nashinoki-Higashi</td>
<td>Early Jomon</td>
<td>Middle/Late Jomon remains of tsunami?</td>
</tr>
<tr>
<td>1991</td>
<td>Daigakoi (Kazakoshi)</td>
<td>Early Jomon</td>
<td>Late Jomon - Middle Yayoi, salt work remains</td>
</tr>
<tr>
<td>1996 -</td>
<td>The Historical Museum of Jomon Village Oshi-matsukuma</td>
<td>Nishihata-nishi, Sato, Daigakoi, Tanoshitakagai</td>
<td>Late/Late Jomon shell layer, Final Jomon mass grave (3 human skeletons), Antiquity shell layer, Late/Late Jomon shell layer, Late Jomon habitation (pit house remains)</td>
</tr>
</tbody>
</table>

(Images of research sites mentioned in the text.)
The Unchanging Landscape of the Sea

Matsushima Bay was formed by the rising sea level caused by global warming after the ice age. The current landscape of Matsushima Bay was created about 7,000 years ago, just around the time when the Jomon people started living along the coasts and the shell mounds began to form. The topography changed a little as the coastline moved in and out throughout time, but as the sedimentation within the bay was very small, the landscape around the village of Satohama has not changed much since then.

Around 3,500 years ago, in the latter half of the Late Jomon period, the dominant shellfish changed from turban shell to Japanese littleneck clam due to transformation of the seabed from rock to sand and mud. (See diagram below.)

Riches of the Forest

According to the analysis of pollen, seeds, and timber found in the strata of the Satohama Shell Mounds, the Jomon forest of Satohama that supported the life of the people, consisted of deciduous broad-leaved trees. Trees such as chestnut, Japanese horse chestnut, Japanese walnut, Asiate hornbeam, Chinese hornbeam, Japanese beech, konara (beech family), Japanese elm, muku tree, and Chinese lacquer tree formed a satoyama (“village mountain”), a forest that co-exist with livelihood of people. Very high proportion of chestnut pollen suggests that, at least since 6,500 years ago, chestnuts were managed and planted by people.

It has been discovered that pine (matsu), that gives Matsushima its name and its unique landscape praised by the poet Basho, has been growing here since the Jomon times, although it is considered that it has only been 500 to 1,000 years since it became the dominant part of the landscape like today.

Village of Satohama

The Satohama Shell Mounds is situated on Miyate Island, the largest island of Matsushima Bay. It is one of the largest shell mounds in Japan, spanning 640 meters west to east and 200 meters north to south. It was designated as a National Historical Site in 1995 as significant bone tools and various remains of the life of the Jomon people can be unearthed. It is an important remains that provides valuable information for the reconstruction of the livelihood of Jomon period.

The shell mound consists of Nishi (West) Shell Mound (Daigakoi-chobu/higashishimen/Kazakoshi area), Higashi (East) Shell Mound (Nashinoki, Hatanaka, Sodekubo area), and Kita (North) Shell Mound (Terashitagakoi, Nishihata, Sato area). The people of Satohama moved from Nishi Shell Mound (beginning of Early Jomon - Middle of Middle Jomon) to Higashi Shell Mound (Middle of Middle Jomon - Middle of Late Jomon) to Nishihata Shell Mound (Early of Late Jomon - Middle of Final Jomon) to Kita Shell Mound (Late of Late Jomon - Middle Yayoi). They moved from village to village in intervals of few hundreds years to thousands years, forming the shell mound over long periods of time in each location. In addition, remains of salt works and shell sites were found at the beach (Nishihata-kita area).

During the 2011 Great Tohoku Earthquake and Tsunami, out of the four villages on the island, three villages along the outer sea were completely destroyed. The Satohama village which stands in part on the shell mounds, suffered little as it is on a higher ground. The Jomon people of Satohama seems to have purposefully chose to fish, shell, and make salt at the coast, and live in the hills. Tsunami sediment layer has been discovered at Nishihata-kita area, belonging to the Middle Jomon (4,600 years ago) and the late/Final Jomon (3,100 to 3,500-3,000 years ago) period. These tsunami would not have affected the village at that time.

<table>
<thead>
<tr>
<th>Name of area</th>
<th>Height of shell mound</th>
<th>Jomon Period</th>
<th>Yayoi Period</th>
<th>Types of shellfish</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 10 20 30</td>
<td>Early</td>
<td>Mide</td>
<td>Late</td>
</tr>
<tr>
<td>Nishi (West) Shell Mound</td>
<td>Daigakoi-chobu</td>
<td>6000</td>
<td>5000</td>
<td>4000</td>
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<tr>
<td></td>
<td>Daigakoi-higashishamen</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Daigakoi</td>
<td></td>
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<td></td>
<td>Daigakoi Kazagosh</td>
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<tr>
<td>Higashi (East) Shell Mound</td>
<td>Nashinoki-higashi</td>
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<tr>
<td></td>
<td>Nashinoki</td>
<td></td>
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<tr>
<td></td>
<td>Hatanaka-Sodekubo</td>
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<tr>
<td>Kita (North) Shell Mound</td>
<td>Nishihata</td>
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<td></td>
<td>Terashitagakoi</td>
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</tbody>
</table>

Transition of Satohama Village and Species of Shellfish

The area numbers correspond to the numbers on the map to the right.
The Life of the People of Satohama

By carefully investigating the tools and food remains unearthed from the shell mounds, seasonal livelihood, such as fishing and hunting, and eating habits of the Jomon people became apparent. The people of Satohama efficiently used the seasonal natural resources to live. The abundant food source of spring and autumn was reserved for winter. Tools were made during times of fishing and hunting so that they were prepared for the coming season. They had a very organized way of life.

There are still much to be investigated on the use of plant based resource by the people of Satohama, but analysis of human bones and pollen suggests that it was a good food source, for example, nuts, mushrooms, mountain vegetables and potatoes. It is thought that the people of Satohama enjoyed wide varieties of food.

Spring
Picking shellfish, mainly Japanese littleneck clam and seaweeds. Catching school of sardine, puffer fish, etc. that migrate to inner sea. Gathering mountain vegetables like ostrich fern and Asian royal fern.

Summer
Catching shellfish, sea urchin, swimming crab, etc. Fishing red sea bream, black porgy, large Japanese sea perch, amberjack, tuna, etc. at outer sea. Salt making.

Autumn
Fishing horse mackerel and mackerel that migrates to inner sea. Concentrated gathering of chestnuts, walnuts, Japanese horse-chestnut and mushrooms.

Winter
Hunting animals like deer and wild boars and migratory birds like goose and duck.

Interpreting Eating Habits from Human Skeletons [Carbon/Nitrogen Isotope Ratios in Human Skeletons]
Analysis of carbon/nitrogen isotope proportion from food source in human skeleton shows that the Jomon people on Miyato Island (Satohama/Murohama) ate more seafood, like fish and shellfish, than meat, like deer and wild boar, or plants.

What We Know from Skeletons of The People of Satohama
More than sixty skeletons of Jomon people have been excavated from Satohama Shell Mounds. The characteristics that can be observed from these skeletons represent the typical food features of Jomon people: broad face, flat profile, deep carvings and rectangular eye socket. Dental features include that of occlusion where the top teeth and bottom teeth came together at its root rather than overlapping in the front, and ceremonial extraction of upper canine and lateral incisors, for entering adulthood and other important life events.

Habitat and disease traces can also be observed. Frequent diving in water often caused osteoma of the external ear canal. Teeth with cavities and enlarged hypoplastic were result of eating habits and nutrition. Various joints were distorted from too much squatting.

The recent development in analytical techniques of physics and chemistry allows analysis of eating habits (carbon/nitrogen isotope analysis) and accurate determination of age, making it possible to reconstruct the livelihood of the Satohama villagers from human skeletons.

Food and Livelihood Calendar of the Jomon People
This diagram was created by analyzing the waste of the Jomon people, pile of soil at a time. For each pile, the season in which the waste was dumped was estimated based on factors such as growth mark on shells and bones, and migration of fish and birds. Using this method, the activities such as food gathering and tool making were summarized in this calendar. The proportion of animal based food intake and plant based food intake was calculated based on carbon/nitrogen isotope analysis on the human bones and referring to the food proportion of contemporary hunter-gatherer tribes.

Illustration by Kazuko Hayakawa
Shellfish Picking
The spring in Satohama village started with shellfish picking by the whole village. The abundant catches of Japanese littleneck clam were then boiled in earthenware pots and preserved or used for trade with villages in the mountains.

Salt Making
Under the scorching heat of summer, the people of Satohama boiled down sea water in pots to make salt for preserving and seasoning food. The salt was also transported to villages in the remote mountains.

Fishing
Through early summer and autumn, fish come closer to shore. Japanese sea perch, red sea bream, black porgy, tuna and amberjack were caught with fishing hooks, harpoons and spears.

Seasonal Livelihood of the People of Satohama Revealed by the Shell Mound

Hunting
As the leaves fall in winter and animals become visible in the forest, the hunting season began. Men hunted animals such as deer and wild boars in teams. The animals were chased by dogs and brought down with bow and arrow.

Nuts Gathering
In autumn, the whole village gathered nuts and stored them underground. In Satohama village, chestnuts have been managed and planted since 6,500 years ago.
Satohama Shell Mounds

Earthenware

Accessory

Prayer

Important Cultural Properties are collections of the Tohoku History Museum.

The Historical Museum of Jomon Village Oku-Matsushima