The Higashimyo Wetland Site

- The Basket Makers of the Jomon period around 7000 BP. -

Discovery of shell midden

The Higashimyo Site is an initial Jomon site, which was found during the construction of the 55-hectare Kose River Trapezoidal Reservoir by the Ministry of Land, Infrastructure, and Transport. It consists of a settlement area with fireplaces and burial grounds, and wet shell middens with storage pits.

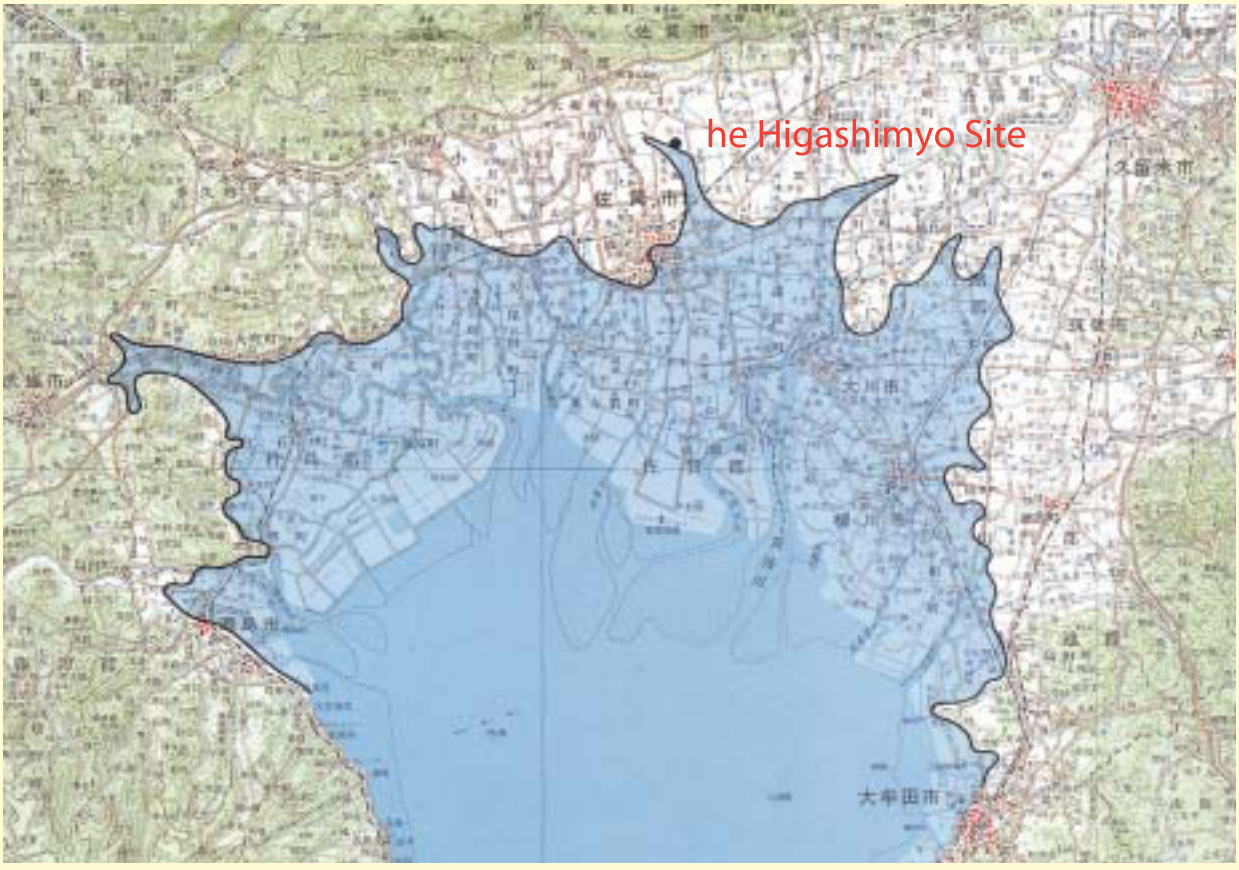
The excavation of the settlement area (approximately 3 meters above sea level) was started in 1993 and successfully concluded in 1996 (primary excavation) with many substantial articles unearthed, including 167 stacked stone structures (fireplaces), the bones of at least five buried people, a number of Senokan B type potsherds, and stone tools. The construction restarted, but more shell middens were unexpectedly exposed one after another by heavy machinery during drilling. Thus the secondary excavation was hastily implemented. The shell middens were approximately 5 meters below the soil surface (approximately 1 meter below sea level). Examination of reclaimed surfaces revealed many microreliefs of the land at the time. All shell middens at the site are of the latter half of the initial Jomon. The middens were covered by clay layers from the margins through upper surfaces where more than 750 baskets and many other floral remains were found.

Lifestyles at the time and the Jomon transgression

According to the styles of excavated potsherds items as well as radiocarbon dating, the Higashimyo Site is understood to have been formed approximately 7,000 years BP, that is, the latter half of the initial Jomon.

Because of global warming during that period, sea-levels in the Japanese archipelago rose (Jomon transgression) to form many shallow basins suitable for fish and shellfish. Since the Jomon transgression is considered to have peaked approximately 6,000 years BP, inhabitation of this area seems to have begun before the rise of sea-levels and ended when the environment became unlivable due to the transgression.

It appears that, at the time that the shell middens were formed, the site was surrounded by a forest of evergreen broadleaf trees, mainly oak, and had a tideland-like area with plants of the family Poaceae, genus Artemisia, family Cyperaceae, etc. along the estuary of the river. The location seems to have been an estuary environment readily accessible to the sea as well as the forest, and very convenient for collecting nuts and shellfish, hunting, and fishing.



Prehistoric Coast Line at the Maximum Jomon Transgression
(Shimoyama et al. 1994)

Characteristics of the Higashimyo Site

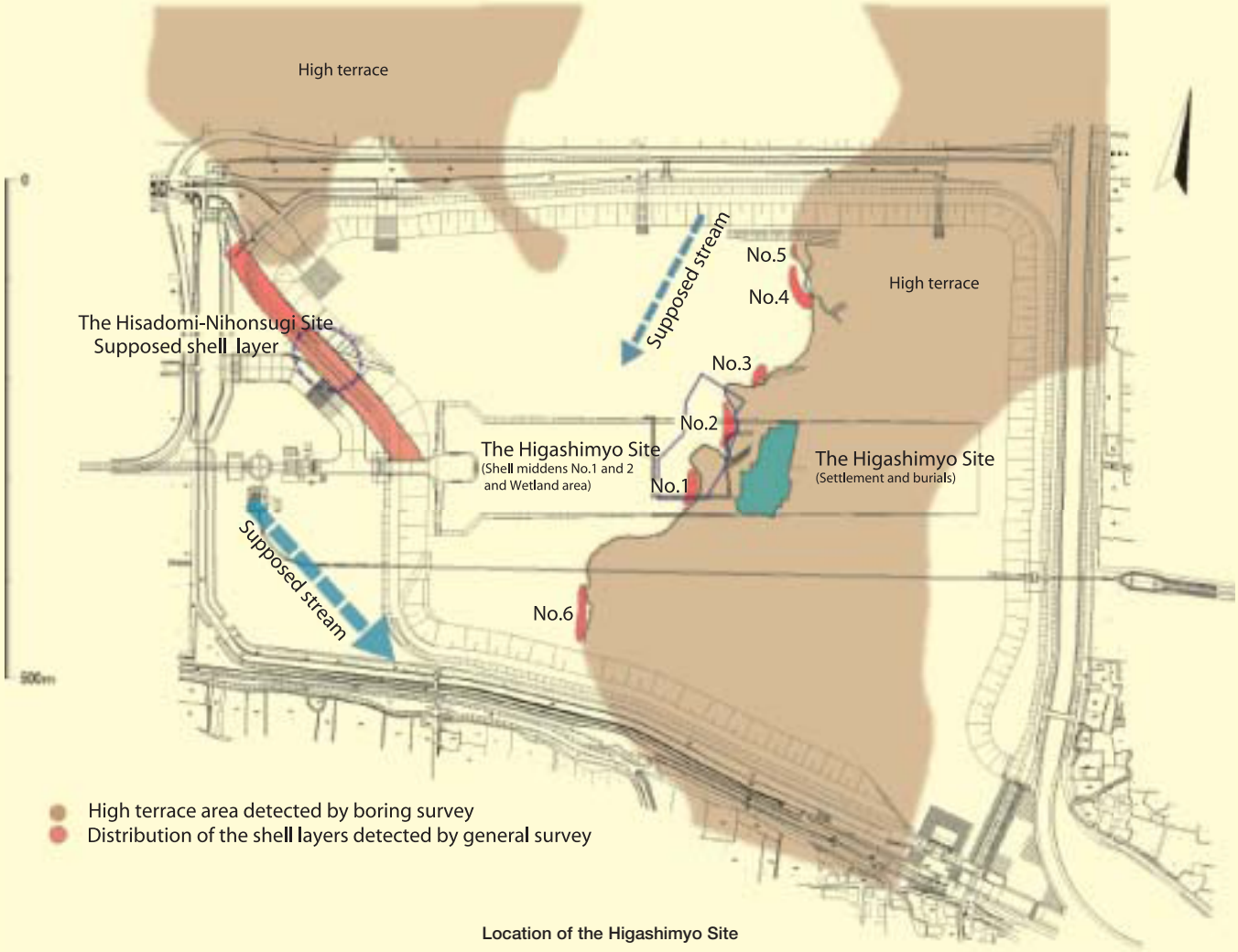
The Higashimyo Site consists of the Higashimyo Site and the Hisadomi-Nihonsugi Site, and was found during the Kose River Trapezoidal Reservoir construction work. Both sites are dated to the latter half of the initial Jomon period.

Excavation of the Hisadomi-Nihonsugi Site was carried out in FY 2002 and 2003. As a result, shell stratums were found at points 3 meters below sea level (7 meters below the top soil). The stratums were approximately 20 centimeters thick with a lot of sand and gravel, which was probably secondarily deposited by water flow. Judging from the estimated microrelief features at the time, the main part of the shell midden is likely to be located north of the point of excavation. On the microknoll, settlement remains are expected to exist.

In the Higashimyo Site, six initial Jomon shell middens (Middens No.1 to 6) were found in the preliminary excavation. They were unearthed when an upper part of the microknoll was dug and flattened by excavation work; shell stratums are partially exposed on reclaimed surfaces. It appears that a river valley separating two microknolls lay between this site and the Hisadomi-Nihonsugi Site.

Location of the Higashimyo and the Hisadomi-Nihonsugi Sites

Arial photograph of the Reservoir and the Higashimyo Site (1996)



Location of the Higashimyo Site

Excavations of settlement area

As a result of the excavation and research of the area from 1993 to 1996, a layer containing late initial Jomon cultural remains was found at approximately 3 meters above sea level. The number of artifacts unearthed exceed 200,000 including approximately 44,000 potsherds, 42,600 stone tools, and 130,000 artificially collected pebbles. The great number of Senokan B type potsherds, all categorized as B type with shell-made decoration, suggests exchanges with Southern Kyushu where the Jomon culture developed earlier. A few other types of pottery such as those with embossed stamping, and Todoroki A types were also found.

Excavated structural remains include 167 stacked stone structures, 19 stone tool accumulations, and the bones of 7 buried human bodies. The bones of buried people are notably valuable; initial Jomon human bones are rare. All bones were found in crouched positions.

The radiocarbon date of the layer is 7040 ± 130 B.P.

Fire place
Concentration of the 70 charred stones formed the fire place.

Burials of the 3 persons (Flexed burials)
They were buried at the same time.

Shell midden No. 2 from south

Acorns Storage Pit
Baskets and pole were found inside.

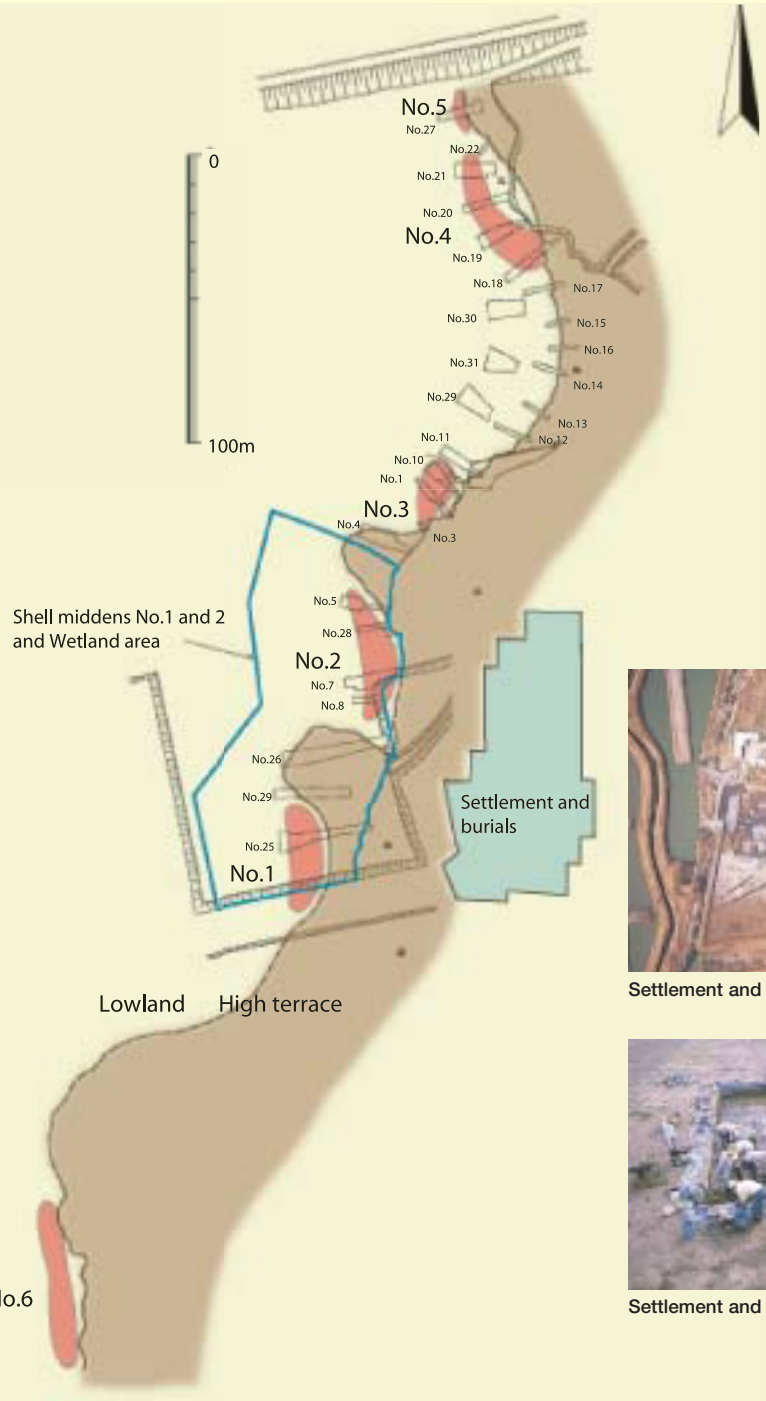
Excavations of shell middens

The shell middens were incidentally found in May 2003 during the construction work of the Kose River Trapezoidal Reservoir. At five meters below the soil surface (0.5 meters below sea level) an exposed shell stratum was found. From Senokan B type potsherds and animal bones unearthed around the spot, the shell stratum was judged to be that of a late initial Jomon midden. Research to specify the scope of the midden was carried out from October to November 2003. Then, from May to September 2004, the preliminary excavation was undertaken. As a result, six shell middens (Middens No.1 to 6) were found in the reservoir construction site, all originating from almost the same period, forming one of the greatest early Jomon shell midden clusters in western Japan. The full-scale excavation started in September 2004, mainly targeting Midden No. 2. Currently, the excavation of Midden No. 1 is also underway.

The shell middens found in the preliminary excavation were formed selectively at a recessed location. The estimated total area of the shell stratums is over 1,700 square meters with 0.5 to 1.5 meters of thickness. Apparently settlements were on the microknoll and shell middens were below them.

Shell midden No. 2 from the air

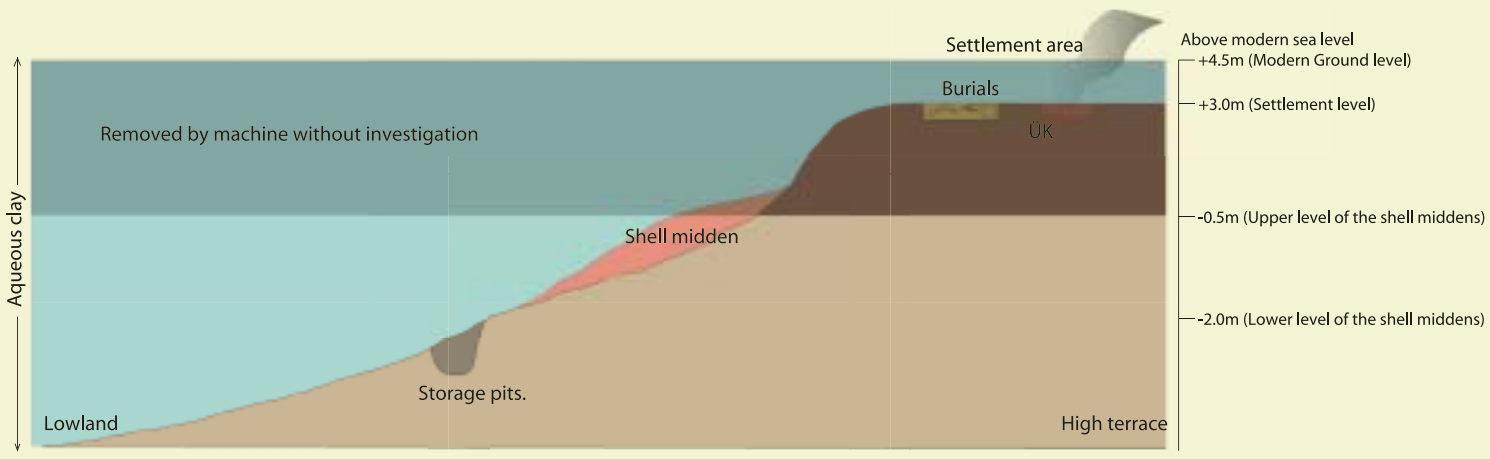
Shell midden No. 2 under excavation



Distribution of the shell middens No.1 to 6

Settlement and burials from the air

Settlement and burials under excavation



Topography of the Higashimyo Site

Diet estimation from faunal and floral remains

The Higashimyo Site features the oldest wet shell middens in the country. Having been covered by clay sediment at once due to the Jomon transgression, items recovered from this site include well-preserved organic articles that normally decay completely. Faunal remains are especially well-preserved and important for studying diet at the period.

The thickness of the shell stratum of Midden No. 2 under excavation is approximately 1.4 meters at maximum. Shellfish remains are mostly of four species: Japanese corbicula (*Corbicula japonica*), Cockle (*Tegillarca granosa*), Jack knife clam (*Sinonovacula constricta*), and Oyster (*Crassostrea gigas*, *Crassostrea ariakesis*). These species are likely to have been gathered selectively, since other species are scarcely found. From shell stratums, shells, mammal and fish bones, and many other food scraps have been unearthed, in addition to articles such as potsherds and stone tools. Mammal remains include many wild boar (*Sus scrofa*) and sika deer (*Cerves nippon*), and some dog, Japanese serow (*Capricornis crispus*), river otter (*Lutra lutra*), and raccoon dog (*Nyctereutes procyonoides*). Typical fish species are those that inhabit the brackish-water, i.e., mullet (*Mugil cephalus*), Japanese sea bass (*Lateolabrax japonicus*), and black sea bleam (*Acanthopagrus schlegeli*), along with sharks, rays, pike conger (*Muraenesox cinereus*), and catfish. Some small Gobiidae fish remains (including mudskipper; *Boloephthalmus pectinirostiris*) and soft-shelled turtle (*Trionyx sinensis*) have also been excavated.

So far more than 200 storage pits for acorns have been identified. Acorn remains found in the pits are mainly *Quercus gilva. Quercus acutissima* and some other species have also been found. A small quantity of other nuts such as *Juglans ailanthifolia* have also been found.

【Shell middens】 Shell calcium leaches into soil and neutralizes acid soil. As a result, mammal and fish bones have been well preserved.

【Wet site】 An archaeological site by a river or other water where vegetable matter or wooden articles become water-soaked and are thus preserved in good condition.

Profile of Shell layers: Shell midden No. 2
It can be observed that the shell layers are accumulated with the same gradient with the topography. The cockles; (*Tegillarca granosa*) and Corbicula clams (*Corbicula japonica*) are visible.

Shell midden No. 2 from the air
Upside is high terrace side and white indicates the shell midden. The shell midden is formed along the bank.

Shell layers of the No. 2 under the excavation
Oysters are typical in the upper level.

Shell layers of the No. 2 under the excavation
Most of the shell are occupied by the Cockles (*Tegillarca granosa*) and the Japanese corbicula *(Corbicula japonica)* clams, although the Jack knife clam (*Sinonovacula constricta*) are common but inconspicuous.

Animal bones [Wild boar (*Sus scrofa*)]

Animal bones [Sika deer (*Cervus nippon*)]

Animal bones [Dog (*Canis familiaris*), Japanese serow (*Capricornis crispus*), River otter (*Lutra lutra nippon*) and Raccoon dog (*Nyctereutes procyonoides*)]

▲ **Soft-shelled turtle** (*Trionyx sinensis*)

Fish bones [Shark, Eagle ray (*Myliobatis tobijei*) and Red stingray (*Dasyatis akajei*)]

Fish bones [Japanese seabass (*Lateolabrax japonicus*), Mullet (*Mugil cephalus*) and Black sea bream (*Acanthopagrus chlegelii*)]

Excavated Storage Pit
There are some Quercus gilva blume (*Quercus gilva*) scattered beneath the basket. Jomon people stored the acorns in the basket and kept in the waterlogged pit.

When the basket was taken away, unretrieved Quercus gilva blume (*Quercus gilva*) were found on the bottom.

Japanese walnut (*Juglans ailanthifolia*)

Sawtooth oak (*Quercus acutissima*)

Quercus gilva blume (*Quercus gilva*)

Cooking methods

Potsherds found in the Higashimyo Site are mostly of Senokan-B type with some later Todoroki type exceptions. Pottery was mainly used for cooking food; many potsherds from the middens are soot-blackened.

Grinding slabs and polishing stones are likely to have often been used in combination with each other for cracking or grinding nuts.

Many stacked stone structures have been identified in the settlement area. These appear to have been used as earth ovens, where burned rocks were gathered to bake or steam food. Inside some pits are noticeable fish bones, suggesting that the structures were used for baking fish.

Concentration of the stones on the residential area
Many concentrated charred stones indicate the earth oven cooking was in use.

Concentration of the stones beneath the shell middens
As there are many small fish bones within the stones indicate that they are concerning to fish cooking.

Coprolites
Most of them contain fish bones and shell fragments, maybe dog's dropping?

Pottery (Senokan-B type)
Most of them are deep-pot shape. The surface is decorated by scratching of the edge of the cockle (*Tegillarca granosa*)

Pottery (Senokan-B type)
These surface were mostly black because they were covered with fine smoke-stained.

Pottery (Kubama and Todoroki-A types)
Only the upper layers of the middens contained these potsherds.

Stone tools
Saddle quern and grinding stones.

Material processing techniques

Unearthed bone and antler artifacts include antler ornaments with geometrical rows of small punctuations, wild boar fang pendants, perforating tools and needles made of the metacarpals and metatarsals of sika deer. Many shell artifacts are bracelets made of ark shell (*Scapharca kagoshimensis*) and limpet (*Cellana nigrolineata*). Beads made of cone shell (*Conidae sp.*) and bivalvia shells have also been found. Bivalvia shell beads are as small as 4 millimeters in diameter, indicating the sophistication of technique.

Baskets and other wooden articles have also been excavated. The number of baskets unearthed so far is over 750, many of them appearing to have been containers for acorns and the like. Baskets were made of sliced arboreous materials and vines and woven using a variety of techniques, e.g., twill plaiting, hexagonal plaiting, and twining.

Other unearthed articles include a dish with handles, a bowl-like vessel, a board-like wooden artifact measuring about one meter in length, etc. These wooden containers are the oldest yet found in Japan and are important materials proving the existence of sophisticated woodworking techniques in the initial Jomon era. In order to make these wooden articles, stone tools such as adze and scrapers are likely to have been used.

Antler ornaments
Each hole mesures 1 mm in diamenter and forms geometric motif. The drilling technique is unknown.

Bone and teeth ornaments
Canines of wild boar (*Sus scrofa*), Shark's vertebrae, etc.

Bone tools
Awls and needles: Made from metapodials of sika deer (*Cervus nippon*).

Shell implements
Cone shell (*Conidae* sp.) and unknown bivalvia.

Shell bracelets
Ark shells (*Scapharca kagoshimensis*) are the most common, though limpet (*Cellana nigrolineata*) and Arcidae family (*Scapharca satowi*) are included. They were traded a long distance.

Wooden article (Bowl-like vessel)
38cm long and 22cm wide. Carving marks are visible. Excavated from SK2106 storage pit.

Wooden article (Dish with handles)
33.5cm long and 18.0cm wide. Handles on both sides. Excavated from SK2087 storage pit.

Wooden article (Purpose unidentified)
Approximately 1.0 meter long board-like article with a hole bored into it. Singed in the process of making. Maybe a lagoon ski? Excavated from SK2006 storage pit.

◀Bundle of herbaceous plant
Herbaceous plant bundled with a vine. Probably immersed in water.

Bundle of vines▶
Twined into a wreath. Probably immersed in water for softening before use.

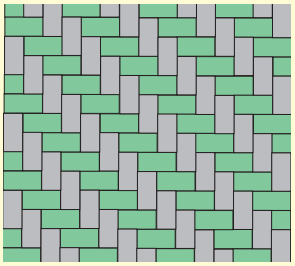
SK2006 storage pit
A wooden board and a sika deer antler apparently soaked in water were unearthed.
Jomon people knew to immerse materials in water for preparation (softening) for easier processing.

Stone tools (arrowhead, harpoon point, awl)
Those in the left row are obsidian, others are andesite (sanukite). Mainly used for hunting. Awls were used as drills.

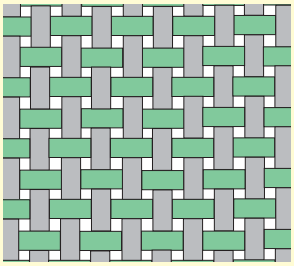
Stone tools (tanged scraper, scraper, adze)
Some tanged scrapers have two tangs. Used for cooking or crafting.

Basket weaving techniques

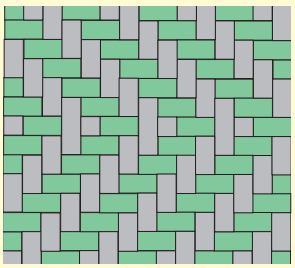
The following are typical weaving techniques of baskets unearthed at the Higashimyo Site. There are a great variety of weaving patterns; evidence of almost all weaving techniques were seen at this site.



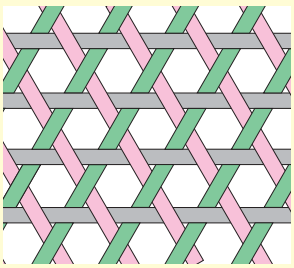
Ajiro ami (Twill plaiting; over-two under-two, offset by one)
Single straps of weft material are woven over two warps and then under the next two warps. Each weft is offset relative to the previous weft by one warp. Most often seen in the Higashimyo Site.



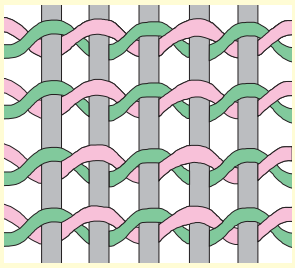
Ajiro ami (Plain plaiting; over-one under-one, offset by one)
Single straps of weft material are woven over one warp and than under the next one warp. Each weft is offset relative to the previous weft by one warp.



Mokume goza ami (Grain pattern mat plaiting)
Combination of diagonal right and left patterns of "over-two under-two, offset by one" pleating with the pattern being reversed each row.



Mutsume ami (Hexagonal weaving)
Three pairs of parallel strips are woven in three directions (horizontal, diagonal right, and diagonal left) to form a hexagonal mesh. Each strip forming the hexagon is woven over and under the next strip alternately to anchor each other.



Mojiri ami (Twined wicker weaving)
Made of vines. Two wefts are woven one over and one under each warp, twisted over between each warp.

Importance of this site

This site is dated to the late initial Jomon. The AMS radiocarbon date of a basket made of Aphananthe aspera is 6976 ± 36BP (5891-5790 yrcalBC).

Finding so many initial Jomon shell middens is an exceptional incident in this country. The scale of the site is one of the largest in western Japan. It is also rare and academically valuable that settlements, a grave yard, shell middens, and storage pits were found at the same time. Some of the unearthed artifacts such as ornaments made of shells and animal bones are especially uncommon. The baskets and wooden containers are the oldest found in the country. Discovery of these artifacts has a dramatic impact on our image of initial Jomon culture. While shell middens in Japan have rarely been excavated as thoroughly as we have done at this site, it is expected that various articles from this site will provide us with important clues to understand ancient lifestyles and cultures.

In the belief that the Higashimyo Site is one of the rare and very important archaeological sites in the country, studies toward the preservation of Middens No. 3 to 6 has commenced.

Faunal artifact (A handle and ropes)
A tree-bark-like material was twisted around the core material of the handle. The ropes are reinforced by thin strands. In the Higashimyo Site small and fragile artifacts such as these are relatively well preserved.

SK2096 Storage pit
A wooden bowl and a basket were found. The wooden bowl is thin with almost no defects, and may be used for scooping or bringing acorns.

Panoramic view of Middens No. 1 and 2 excavation site (Shot in March 2006)
Black soil deposits are visible in recessed areas.

Panoramic view of the Kose River Trapezoidal Reservoir (Shot in March 2005)
Excavation work is completed to the depth of over five meters below the soil surface. Areas marked in red are where shell stratums were found. From left to right: Middens No. 6, 1, 2, 3, 4, 5.

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