JOMON LITHIC RAW MATERIAL EXPLOITATION IN THE IZU ISLANDS, TOKYO, JAPAN

Emiko Motohashi[1]

Archaeology Unit, Nerima Board of Education, Tokyo 176, Japan

ABSTRACT

This paper discusses the dynamics of lithic raw material procurement in the Izu Islands during the Jomon period. The utilization of obsidian, andesite and pumiceous rhyolite from different sources in the Izu Islands shows the high degree of raw material interdependence within the island group. This, however, should not be confused with isolation. Obsidian from Kozu was transported to the mainland on a large scale, reaching a peak during the Middle Jomon when it is found at sites on the Japan Sea coast. The evidence of ceramics and stone-paved dwelling technology also demonstrates regular cultural interaction, particularly with the Kanto region.

INTRODUCTION

The Izu Islands are located to the south of Honshu, the main island of the Japanese archipelago. The islands form part of the Izu-Marianas volcanic arc which begins with Mt. Fuji and stretches far into the Pacific. From north to south, the Izu Islands begin with Oshima, located some 119 km SSW of Tokyo, and follow with Toshima, Niijima, Shikine, Kozu, Miyake, Mikura and Hachijo Islands. Hachijo is 77 km from Mikura and 300 km south of Tokyo. Even today some of the islands are volcanically active and the eruption of Oshima's Mt. Mihara in the late autumn of 1986 is still fresh in the memory. Earthquakes also occur frequently in this region. Few of the islands have many sandy beaches and the discovery of quite a number of archaeological sites on top of sheer wind-beaten cliffs is further testimony to the severe natural environment of the islands. All these sites are located on high ground from which the Izu Peninsula or the other islands can be seen.

The other main distinguishing geographical feature of the Izu Islands is the presence of a warm-water current, the Kuroshio, which flows north from the Nansei or Ryukyu Islands (Figure 1). This current brings a subtropical climate, particularly to Hachijo. A so-called "southern hypothesis", postulating the spread of cultural influences up the Kuroshio, is based particularly on the discovery of polished cylindrical adzes on Hachijo and Iwo Islands which are seen as similar to adzes from the Philippines and Rota in the Marianas (Oda 1977, 1978, 1981a). In a comparison of stone tools, including cylindrical adzes, from the Marianas, however, Takasugi (1979-80) claimed that the composition of assemblages was different: compared to a high reliance on shell in Oceania, shell artifacts are almost non-existent in the Izu, Ogasawara and Mariana Islands. According to Takasugi this may be due to environmental limitations, although shell artifacts are more widely distributed on the Japanese mainland than in these islands. Takasugi (*ibid.*) concluded that the cylindrical adzes of the Izu and Ogasawara Islands are similar to those of the Marianas either for functional reasons, or by chance, and pointed out that on a macroscopic scale we have to accept that the characteristics of these tools are widely distributed throughout the world.

This paper looks at cultural influences on Jomon lithic raw material procurement within the context of interaction between the Izu Islands and Honshu. This approach is possible because some of the islands in the volcanic Fuji-Izu chain have sources of obsidian, andesite and pumiceous rhyolite - raw materials which were useful for making stone tools. The fact that these sources are islands also makes it easier to investigate the prehistoric procurement of these materials.

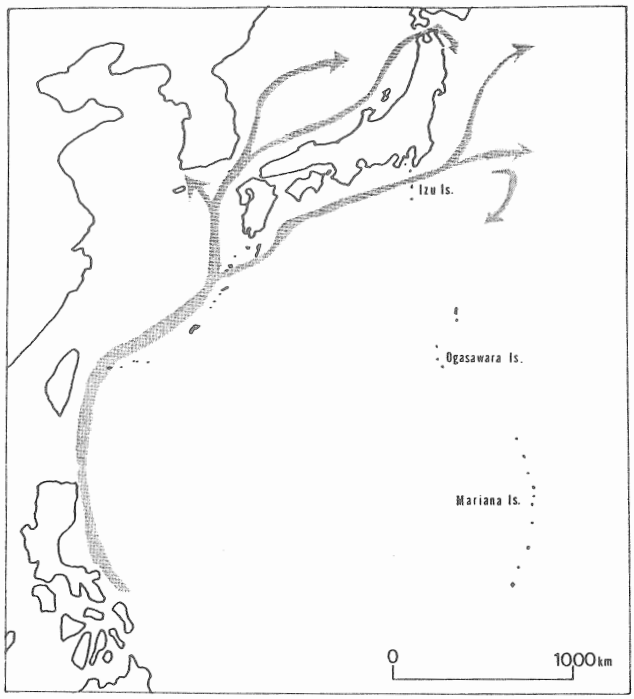

Figure 1: The Japanese archipelago, the Izu Islands and the Kuroshio current.

POTTERY AND INTERACTION

Pottery was brought to the Izu Islands from the Kanto and Chubu regions. The oldest known ceramics are *oshigatamon* (carved-dowel impressed) and Hirasaka types of the Initial Jomon period found at Shimotakabora on Oshima (Oshima Board of Education 1985). *Oshigatamon* pottery has also been found at Senki on Kozu, and at Kamenoshiri and Nishihara C on Miyake. From the late Initial Jomon, Tado Upper Layer pottery has been found at Oishiyama on Toshima, the Shiboguchi type at Nishihara B and Botasawa on Miyake, the Nojima type from Fukinoe on Shikine, and Ugashima pottery from the Zo site on Mikura. Thus we know that in the Initial Jomon period there was frequent contact between the islands and the Kanto region, particularly with what is now Kanagawa Prefecture (see Hashiguchi 1988).

At the end of the Early and the beginning of the Middle Jomon, Kanto ceramics made their way to Hachijo Island where both Jusanbodai and Goryogadai pottery have been found at the Kurawa site. Remarkably, these ceramics were found in association with pottery of the Takashima type which originated in the Kansai area. Moving on to the end of the Middle and the beginning of the Late Jomon, Kasori E4 and Shomyoji types have both been found at Shimotakabora and Oishiyama.

These pottery types are not unique to the Izu Islands and it is presumed that they were brought in from the mainland. Beds of clay, the raw material for pottery, have not yet been found in the islands and most pottery would have had to have been brought in from outside. From Imamura's temper analysis we know that the late Early Jomon Moroiso pottery from Nishihara on Miyake and from Uenoyama on Kozu was made on Honshu, probably in the southwest Kanto (Yoshida and Imamura 1980:34-39). The undecorated late Initial Jomon Hirasaka pottery found at Shimotakabora on Oshima, however, is much thicker than its counterpart on the mainland. Kobayashi (1987) has noted that this pottery appears to be very similar to the thick undecorated pottery from Yubama on Hachijo, a type which draws on the Hirasaka tradition which was distributed throughout the Kanto. According to the temper analysis conducted by Isshiki and Matsumura (1976), the thick, undecorated pottery from Shimotakabora was made on Oshima. It is hoped that in the future further attempts will be made to investigate the sources of pottery using techniques independent of typology.

LITHIC RAW MATERIALS AND INDEPENDENCE

The Izu Islands boast a source of obsidian, a useful raw material for sharp cutting tools, on Kozu. Most chipped stone axes and side- and end-scrapers were made using andesite from Toshima and Hachijo. The pumiceous rhyolite of Niijima, the most distinctive lithic material of the islands, was used to make whetstones and bowl-like containers. In the following I shall discuss the distribution and use of these three types of raw material.

Kozu Obsidian

Figure 2 shows the distribution of Kozu obsidian based particularly on the chemical and physical analyses of Warashina and Higashimura (1983, 1985) and on the research of Oda (1981b). Warashina and Higashimura (1985) divided the four outcrops of obsidian on Kozu into two groups. Group I contains obsidian from Nagahama beach and Group II consists of the three other sources: Sanukazaki, Sawajiriwan and Onbase. The last of these (Onbase) is a small islet, four kilometers southwest of Kozu. Analyses of stone tools from Shimotakabora and Tatsunokuchi on Oshima, Tabara and Tobune on Niijima, Oishiyama on Toshima, Honuihara on Shikine, Hansaka on Kozu, Zo on Mikura, and Kurawa on Hachijo showed that they were all made using

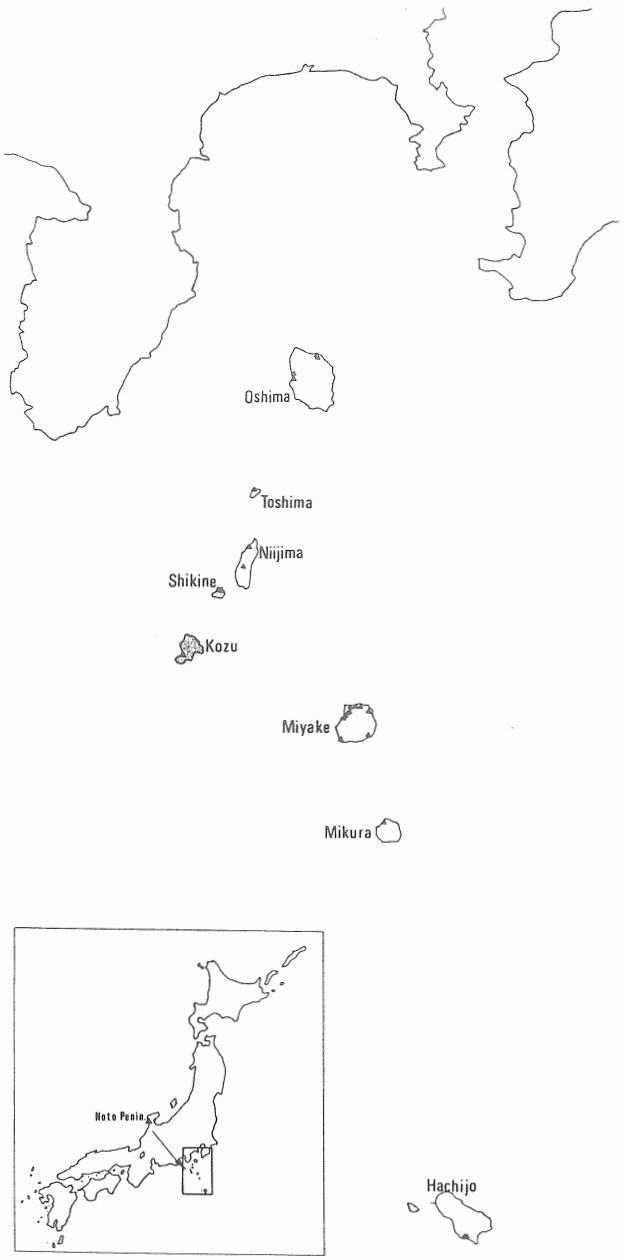

Figure 2: The distribution of Kozu obsidian (black triangles) in the Izu Islands

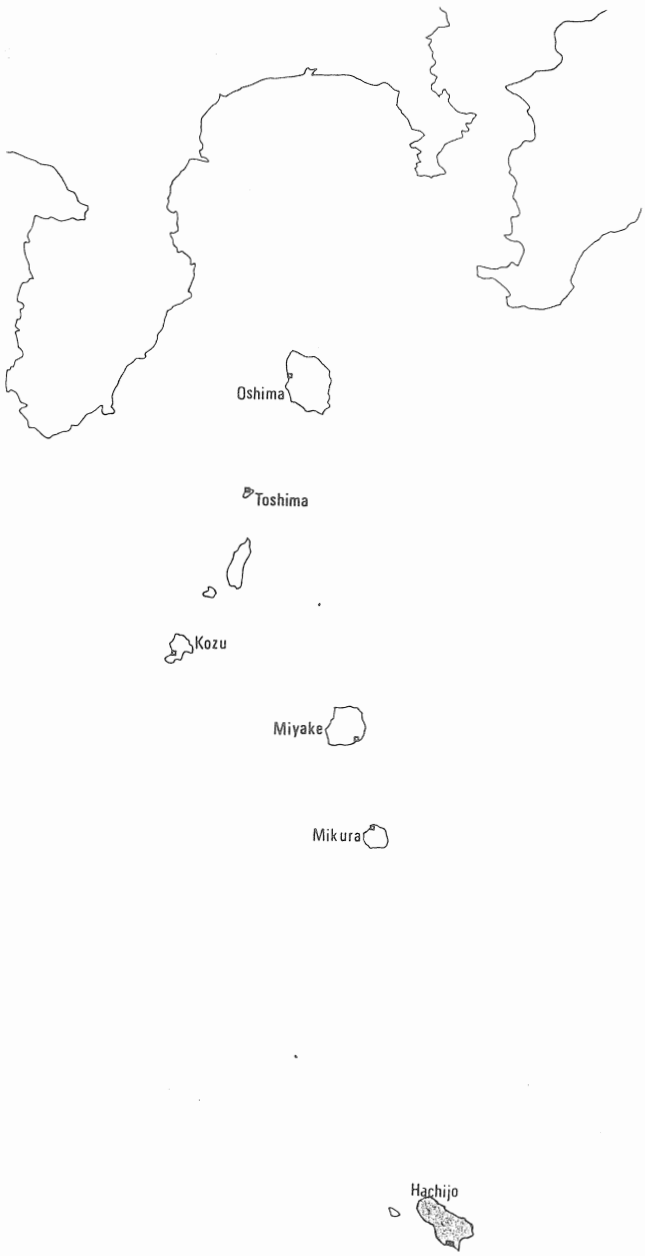

Figure 3: The distribution of andesite tools (open squares) from Toshima and Hachijo in the Izu Islands.

Kozu obsidian (*ibid.*). Although most of the obsidian found at island sites is from Kozu, obsidian from other, mainland sources also exists. Oda (1981b) has noted that obsidian from Yatsugatake and Oishitoge in Nagano was found at Tatsunokuchi, that from Hakone at Oishiyama, and that from Kamitaga on the Izu Peninsula at Zo. Similarly, Kozu obsidian is not just limited to the nearby prefectures of Tokyo, Kanagawa and Shizuoka, but has also been discovered at the Mukaiheraso and Awagatani sites on the Noto Peninsula in Ishikawa Prefecture on the Japan Sea coast (Hiraguchi 1984).

Kozu obsidian contains white crystalline impurities and is comparatively easy to identify with the naked eye. Although the presence of these impurities could only have been a disadvantage in making stone tools, the fact that Kozu obsidian was distributed through such a wide area traversing the Japanese archipelago shows that vigorous regional interaction occurred, especially during the Middle Jomon period. With the discovery of Kozu obsidian at Paleolithic sites on the Musashino terrace in the southern Kanto, there have been suggestions that there was exchange between Kozu and the mainland in the preceramic period (Oda 1981b). Paleolithic sites have not yet been found in the islands themselves, however, and it seems more appropriate at the moment to suggest, following Kobayashi (1987), that obsidian was first transported during the Jomon period.

Andesite Tools

Both Toshima and Hachijo Islands are sources of andesite (Figure 3). Toshima is a basalt and andesite stratovolcano comprised of olivine andesite and andesitic basalt (Isshiki 1978). Hachijo is also formed from andesite and basalt. Platy joints are especially characteristic of the andesite on both islands and, when utilized efficiently, flakes with uniform thickness could be produced. Almost all large-sized tools, such as chipped axes, side-, end- and stemmed-scrapers (*ishisaji*), seem to have been made on regular flakes of this andesite. A good example is provided by the Kurawa site on Hachijo where many andesite tools were discovered (Motohashi 1985). The bedrock at Kurawa is platy-jointed andesite and outcrops may be seen in the cliff face just below the site.

A large quantity of platy-jointed andesite tools is characteristic of archaeological sites in the Izu Islands. Also, grinding, hammer and whetstones appear to have been made using local basalt. In other words, the demand for lithic raw material in the Izu Islands was satisfactorily supplied either on the islands themselves or through inter-island exchange by the use of naturally available resources, including such characteristic material as platy-jointed andesite. Although tools made on this andesite are common in the Izu Islands, they have not been found in Tokyo or in neighboring Kanagawa or Shizuoka Prefectures. It is possible that they have simply not yet been discovered, but if they do exist they are likely to be very few in number.

The Distribution of Pumiceous Rhyolite Grooved Whetstones

An outcrop of pumiceous rhyolite is found on Niijima and, as mentioned previously, many stone tools made of this material have been excavated in the Izu Islands (Figure 4). Most of these seem to have been used as whetstones, but at Shimotakabora bowls, floats and a turtle-shaped object were also found (Motohashi 1985). In the islands, pumiceous whetstones with grooves are often excavated in association with bone and antler tools. From the fact that traces of lines are often visible in the

Figure 4: The distribution of pumiceous rhyolite artifacts (open circles) from Niijima in the Izu Islands.

grooves, I have suggested that these objects may have been used for sharpening bone tools and have given them the name "grooved whetstones" (*joko-toishi*) (Motohashi 1988a, 1989). Because these whetstones are made of pumice, it is relatively easy to determine what sort of material they were used to sharpen.

Sugao Yamanouchi (1968) gave the name "arrowshaft smoother" to objects shaped like an egg divided into two with one groove on the surface. He believed they were used in pairs in order to polish arrowshafts. The name "arrowshaft smoother", which Yamanouchi included within the general category of whetstones, came from the fact that they are often found in pairs and from ethnographic parallels with American Indians. Yamanouchi noted that these tools were distributed in Europe, Siberia, the Maritime Provinces and America at around 2500 bc. He assumed they were invented in the "nuclear zone of civilization or its surrounding areas" and that by around 2500 bc they spread to central Europe and in Asia to Siberia and Mongolia and were then transmitted to Japan in the Incipient Jomon period (Yamanouchi 1968). Yamanouchi used this as his basis for the date of the beginning of the Jomon on the following reasoning:

> I have found about ten arrowshaft smoothers in Japan of which two specimens belong to the earliest ceramic type. While in the world prehistory arrowshaft smoothers occurred in the Periods beginning in 2500 bc but never before that age. Thus the date 2500 bc was assumed for the beginning of [the Incipient] Jomon (Yamanouchi 1968:87; original English retained).

Yamanouchi later revised this date to 5000 bc., but most archaeologists now place the beginning of the Jomon as twice as old as even this revised estimate. While we must not ignore problems caused by the careless use of radiocarbon dating, it is by no means clear that the so-called arrowshaft smoothers distributed across the world are really all comparable.

Considering the use of pumice as a raw material, it may be noted that whetstones with grooves have also been excavated from Kagoshima in southern Kyushu, a volcanic area similar to the Izu Islands. For example, a large quantity of such tools were discovered at the Muginoura shell midden in Sendai City, Kagoshima. It is important to point out that this pumice is also rhyolite, a material which does not float in water and thus cannot drift ashore by itself. The occurrence of pumiceous rhyolite away from its natural sources, therefore, indicates that it was transported by man. In the case of the Izu Islands, I hope that future research will make clear whether grooved whetstones were developed locally because of the abundance of pumiceous material or whether the technology was brought up on the Kuroshio which flows just to the south of Kagoshima.

In the past three sections we have seen that the volcanic Izu Islands boast sources of andesite, pumice and obsidian. These were exploited in prehistory as raw material transported to the mainland as well as for the local production of stone tools. Apart from some obsidian, almost all lithic raw material used by the prehistoric occupants of the Izu Islands was supplied from the islands themselves. The regular transportation of obsidian from Kozu, sometimes on a large scale, is evident from sites such as Shimotakabora. The supply of lithic raw material was thus one element in which each island, or at least the islands as a whole, were independent of mainland sources during prehistory.

STONE-PAVED DWELLINGS

As their name suggests, stone-paved dwellings were constructions with flat paving stones placed upon a level floor. These dwellings became common from the Sori II phase of the late Middle Jomon in the Chubu region. Houses with stones completely covering the floor, however, first appeared in the late Kasori E3 stage of the Middle Jomon. At this time many paved dwellings in the Chubu and north and south Kanto had projecting sections leading to a pan-handle shape plan.[2] The centers of distribution were the Musashino and Sagamino Terraces and the Tama Hills. These paved dwellings only existed for quite a short period, disappearing after the first half of the Late Jomon.

At the Oishiyama site on Toshima a paved pit-house was discovered (Nagamine 1986). Although the preservation was not good, the building appears to be a pan-handled-shape construction. This type of dwelling was common in the Kanto and Chubu areas in the Kasori E4 and Shomyoji pottery phases of the Middle and Late Jomon (Figure 5). At Oishiyama, Kasori E4 pottery was excavated, of a type distributed on the Musashino and Sagamino terraces of the Kanto and influenced by Sori ceramics. The pottery and paved building may have been diffused together from these areas.

The paving raw material at Oishiyama was the above-mentioned platy-jointed andesite from Toshima. Generally this material was only used for paved dwellings at mountain sites such as Miyadaira in Miyota and Hiraishi in Mochitsuki, both in Nagano Prefecture, where such stone was available close-by (Fukushima 1989; Tsutsumi 1985). Platy-jointed stone is, of course, very suitable material for a flat floor surface. Using such thin stone it would have probably have been easier to construct a

Figure 5: The distribution of Jomon stone-paved dwellings in Central Honshu and Toshima Island. Filled circles represent pan-handle shaped stone-paved buildings; open circles show unpaved pan-handle shaped buildings; and filled squares indicate other types of stone-paved buildings.

paved dwelling than a pit-house. At Oishiyama, the technique of placing small stones in the gaps between flat paving-stones and the use of curbstones around the edge of the building were the same as those used in paved dwellings in the central Kanto (Motohashi 1988b, 1989).

At the Otsuka site in Shuzenji on the Izu Peninsula, a Middle Jomon Kasori E3-equivalent circular pit-building with stones around the wall was discovered together with an early Late Jomon stone circle of a type not found in the central Kanto (Ono 1972). From this fact we can see that the Kanto paved dwellings underwent a process of localization in the Izu region. The existence of Sori and Sori-influenced Kasori E3 pottery of the late Middle Jomon at Oishiyama suggests considerable interaction between Toshima and the mainland - particularly the Sagamino Terrace and the Tama Hills - during this period. The construction techniques of pan-handled pit-buildings were thus probably transmitted as part of this process.

SUMMARY

From the viewpoint of ceramics, the Izu Islands were influenced from the Kanto region on the mainland from as early as the first half of the Initial Jomon; by the beginning of the Middle Jomon this influence had reached Hachijo, the southernmost point of the islands. Seen as a whole, however, frequent interaction with the mainland only occurred as far as Mikura. Hachijo received influences from the other islands, but contacts with the mainland were less than those experienced by the other parts of the Izu Archipelago. Apart from the question of distance, the effect of the Kuroshio current which runs between Mikura and Hachijo was no doubt considerable. The presence of Kansai pottery at Kurawa, whether brought by people transported by this current or from the mainland, may indicate that in future we will have to consider interaction not only with the Kanto and Tokai regions, but also with the Kansai, southern Kyushu and the Ryukyu Islands.

Influences from the south may have been important in the formation of Izu Island culture, but the independent aspects of this culture are clear from the procurement of lithic raw material and the production and use of stone tools. Pottery from the Tokai, Kansai, and especially the Kanto and Chubu regions can be seen in the islands. While this may represent a passive, one-way relationship with the mainland, the distribution of Kozu obsidian as far as the Japan Sea coast demonstrates active contacts in the opposite direction.

In this paper I have focused on lithic raw material in the Izu Islands with the aim of gaining a better understanding of island-mainland interaction, as well as the unique characteristics of the islands. In the future more research is needed on the mainland side, not just regarding Kozu obsidain but also on platy-jointed andesite and pumiceous rhyolite. Detailed temper analysis studies have also become necessary in order to determine if the pottery excavated in the islands was local or from the mainland. One thing is sure, however, that by the Early-Middle Jomon transition, Jomon people had the means and the determination to trespass over the dangerous Kuroshio current and reach Hachijo Island.

NOTES

1 This paper was translated by Mark Hudson.

2 The term 'pan-handle shape' is a translation of the Japanese *ekagami gata* which literally means 'handled-mirror shape'.

REFERENCES

Fukushima, K. (ed.) 1989. *Hiraishi iseki* [The Hiraishi site]. Mochitsuki, Nagano: Mochitsuki Board of Education.

Hashiguchi, N. 1988. *Shima no kokogaku: Kuroshioken no Izu shoto* [Island Archaeology: the Izu Islands and the Kuroshio sphere]. Tokyo: Tokyo University Press.

-----. (ed.) 1984. *Furai-machi Fuku'ura-ko Mukaiheraso iseki, Awagatani iseki hakkutsu chosa hokokusho* [Excavation report of the Mukaiheraso and Awagatani sites, Fuku'ura Port, Furai]. Furai, Nagano: Furai Board of Education.

Isshiki, N. 1978. *Chiiki chishitsu kenkyu hokoku: gomanbun no ichi zu: Toshima chiiki no chishitsu* [Regional geological research report: 1:50,000 geological map of Toshima]. Tokyo: Chishitsu Chosajo.

Isshiki, N. and K. Matsumura 1976. Izu Oshima kara hakken sareta Jomon soki iseki to sono funka nendai shijisha toshite no igi [Finding of the Earliest Jomon site from Oshima Island, Izu Islands, and its significance as a time marker of the volcanic activity]. *Daiyonki Kenkyu* 15(1): 1-9. (in Japanese with English title and summary)

Kobayashi, T. 1987. Jomon sekai no naka no Izushoto to Hachijojima [The Izu Islands and Hachijo in the Jomon world]. In Hachijo Board of Education (eds.), *Tokyo-to Hachijojima Kurawa iseki* [The Kurawa site, Hachijojima, Tokyo], pp.122-6. Tokyo: Hachijo Board of Education.

Motohashi, E. 1985. Sekki ni tsuite [The stone tools]. In Oshima Board of Education (eds), *Tokyo-to Oshima-machi Shimotakabora iseki* [The Shimotakabora site, Oshima, Tokyo], p.43. Tokyo: Oshima Board of Education.

----- 1988a. Hachijojima Kurawa iseki ni okeru joko toishi ni tsuite [The grooved whetstones of the Kurawa site, Hachijo]. *Shigaku Kenkyu Shuen* 13: 31-54.

----- 1988b. Jomon jidai ni okeru ekagamikei jyukyoshi no kenkyu: sono hassei to denpa o megutte [Research on pan-handled dwellings of the Jomon period: their development and diffusion]. *Shinano* 40(8): 32-44 and 40(9): 52-65.

----- 1989. Jomon jidai no yuko toishi no kenkyu: karuiishi sozai o chushin toshite [Research on grooved whetstones of the Jomon period: with special reference to pumice raw material]. *Tokoku Shiron* 4: 31-44.

Nagamine, M. (ed.) 1986. *Toshima-mura Oishiyama iseki IV* [The Oishiyama site, Toshima IV]. Tokyo: Oshima Board of Education.

Oda, S. 1977. Kuroshioken no sekifu: Hachijojima no maseisekifu [Stone axes of the Kuroshio: the polished stone axes of Hachijo]. *Dorumen* 12: 114-26.

----- 1978. Kita Iojima no maseisekifu [The polished stone axes of Kita Iwojima]. *Bunkazai no Hogo* 10.

----- 1981a. Stone adzes of the Black Current region: polished stone axes of Hachijo Island. *Asian Perspectives* 14: 97-110.

----- 1981b. Kozushimasan no kokuyoseki [Kozushima obsidian]. *Rekishi Techo* 9(6): 11-7.

Ono, S. (ed.) 1972. *Shuzenji Otsuka* [The Otsuka site, Shuzenji]. Shuzenji, Shizuoka: Shuzenji Board of Education and Kato Gakuen Archaeology Research Center.

Oshima Board of Education (eds) 1985. *Tokyo-to Oshima-machi Shimotakabora iseki* [The Shimotakabora site, Oshima, Tokyo]. Tokyo: Oshima Board of Education.

Takasugi, H. 1979-1980. Mariana oyobi Izu, Ogasawara shoto no sekisei kogu (1-3) [Stone tools in the Marianas, Izu and Ogasawara Islands (1-3)]. *Kokogaku Janaru* 168: 12-16, 171:11-17, 173:11-13.

Tsutsumi, T. (ed.) 1985. *Miyadaira iseki* [The Miyadaira site]. Miyota, Nagano: Miyota Board of Education.

Warashina, T. and T. Higashimura 1983. Sekki genzai no sanchi bunseki [Sourcing analysis of lithic raw material]. *Kokogaku to Shizengaku* 16.

----- 1985. Shimotakabora iseki shutsudo no kokuyoseki no genzai sanchi bunseki [Sourcing analysis of the obsidian excavated at the Shimotakabora site]. In Oshima Board of Education (eds), *Shimotakabora iseki* [The Shimotakabora site], pp. 95-101. Tokyo: Oshima Board of Education.

Yamanouchi, S. 1968. Yagara kenmakki ni tsuite [Arrowshaft smoothers in world prehistory and their bearing on the chronology of Jomon pottery]. In The Committee for the Commemoration of Professor T. Kanaseki's 70th Birthday (eds), *Nihon minzoku to nanpo bunka* [The Japanese and the Cultures of the South], pp.63-87. Tokyo: Heibonsha.

Yoshida, T. and K. Imamura 1980. *Izu Shichito no Jomon Bunka* [The Jomon culture of the Izu Seven Islands]. Tokyo: Musashino Bijitsu Daigaku Kokogaku Kenkyukai.