LETTER TO THE EDITOR

**A Critical Look at the Palaeolithic and "Lower Palaeolithic"
Research in Miyagi Prefecture, Japan**

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Abstract After talking to the principal investigators, OKAMURA and KAMATA, and a thorough study of the relevant publications and the lithics themselves, we have concluded that no proven artifacts of human origin predating 30,000 B.P. exist in Miyagi prefecture. The claims of OKAMURA, KAMATA, and some other Miyagi archaeologists that they have discovered a "Lower Palaeolithic" there are based on flawed research and are dubious claims. The artifactual database for the Miyagi Palaeolithic is extremely small and much of it has been picked out of road and field cuttings. Several obviously Jomon artifacts are being called Palaeolithic, the oldest lithics are probably not artifacts, and the dates being assigned to the geological strata by the archaeologists disagree with the actual age measurements published by the dating specialists. Furthermore, sensationalizing these very controversial finds in the press is unethical.

Keywords Palaeolithic, Lower Palaeolithic, Early Palaeolithic, Miyagi, Criticism

Introduction

One of the most important and controversial questions in Japanese Palaeolithic archaeology today is the date of the first human inhabitants in the archipelago. Rarely does anyone deny the

existence of Palaeolithic artifacts dating 12,000 to 30,000 years ago. However, archaeological opinion is sharply divided on the question of artifacts of human origin predating 30,000 B.P., "Lower Palaeolithic" artifacts according to their proponents (SERIZAWA 1968; and others).

The controversy has a long history dating back at least to the 1960s (SERIZAWA 1962), and it involves sites all over the country. But during the past few years it has focused on sites in Miyagi prefecture in northeastern Japan. OKAMURA, KAMATA, and some other archaeologists working there claim they have found "Lower Palaeolithic" occupations in 33 sites in that one prefecture alone (Tohoku Rekishi Shiryoukan 1984: 1; OKAMURA 1986b: 13). The most famous of the "Lower Palaeolithic" sites are the excavated ones at Zazaragi (Sekki Bunka Danwakai 1978, 1981, 1983), Babadan A (Tohoku Rekishi Shiryoukan 1985a, 1985b, 1986; KAMATA and FUJIMURA 1986; OKAMURA 1986b), Shibiki (KAMATA 1984), Nakamine C (FUJINUMA *et al.* 1985), Yamada Uenodai (WATABE and SHUHAMA 1981), and Kitamae (SATO and SAINO 1982).

We have read all these reports on the excavations. We have also read the printed materials from symposiums and panel discussions on the research. We have studied the original lithics at the Tohoku Museum of History, and visited the excavation at Babadan A and many of the nearby cuttings. On February 2, 1986, we sat through an eight-hour symposium at which a number of

natural scientists presented their findings from research on the Babadan A site (Tohoku Rekishi Shirayokan 1986). We have also listened to several recent presentations of the materials from Babadan A (KAMATA and FUJIMURA 1986; OKAMURA 1986b; SHOJI 1986), and talked with the principal investigators, OKAMURA and KAMATA, and with many of the specialists doing natural scientific studies related to the Miyagi "Lower Palaeolithic" research. Our conclusion is simple: nearly everything about the Miyagi Palaeolithic and "Lower Palaeolithic" is highly questionable. The dates being assigned to the entire Palaeolithic chronology there are quite unreliable, the oldest lithics do not appear to be man-made, and the research methodology leaves a lot to be desired.

We originally intended to argue only the fallacies of the "Lower Palaeolithic" in Miyagi. However, as we researched the information for that topic, we discovered the question of a Lower Palaeolithic in Miyagi is inextricably tangled

with the multitude of problems afflicting almost every aspect of Palaeolithic research there. It is, therefore, necessary to review and criticize Miyagi Palaeolithic research as a whole.

Miyagi Palaeolithic Chronology According to Proponents of the Lower Palaeolithic

Background:

Miyagi prefecture has 4 major geomorphological regions (Fig. 1): (1) the Ou Mountain Range running north-south along the western side of the prefecture, (2) the Kitakami Highland on the northeast, (3) the Abukuma Highland on the south, and (4) the Sendai Plain in the middle (Geographical Survey Institute 1977: 8; Kankyo-cho Shizen Hogo Kyoku 1982: 13). The plain is a mosaic of hilly and often wide, intervening alluvial lowlands (KITAMURA 1967). The hills vary from gently rolling, with 20 to 30 m relief, to rather rugged, with 100 to 200 m relief.

Fig. 1. General geomorphology of Miyagi prefecture and the distribution of Palaeolithic sites (based on KITAMURA 1967; and OKAMURA 1983: 3 and KAMATA 1985: 78).

About 130 Palaeolithic sites are recorded in the hills and on the eastern flanks of the mountains (Fig. 1) (OKAMURA 1983: 3). Thirty-three of these have components identified as "Lower Palaeolithic" (Tohoku Rekishi Shiryokan 1984: 1; OKAMURA 1986b: 13). The highest density of Palaeolithic sites of all kinds is in the gently rolling hills along both sides of the Eai River in the north-western part of the plain, where 62 Palaeolithic sites, including 16 with "Lower Palaeolithic" components, have been recorded (Tohoku Rekishi Shiryokan 1985a: 88). Partly because of the density of sites in that locality, research on the Palaeolithic and "Lower Palaeolithic" has tended to concentrate there. And the Eai River cultural and geological sequences have become the standards to which all other published sequences are compared.

Eai River Geological Sequence:

Stratigraphic profiles in sites along the Eai River sometimes are fairly similar and comparable, although surprisingly dissimilar stratigraphy is commonly seen in neighboring sites (Fig. 3) (OKAMURA 1985a: 12-14): Zazaragi and Babadan A are only 2 km apart on the top of the same row of hills, yet their deposits have no visual similarity. Moreover, the stratification is complicated and many important points about the deposits are still being debated (TOYOSHIMA and ISHIDA 1983; SHOJI *et al.* 1983; SODA 1986; ITAGAKI *et al.* 1981; SHOJI and YAMADA 1982; OKAMURA 1985a: 7-10; and others). And the sequence is highly local and not comparable to stratigraphy in sites even as close as 10 to 15 km, for example the Nakamine C site just south of the Eai River drainage (compare OKAMURA 1985a: 14 and FUJINUMA *et al.* 1985: 8-10).

Humus is the topmost stratum in the Eai River profiles (Fig. 2). It is often the plow zone. Below the humus is the Hijiori Pumice (HP) (MACHIDA *et al.* 1984: 905-906). Underneath this pumice layer is the Upper Yasuzawa Tephra. The Aira-Tanzawa (AT) ash is difficult to discern in all sites, but it is said to lie somewhere in

Fig. 2. Columnar sections of the general stratigraphic sequence along the Eai River (based on OKAMURA 1985a: 13-14 and Tohoku Rekishi Shiryokan 1985a: 37, 41).

this tephra unit (SODA 1986: 4, 7; KAMATA 1985: 82). This ash comes from the Aira caldera in Kyushu (MACHIDA *et al.* 1984: 876). The younger Yasuzawa Pumice (YP-1) marks the base of the Upper YASUZAWA Tephra (TOYOSHIMA and ISHIDA 1983: 76).

Many sites have lenses or layers of sand and

Fig. 3. Columnar sections from individual sites along the Eai River showing intersite variability (after OKAMURA 1985a: 12-14).

gravel, or other signs of water disturbance in strata between the Upper Yasuzawa Tephra and the Lower Yasuzawa Pyroclastic Flow (OKAMURA 1985a: 9; TOYOSHIMA and ISHIDA 1983: 76). These water-laid deposits often seem to incorporate redeposited materials from the underlying Lower Yasuzawa Pyroclastic Flow (OKAMURA 1985a: 9) and to correlate with the lacustrine Narugo Lake Formation (YAMADA and SHOJI 1983: 14).

The Lower Yasuzawa Pyroclastic Flow is the most debated stratigraphic unit in the Eai River sequence (OKAMURA 1985a: 9). For a number of years geologists have thought it was a pyroclastic flow (MACHIDA *et al.* 1984: 906; SODA, pers. comm., 1986), but they have hesitated to say so concretely because the deposit is thought to contain occupation surfaces and artifacts in primary context. The archaeologists have always maintained it was a tephra. But in his most recent reports, OKAMURA (1986a: 14, 1986b: 13) apparently has reversed his stand on this. KAMATA (pers. comm., 27 April 1986) explained to us that this was true, but that the lower part of the unit, Zazaragi Stratum 15, which contains the lithics being called artifacts, was still thought by the archaeologists to be a tephra.

The Lower Yasuzawa Pyroclastic Flow is redder than the other units, supposedly due to weathering under warmer climatic conditions (SHOJI *et al.* 1983: 83-84, 93; SHOJI 1986: 34). This color characteristic is the only geological information used to correlate other sites with the Eai River sequence (KAMATA 1984: 11; YAMADA and SHOJI 1984: 12; FUJINUMA *et al.* 1985: 11, 111; YAMADA and SHOJI 1985: 13).

The next stratigraphic unit is the Yanagisawa Tuff (YPF), a pyroclastic flow. A white clay called the Babadan Pumice (BP) is correlated with the upper part of the Yanagisawa Tuff by TOYOSHIMA and ISHIDA (1983: 77, Fig. 47) but with the strata between the Yanagisawa and Nizaka Tuffs by SHOJI *et al.* (1983: 88). KAMATA (pers. comm., 10 May 1986) tells us that this

stratum is now considered a manifestation of the Yanagisawa Tuff and is being called as such (KAMATA 1985: 84).

The Aso-4 ash fall from the Aso caldera in Kyushu has been tentatively identified with the strata between the Yanagisawa and Nizaka Tuffs (SODA 1986: 4). The Nizaka Tuff (NPF) is another pyroclastic flow. This pyroclastic flow is accompanied by an Upper (NT1) and Lower (NT2) Nizaka Tephra (OKAMURA: 1986a 14, 1986b: 13). Below the Nizaka Tuff is the Nakazato Tephra, a thick unit with many intercalated layers of pumice. The Toya ash from the Toya caldera in Hokkaido is said to be interbedded near the top of the Nakazato Tephra (SODA 1986: 4, 7). Below this the Ichihazama Pumice (ICP), Iwadeyama Pumice (IWP), and three Nakazato Pumices follow in that order (SODA 1986: 7). The deepest unit of importance is the Shimoyamazato Tuff (SPF) (TOYOSHIMA and ISHIDA 1983: 74). This is a pyroclastic flow.

Eai River Palaeolithic Sequence:

Well more than half of the Eai River Palaeolithic sites are multiple-component (Tohoku Rekishi Shiryokan 1985a: 88, 91-93). Sixteen of the sites have components classified as "Lower Palaeolithic", 47 as "Upper Palaeolithic", and 24 as "Mesolithic." A large number also have Earliest and Early Jomon components. However, only the Zazaragi and Babadan A sites have been excavated, and only the Zazaragi excavation was fully published at the time of this writing.

OKAMURA seems to distinguish 11 phases of development in the Eai River Palaeolithic sites (Figs. 4 and 10), judging from the most comprehensive illustration of the chronology that we could find (Tohoku Rekishi Shiryokan 1985a: Fig. 68, pp. 95-96). He numbers these phases from 1 for the "Mesolithic", backwards into the "Lower Palaeolithic". However, calling these Phase I, Phase II, etc. is our idea; such names are not used by OKAMURA or any of the other Miyagi Palaeolithic archaeologists. But it allows us to impose some order on the loose body of informa-

Fig. 4. Eai River cultural sequence according to the Miyagi Palaeolithic archaeologists (based on materials in Tohoku Rekishi Shiryokan 1985a, Sekki Bunka Danwakai 1978, 1981, 1983, and OKAMURA *et al.* 1980).

tion in the publications coming from Miyagi.¹ In addition, we have added to the following description a number of components temporally between phases illustrated by OKAMURA that are frequently referred to by others when making inter-regional correlations.

Phase I (Mesolithic): There are 5 components which are used to illustrate this youngest phase (Tohoku Rekishi Shiryokan 1985a: Fig. 68, pp. 95-96). Apparently none of the artifacts was recovered through excavation. The linear-relief potsherd, stemmed point, stone ax, spatula-shaped stone tool, and flakes ascribed to Stratum 5 at Zazaragi, just below the Hijiori Pumice, come from a road cutting on the site and not from the main excavation (Sekki Bunka Danwakai 1981: 122-124). The stone artifacts are mostly of tuff and rhyolite.² A linear-relief potsherd, stemmed point, 2 or 3 foliates, and some other types of stone artifacts have been collected from the upper face of the soft loam (in a road cutting?) at Babadan B (Tohoku Rekishi Shiryokan 1985a: 63). At Babadan C, plain potsherds, possible nail-marked potsherds, 7 small, arrowhead-like points, a spatula-shaped stone tool, and some other artifacts were picked out of a road cutting from a stratum just under the Hijiori Pumice

(Tohoku Rekishi Shiryokan 1985a: 63). Three artifacts considered "Mesolithic" were found in a road cutting on the Uranokoshi Higashi site, in a stratum comparable to Stratum 5 at Zazaragi (Tohoku Rekishi Shiryokan 1985a: 64). All 3 were shale: a spatula-shaped tool, a scraper, and a drill. And lastly, a *Yanagimata* stemmed point, a long, slender point, and 2 drills were unearthed in the upper part of the soft loam in a pit dug to store potatoes at the Izumisawa site (Tohoku Rekishi Shiryokan 1985a: 84-85). These 4 artifacts were one of shale and three of hard shale.

Phase II (Terminal Upper Palaeolithic?): The stone artifacts from the 4 sites used to illustrate this phase (Tohoku Rekishi Shiryokan 1985a: Fig. 68, pp. 95-96) are mostly shale, or are said to be a tuff that is generally identified as shale;³ a few are agate, rhyolite, obsidian, or other materials. The only excavated artifacts are from Zazaragi Strata 6b and 6c (Sekki Bunka Danwakai 1978: 10-13, 16, 39; 1981: 44-45, 56-60, 62, 65-67).

These artifacts from Zazaragi include stemmed points, foliates, scrapers, a keel-shaped stone tool (which is perhaps a microcore), flakes and chips, a clay object called an animal figurine, and a potsherd with herringbone cord-marking. The Zazaragi archaeologists claim that the clay object is "the world's second oldest clay animal figure" (Sekki Bunka Danwakai 1978: 16), and that the cord-marked pottery is older than the linear-relief style generally thought to be the oldest in Japan (KAMATA 1984: 74; see Sekki Bunka Danwakai 1981: 56-61). Altogether about 60 to 70 artifacts have been recovered from these two strata at Zazaragi. But about 20 of them are from a three-throw and are assigned to Stratum 6 on the basis of the color of the soil matrix they were in, despite their disturbed context (Sekki Bunka Danwakai 1978: 10-13). These

1. OKAMURA and KAMATA (1980) did describe 5 phases of development for the Eai River sites, using geological strata numbers to group the archaeological data. But the information to correlate this description accurately with more recent partial descriptions and illustrations is missing, or at least is not very obvious.

2. We are following standard translations for the lithic materials identified in the reports being quoted. However, we feel the original identifications should be treated with caution because there is reason to believe they are not consistent, especially in the distinction between tuff and shale. Different petrologists assisted at different sites, and the first Zazaragi report identifies one of the materials as "tuff which the archaeologists call shale" (Sekki Bunka Danwakai 1978: 11, 16, 19). This is not followed up in subsequent reports.

3. This comment on lithic raw material is made several times in the first Zazaragi report (Sekki Bunka Danwakai 1978), but it does not appear in any other reports. Consequently, we are not sure just what is being identified as shale and what as tuff.

collections from Strata 6b and 6c are called Terminal Palaeolithic (Sekki Bunka Danwakai 1981: 138).

A large collection of artifacts has been gathered (from a road cutting?) at the Nandayama site, from a stratum matching Stratum 6 at Zazaragi (Tohoku Rekishi Shiryokan 1985a: 48-51). The majority of the 68 artifacts listed individually are obsidian; the rest are shale or agate. There are retouched flakes, edge-modified points, scrapers, notched pieces, and flakes and chips. An additional 171 obsidian artifacts have been picked up on the surface of the fields at the site. This site is classified as Upper Palaeolithic and Mesolithic, but it is not clear from the report to which the obsidian artifacts are supposed to belong.

The Shin-Tsutsumiue site produced 19 stone artifacts from a stratum correlated with Stratum 6 at Zazaragi (Tohoku Rekishi Shiryokan 1985a: 38-39). These come from a cutting on the site. One is a spatula-shaped stone tool. The others are retouched flakes, utilized flakes, or flakes. All were made of shale. One artifact called a foliate point, and from either Stratum 5 or 6, resembles a thumbnail scraper. This component is called Mesolithic.

A few shale scrapers, a spatula-shaped tool, a small arrowhead-like point, and some flakes apparently are the entire collection for the Mesolithic component at the Iwadeyama Bokujo site (Tohoku Rekishi Shiryokan 1985a: 70-72). These were picked from a road cutting from a stratum compared to Stratum 6 at Zazaragi.

Phase III (Upper Palaeolithic to Mesolithic?): The basic chronology chart (Tohoku Rekishi Shiryokan 1985a: Fig. 68, pp. 95-96) shows only 2 sites in this phase and separates them from Phase II by a dashed line, apparently to indicate that the two phases are very similar. The artifacts from both sites, Gofukuzawa and Koderagakoi, are from cuttings, found in the soft loam or the top of the hard loam (Tohoku Rekishi Shiryokan 1985, 65). The 10 reported artifacts are mostly flakes of hard shale and obsidian; 2 of them might be microblades. One

keel-shaped shale tool (a microcore?) has been picked up from the surface of the Gofukuzawa site, together with a large number of flakes. The report seems to suggest this is the micro-lithic phase of the Palaeolithic.

Phase IV (Upper Palaeolithic): Five sites along the Eai River have materials used to illustrate this main phase of the Upper Palaeolithic (Tohoku Rekishi Shiryokan 1985a: Fig. 68, pp. 95-96); only the Zazaragi materials come from an excavation.

This collection from Zazaragi contains about 120 to 130 lithic artifacts, all from Stratum 8 (Sekki Bunka Danwakai 1978: 19, 40-41, 1981: 12, 24-29, 38). Most are made of shale, or a tuff generally identified as shale (Sekki Bunka Danwakai 1978: 19). There are also a few pieces of agate, rhyolite, and obsidian. Knife-shaped tools are the most distinctive type. The collection further includes scrapers, drills, blades, lots of flakes and chips, and several other types of stone tools. One drill is "a distinctly strange artifact for the Palaeolithic period" (Sekki Bunka Danwakai 1981: 17), but despite its obvious similarity to drills from the Middle Jomon period and later (Fig. 8), the excavators consider it a confirmed part of the Zazaragi 8 component (Sekki Bunka Danwakai 1981: 38-41).

The other 4 components said to belong to this phase are from Tsukahara, Ochiai, Nishi Tennoyama, and Akebizawa. A knife-shaped tool and a graver of hard shale come from the surface of the Tsukahara site (Tohoku Rekishi Shiryokan 1985a: 56-57). A single *Kiridashi* knife of hard shale was picked up from the surface of the Ochiai site (Tohoku Rekishi Shiryokan 1985a: 54-55). Three flakes are reported from the tephra (exposed in a cutting?) on the Akebizawa site (Tohoku Rekishi Shiryokan 1985a: 68-69). Two of these are shale and 1 is sandstone, and they come from a stratum said to be probably comparable to Stratum 8 at Zazaragi. The Nishi Tennoyama collection is a bit larger than the others: 7 stone artifacts from the upper part of the soft loam, and 5 more from the surface of

the site (Tohoku Rekishi Shiryokan 1985a: 19–21). These include a bifacial point, 2 scrapers, a side-scraper, a denticulate, 2 knife-shaped tools, and 3 blades. Most are shale; 1 is obsidian and another is given as possibly chert.

Phase V (Transition Lower to Upper Palaeolithic): Materials from cuttings at Zazaragi and Yasuzawa are the only collections clearly assigned to this transitional phase (Tohoku Rekishi Shiryokan 1985a: Fig. 68, pp. 95–96). Only 1 artifact, a retouched flake (a knife-shaped tool?), was found during the excavation of Stratum 9 at Zazaragi (Sekki Bunka Danwakai 1983: 10). However, a few backed knife-shaped tools, blade-flakes, and flakes were picked out of Strata 9 through 11 in cuttings on the site (Sekki Bunka Danwakai 1983: 45, Fig. 23: 1–8, p. 52). The 3 Yasuzawa artifacts illustrated in the basic chronology chart (Tohoku Rekishi Shiryokan 1985a: Fig. 68, pp. 95–96) are identified in another report (Sekki Bunka Danwakai 1983: 44–45, Figs. 23–24, pp. 52–53) as two coming from the Yasuzawa A site and one from the Iwadeyama Bokujo site. They are 2 knife-shaped tools and a retouched flake picked out of Strata 9 through 11 (in cuttings?). This very small collection of materials from Zazaragi and Yasuzawa is identified as transitional from the “Lower” to the “Upper” Palaeolithic (Sekki Bunka Danwakai 1983: 40).

Phase V/VI (Zazaragi Stratum 12): Probably the larger and slightly older Zazaragi Stratum 12 collection should be used to represent this Phase V. We could find only 3 artifacts in this collection that actually were found at Zazaragi, and these were picked out of cuttings on the site (Sekki Bunka Danwakai 1981: 129, 135). But a total of 46 stone artifacts have been recovered from Stratum 12 at sites near Zazaragi (Sekki Bunka Danwakai 1983: 46–49, 55–62), and these seem to be the materials referred to in reports as “Zazaragi Stratum 12” (KAMATA 1984: 73; FUJINUMA *et al.* 1985: 111). Points, scrapers, retouched flakes, ovoids, cores, and what are possibly discoidal tools and spatula-shaped tools, are characteristic of this collection. The raw

materials are about 70% siliceous shale, plus some rhyolite tuff, siliceous tuff, and other unidentified stone.

Phases VI through XI (Lower Palaeolithic): These 6 phases are all represented by single components (Tohoku Rekishi Shiryokan 1985a: Fig. 68, pp. 95–96). All of them are from the only two excavated sites along the Eai River: Zazaragi and Babadan A.

Zazaragi 13 (Phase VI) consists of 49 stone artifacts recovered from the interface of Strata 12 and 13 (Sekki Bunka Danwakai 1983: 12, 17–18, 23). Stratum 12 has been greatly disturbed, probably by the action of water, and Stratum 13 is the undisturbed (?) Lower Yasuzawa Pyroclastic Flow (MACHIDA *et al.* 1984: 906; SODA, pers. comm., 1986; Sekki Bunka Danwakai 1983: 9; TOYOSHIMA and ISHIDA 1983: 77; OKAMURA 1985a: 9, 1986a: 14, 1986b: 13). Only 81 m² of the site were excavated into this stratum. Most of the artifacts appear to be flakes of undefined forms. One of them, however, looks like a preform for a large stemmed point (Sekki Bunka Danwakai 1983: Fig. 12: 11, p. 19). None of them refits with any others, and rarely do any come from the same nodule of raw material. The bulk of the artifacts are siliceous shale or siliceous tuff. A few of them are chert or other material.

Zazaragi 15 (Phase VII) yielded 14 stone objects from a 54 m² excavated area (Sekki Bunka Danwakai 1983: 24, 27–31). Among these are things said to be a chopper, a chopping tool, ovoids, and other artifacts. Twelve of them are andesite, 1 is shale, and 1 is sandstone. Geological data suggest that Zazaragi Stratum 15 is part of a pyroclastic flow, but the archaeologists OKAMURA and KAMATA say it is probably a tephra, as was discussed above.

Babadan A 10 (Phase VIII) yielded 32 artifacts from a 20 m² excavation (KAMATA and FUJIMURA 1986: 12). The materials are rhyolite, shale, and chert. The tool types are said to be points, graters, denticulates, and all kinds of scrapers.

Babadan A 14–17 (Phase VIII/IX) is not shown in the basic chronology chart (Tohoku Rekishi

Shiryokan 1985a: Fig. 68, pp. 95-96) but should be added here because it is used as comparative material (KAMATA 1984: 71, 73; FUJINUMA *et al.* 1985: 113). This is a collection of 23 lithics picked out of cuttings at the site (Sekki Bunka Danwakai 1983: 49-51, 65-71). Several of the pieces are identified as flakes or retouched flakes, 2 are called ovoid tools, 1 a chopper, 1 a chopping tool, and the rest a variety of other types. The raw materials are andesite, siliceous tuff, siliceous shale, and chert, plus 1 or 2 each of wood opal, sandstone, rhyolite, and rhyolite-tuff.

Babadan A 19a (Phase IX) is a collection of 23 stone objects of coarse-grained andesite, rhyolite, shale, and ferruginous quartz (Fig. 5) recovered from a 20 m² excavation (KAMATA and FUJIMURA 1986: 12). Most of the objects are relatively large and crude, and are identified as choppers, hand-axes, discoidals, and flakes.

Babadan A 20 (Phase X) yielded 100 lithics in 7 clusters from an excavation area of 240 m² (KAMATA and FUJIMURA 1986: 12). These are called points, drill-shaped tools, graters, wedges, and all kinds of scrapers. Most are small flakes. The materials are identified as agate, chalcedony, wood opal, and ferruginous quartz.

We had the opportunity to look over this interesting collection quite carefully, at the Tohoku Museum of History in February 1986 and at the excavation site in May 1986. Most of the lithics have clear bulbs of percussion, striking points, and fissures. The striking angles generally are well within the range seen on unquestionable human products. However, the surfaces of the pieces glisten and show signs of rolling, and the flake scars are worn unequally and irregularly. Further, each piece is a morphologically unique specimen, for the most part each piece represents a different original nodule, and fine-screening of the deposits has failed to find any flakes or chips indicative of tool manufacturing or sharpening. The lithics are found at the interface between the eroded surface of the clayey tephra Stratum 20 and the 4-5 cm thick, gravelly Stratum 19f (the Ichihazama Pumice) that covers

it. There are a number of fist-sized pebbles on the surface of Stratum 20, together with the lithics being called artifacts, but these pebbles are not being collected or recorded.

Babadan A 32-33a (Phase XI) has only 3 agate objects (KAMATA and FUJINUMA 1986: 12) from a 12 m² test pit. These objects are similar to the lithics from Stratum 20.

Other Excavated Sites with Palaeolithic Components:

There are a number of other sites with "Lower Palaeolithic" components located in the central and southern Sendai Plain (OKAMURA 1983: 4). Four of them have been excavated and published (WATABE and SHUHAMA 1981; SATO and SAINO 1982; KAMATA 1984; FUJINUMA *et al.* 1985). A fifth excavated and published site in the foothills has only late Upper Palaeolithic materials (OKAMURA *et al.* 1980). These five sites provide useful information on the cultural sequence, but none of them has geological stratification that matches that seen in sites along the Eai River. This makes correlation of the cultural materials very difficult, especially so for the "Lower Palaeolithic" materials.

The Shibiki Site: Shibiki is located near the coast about 20 km east-northeast of the city of Sendai (KAMATA 1984). The deposits in this site are less than 1 m thick and bear little resemblance to deposits in sites along the Eai River. Artifacts were found in 5 strata.

Stratum 3 yielded several nail-marked and plain potsherds, 7 stemmed points, drills, and a number of flakes or flake-tools. The raw materials for the 42 stone artifacts are mostly siliceous shale imported from across the mountains in Yamagata prefecture. A few pieces of obsidian and chert are also present. This component is classified as Terminal Palaeolithic or Early Ceramic, and it apparently correlates with Phase I in the Eai River chronology.

Stratum 4 produced 17 flakes or flake-tools of siliceous shale, together with a few pieces of siliceous tuff and chert. These artifacts are as-

Fig. 5. Dubious lithic objects from Babadan A Strata 19a (1-3), 20 (4-11), and 33a (12), and from Nakamine C Stratum VII (Tohoku Rekishi Shiriyokan 1985a: 61-62; FUJINUMA *et al.* 1985: 131-132, 134).

signed to the Upper Palaeolithic and are said to resemble artifacts found in the lower part of Stratum IV in sites on the Musashino Upland in Tokyo; their correlation with the Eai River chronology is not specified in the excavation report.

Only 6 artifacts were recovered from Stratum 7; all are flakes of siliceous shale or fine-grained siliceous tuff. These are called Middle or Lower Palaeolithic and are said to correlate roughly with the materials from Strata 12 and 13 at Zazaragi (Phase VI).

Thirty-six stone objects were found in Stratum 8 at Shibiki. These include a number of flakes and some rather chunky objects. This is the oldest stratum with typical siliceous shale artifacts, but most of the lithics from this stratum are tuff, chert, opal, chalcedony, rhyolite, mudstone, or black clayslate. The make-up of this collection is transitional between that of Stratum 9 below and that of Stratum 7 above. This is called a Lower Palaeolithic component and is correlated with the lower component at the Kitamae site southwest of the city of Sendai, but its correlation with sites along the Eai River is not specified in the excavation report.

The deepest materials at Shibiki are from Stratum 9; these are 25 large and small, angular fragments of coarse-grained andesite and a few other coarse materials. This collection of lithics is said to resemble those from Stratum 15 at Zazaragi and also those from below the Babadan Pumice (BP) in the Eai River sequence. These lithics are also said to correlate with collections from the deeper strata at Yamada Uenodai and the deepest stratum at Nakamine C. These comparative materials span a wide range of time, making the proposed correlations nearly meaningless.

The Nakamine C Site: The Nakamine C site is located in the town of Taiwa, about 20 km north of the city of Sendai and about 10-15 km south of the sites on the Eai River (FUJINUMA *et al.* 1935). But despite its proximity to the latter, its stratification is completely different

and not comparable geologically. Stone objects classified as artifacts were found in 5 strata: 3 collections from very thin strata about 1 m below the surface, a fourth from about 2 m below the surface, and the fifth and deepest from about 5 m below the surface.

Although the three collections from the upper Strata IIb, IIc, and III are very close stratigraphically, they manifest compositional differences. Large blades and artifacts that resemble bifacial points and axes are distinctive of the collection from Stratum IIb; small blade-flakes are more common in Stratum IIc; and undefined flake tools are common in Stratum III. The raw materials for all three collections are mostly siliceous shale, but some are of black shale, siliceous tuff, jasper, and chalcedony, and in Stratum III about 30% are fine-grained dacite tuff. The collection from Stratum IIb correlates with materials found just below the Hijiori Pumice (Phase I?) and is classified as Terminal Palaeolithic. The collection from Stratum IIc matches Zazaragi 6c and 8 (Phases II and IV) and is classified as Upper Palaeolithic. And the collection from Stratum III corresponds to Zazaragi 12 and Babadan A 7 (between Phases V and VI), and it is placed at the end of the Lower Palaeolithic.

Stratum IV is a full 1 m below the top of Stratum III, and only 1 small group of 10 or 11 lithic objects was recovered from this stratum. These lithics are called flakes and cores; about 40% are dacite, about 20% siliceous tuff, and the rest a mix of rhyolite, chalcedony, siliceous shale, and fine-grained dacite tuff. These lithics are said to match those found below the Babadan Pumice (Strata 9 to 33a?) in the Eai River sites, based on the large dacite objects. Such a vague statement makes it difficult to specify the phase, but it must be Phase VII or older.

Seven concentrations of lithics, totalling 106 pieces, were recorded in Stratum VII at Nakamine C (Fig. 5), nearly 3 m deeper than the preceding cultural layer. The archaeologists used numbered types instead of named types; most of the lithics seem to be undefined flakes and other

types of broken stones and stone fragments. About 30% are jasper, about 25% are chalcedony, and the rest are siliceous tuff, dacite, rhyolite, fine-grained dacite tuff, and "other." The dacite and rhyolite objects are said to resemble those from Zazaragi 15, whereas the chalcedony and jasper pieces are said to resemble those from Babadan A 20. Both of these comparative collections are classified as Lower Palaeolithic, but they are stratigraphically quite separated. Zazaragi 15 is assigned to Phase VII above the Yanagisawa Tuff, and Babadan A 20 is assigned to Phase X below the Ichihazama Pumice in the upper part of the Nakazato Tephra.

The Yamada Uenodai Site: This site is located in the city of Sendai, about 6.5 km southwest of the station (WATABE and SHUHAMA 1981; Sendai-shi Kyoiku Iinkai 1982). About 200 m² were excavated into the Palaeolithic deposits. Strata 1 to 9, and 11 and 12 are surface humuses and tephra; Stratum 10 is the Kawasaki Scoria; Strata 13 to 32 are silt, clay and sand deposits, many containing gravel; and Stratum 33 is the terrace gravel. Fluvial action is recognized in Strata 15 to 28, and Strata 29 to 33 are fluvial deposits. Palaeolithic cultural layers occurred on the surfaces of Strata 5, 6, 7, 8, and 9, and in four layers cutting across Strata 21 to 31.

Stratum 5 yielded 30 artifacts, including points, blades, cores, and chips. Stratum 6 yielded 70 artifacts. One of these is possibly a knife-shaped tool; the others include axes, scrapers, blades, flakes, and chips. Only 6 artifacts were recovered from Stratum 7, only 1 from Stratum 8, and only 3 from Stratum 9. These are flakes and chips, and an ax-like tool. The reports say nothing clear about the lithic raw materials for these 5 collections, but one of the tables (WATABE and SHUHAMA 1981: 23) indicates that the material is almost entirely siliceous shale. These collections are called Upper Palaeolithic, but no attempt was made to correlate them with the Eai River sequence.

The excavators identified 4 cultural layers in Strata 21 to 31. Each of these layers cut through

several of the geological strata. The quantities and types of tools found in these layers are not specified in the final excavation report (WATABE and SHUHAMA 1981), but a later article (Sendai-shi 1982: 9) says Cultural Layer 6 has 5 stone tools, Cultural Layer 7 has 13, Cultural Layer 8 has 3; and Cultural Layer 9 has 3. The raw materials also were not specified clearly in the final excavation report, but the article says they are mostly siliceous shale, with some andesite, rhyolite, and other materials. These collections are called Lower Palaeolithic because they are below the Kawasaki Scoria (Stratum 10) and thus thought to predate 30,000 years.

The Kitamae Site: The Kitamae site is located in the city of Sendai, about 200 m from the Yamada Uenodai site (SATO and SAITO 1982; Sendai-shi Kyoiku Iinkai 1982). The deposits are about 2 m thick. Strata 1 to 6, and 8 and 9 are the surface humuses and tephra. Stratum 7 is the Kawasaki Scoria. And Strata 10 to the basal terrace gravels are different all over the site and hence no single number sequence could be applied. These deeper strata are all fluvial deposits. Excavation of the Palaeolithic strata seems to have covered no more than 54 m² of the site. "Upper Palaeolithic" materials were found on the surfaces of Strata 5, 6 and 9, and "Lower Palaeolithic" materials on the surfaces of Stratum 15 in Grid D-3a and Stratum 17 in Grid I-5b.

Five scrapers, 1 notched piece, 1 retouched flake, 1 blade, and 1 other stone artifact were recovered from the bottom of the pit made by an up-rooted tree. These are assigned to Stratum 5. Two flakes and a scraper were found in the wall of a Jomon pit and are said to come from Stratum 6. And a single flake from the wall of the excavation pit is identified with Stratum 9. The raw material for these artifacts seems to be entirely siliceous shale. Their correlations with other sites are not given in the reports. These 3 collections are called Upper Palaeolithic, although the flake from Stratum 9 is questioned.

Seven scrapers, 3 cores, 1 end-scraper, 3 flakes, and 1 bipolar tool were found in Stratum 17 in

Grid I-5b; and 1 ax, 3 scrapers, and 1 flake were found in Stratum 15 in Grid D-3a. The raw materials seem to be a mix of siliceous shale, chert, dacite, wood opal, chalcedony, silt-stone, and other materials. Correlations with other sites are not specified in the reports, but these collections are called Lower Palaeolithic.

The Kanohara D Site: This site is located on a terrace in the foothills, along the upper Naruse River in the northwestern part of the Sendai Plain, not far from the concentration of Palaeolithic sites along the Eai River (OKAMURA *et al.* 1980). Much of the 1,500 m² site was tested, but artifacts were found in only one location. The main excavation there unearthed 120 m² and exposed 6 geological strata. Stratum 1 was humus, Stratum 2 was the Hijiori Pumice, Strata 3 to 5 were tephra, and Stratum 6 was silt and gravel. Strata 4 and 5 contained a lot of pebbles. Two Palaeolithic components were recovered.

Six stone tools, including stemmed points, and 2 sherds of linear-relief pottery were found on the surface of Stratum 3 in Block AD-11. The lithic raw materials are mostly siliceous shale. Fifteen stone tools were found on the surface of Stratum 5a in Block AF-11. These include a possible microcore, blade-flakes, ovoid axes, spatula-shaped tools, and scrapers. The lithic raw materials are siliceous shale, obsidian, andesite, and other materials. The Stratum 3 component is called Terminal Palaeolithic and is correlated with the collection from Zazaragi Stratum 5. The Kanohara D Stratum 5 component is compared to components covering a wide range of time, but the authors of the excavation report seem to imply that this collection of artifacts correlates with those from Zazaragi Stratum 6 or the microlithic Phase III.

Absolute Dating:

Dates are important to any chronology, and the Miyagi Palaeolithic phases and components just described have more than 45 absolute dates based on thermoluminescence (TL), fission-track (FT), radiocarbon, and Th-230 measurements

made on samples from the archaeological sites themselves or from equivalent strata in nearby geological sites (Fig. 6). The Miyagi archaeologists have published several divergent sets of general dates based on the actual dates (KAMATA 1985: 82; Tohoku Rekishi Shiryokan 1985a: 95-96, 1985b: 6; FUJIMURA *et al.* 1985: 150; OKAMURA 1986a: 14, 1986b: 13; KAMATA and FUJIMURA 1986: 13). But all of their schemes are at best very dubious approximations of the actual dates that are available for estimating the ages of the archaeological materials.

Phase I components are found in the top of the soft loam, just under the Hijiori Pumice. This pumice has 4 radiocarbon, 1 Th-230, and 1 TL dates that range from 9,500 to 11,000 years (MACHIDA *et al.* 1984: 906). These dates provide the younger limit for Phase I. Stratum 4 at Zazaragi, which is the Hijiori Pumice, has a TL age of 83,400 years (ICHIKAWA 1983b: 96). The huge difference in dates is not explained, and this date is disregarded by OKAMURA and KAMATA.

Phase II components correlate with Zazaragi Stratum 6 in the upper part of the Upper Yasuzawa Tephra. This stratum at Zazaragi has a TL age measurement of 75,900 years (ICHIKAWA 1983: 96). The stratigraphic reversal in the TL age is not explained, and this date is disregarded by OKAMURA and KAMATA.

Phase III components are found in the soft loam or the top of the hard loam, supposedly between Zazaragi Strata 6 and 8. None of these components has absolute dates of its own.

Phase IV components correlate with Stratum 8 at Zazaragi. This stratum is approximately the middle of the Upper Yasuzawa Tephra. Stratum 8 has a TL age of 95,900 years (ICHIKAWA 1983b: 96). This TL date is disregarded by OKAMURA and KAMATA.

Phase V components are in the lower part of the Upper Yasuzawa Tephra, equivalent to Strata 9 to 11 at Zazaragi. Stratum 9 at Zazaragi has a TL age of 34,400 years, and Stratum 11 has 33,200 years (ICHIKAWA 1983b: 96). However,

Fig. 6. Original dates for the Eai River sequence, and several versions of the dating as published by the archaeologists.

the Aira-Tanzawa ash probably lies somewhere about this point in Stratum 9 or 10 in the Upper Yasuzawa Tephra (SODA 1986: 4, 7; KAMATA 1983: 82); its radiocarbon age (based on estimates made from over 24 samples) is 21,000 to 22,000 years (MACHIDA *et al.* 1984: 876). In their most recent reports, OKAMURA and KAMATA have both used this radiocarbon age estimate and apparently rejected the TL ages.

The Zazaragi Stratum 12 component lies between Phases V and VI in the Eai River sequence, and it has a TL age of 43,900 years (ICHIKAWA 1983b: 96). This date, however, is 10,000 years older than that of the immediately overlying Stratum 11 and also 2,000 years older than the 41,800 TL years measured for the underlying Stratum 13 (ICHIKAWA 1983b: 96). Furthermore, Stratum 12 at Zazaragi seems to correlate with erosional and terrace deposits at some other sites along the Eai River (OKAMURA 1985a: 9, 12-14), and also with the widespread formation of lakes and lacustrine deposits on the Sendai Plain (SHOJI *et al.* 1983: 91) that have much younger radiocarbon dates. The Narugo Lake Formation just upstream from Zazaragi and Babadan A has a radiocarbon age of 26,000 to 28,000 years (ISHIDA 1983: 7; YAMADA and SHOJI 1983: 14; SHOJI *et al.* 1983: 91). The nearby Ichihazama lacustrine sediments date about $27,900 \pm 1,700$ years B.P. (Gak-314: Oide 1976: 19). And the base of the lacustrine sediments in the town of Zao in the southern Sendai Plain is about $34,400 \pm 1,000$ years B.P. (Gak-4853: IMAIZUMI 1976: 190). Contrarily, one of the erosional deposits seen at the Yasuzawa site (at least that is what we think is meant by the name "Yasuzawa Lower Formation") has a confusing set of TL ages: 31,600 years, 45,300 years, 53,400 years, and 53,700 years (ICHIKAWA 1983b: 96). Apparently OKAMURA rejects all of the TL and radiocarbon dates for this component and uses the TL age of 33,000 years obtained for Stratum 11. KAMATA does not indicate a date for this stratum.

Phases VI to XI have a sizable series of TL and FT age measurements that are relatively

consistent in contrast to the series for Phases I to V (ICHIKAWA 1983b: 96, 1986: 16; KOSHIMIZU 1983: 99, 1986: 17). The TL dates roughly suggest ages of 41,000 years for Zazaragi 13 (Phase VI), perhaps 42,000 to 43,000 years for Zazaragi 15 (Phase VII), about 44,000 or 45,000 years for Babadan A 10 (Phase VIII), 51,000 to 73,000 years for Babadan A 14 to 17 (Phase VIII/IX), about 122,000 years for Babadan A 19a (Phase IX), maybe 130,000 years for Babadan A 20 (Phase X), and possibly 154,000 years or more for Babadan A 33a (Phase XI). However, only 4 of the 6 FT ages agree with the TL ages. And in addition, the TL age of Stratum VII at Nakamine C is nearly 370,000 years (ICHIKAWA 1985: 163), totally out of line with the ages of Zazaragi 15 and Babadan A 20 to which it is compared (FUJINUMA *et al.* 1985: 151) and with the 140,000 to 141,000 years TL and FT ages of the immediately overlying Stratum VI at Nakamine C (ICHIKAWA 1985: 163; KOSHIMIZU, pers. comm. 1986).⁴

Only 1 relevant radiocarbon age measurement is available for these older phases. It indicates an age of $41,400^{+340}_{-320}$ years for peat embedded in the Nizaka Tuff (S. 8210: OMOTO and KAJIWARA 1983: 22-23). This tuff correlates with Strata 12 and 13 at Babadan A (SODA, pers. comm. 1986), between Phases VIII and IX. This radiocarbon date disagrees with the TL and FT dates, but it is completely consistent with other radiocarbon dates. Furthermore, the composition of the pollen and plant macrofossil assemblages retrieved from the Nizaka peat compare best to assemblages elsewhere in northeastern Japan with similar dates (SUZUKI, pers. comm. 1986; see SUZUKI 1986 and TAKEUCHI 1986: 21-22).

One more pair of radiocarbon dates is available but hard to tie into the cultural sequence of the Eai River. This pair of dates brackets the Kawasaki Scoria between $26,240^{+1,360}_{-1,160}$ years (TH-309)

4. KOSHIMIZU (1985: 167-168) originally published the FT age of Stratum VI as 211,000 years but later retracted this after recalculating it.

and $31,500^{+2,610}_{-1,970}$ years (TH-365) (MACHIDA *et al.* 1985: 906) at the Yamada Uenodai and Kitamae sites. This scoria lies between lithic collections too sparse to correlate confidently with collections from other sites. But the collections below the scoria seem to match those from Zazaragi Stratum 13 (Phase IV) or Babadan A Stratum 10 (Phase VIII).

OKAMURA and KAMATA reject the radiocarbon dates. But we see little relationship between the general dates they publish for the various phases and the actual TL and FT dates these are supposedly based on. The 50,000 years they give for Zazaragi Stratum 16 seems to be the average of the TL and FT ages of that stratum. The ages they give for Babadan A Strata 8 through 18 seem to ignore all of the TL ages obtained from the Eai River sites and instead follow the estimated ages of the Aso-4 ash from Kyushu and the Toya ash from Hokkaido. For the age of Babadan A Stratum 19, the Ichihazama Pumice, OKAMURA uses the average of the TL and FT ages of that stratum; KAMATA brackets the age with the younger TL and older FT ages. The rest of the dates are too fragmentary for comment.

Criticism of the Miyagi Palaeolithic Chronology

Quality of the Database: The quality of the database for the Miyagi Palaeolithic is quite poor, as our preceding discussion of the chronology indicated. Only 9 of the 130 or so Palaeolithic sites have been excavated and only 6 have been published (FUJINUMA *et al.* 1985: 149). By present standards these are mini-excavations and the number of artifacts is a relative handful (Table 1). On top of this, a very large proportion of the information used in Miyagi Palaeolithic research has been picked out of the face of road and field cuttings, and even from the surfaces of fields, where the stratigraphic origin of the artifacts frequently is not clear or is completely unknown (Tohoku Rekishi Shiryokan 1985a). And these problems are compounded further by the fact that the Pleistocene geology of Miyagi is complex and still very much debated (TOYOSHIMA and ISHIDA 1983; SHOJI *et al.* 1983; SODA 1986; ITAGAKI *et al.* 1981; SHOJI and YAMADA 1982; OKAMURA 1985a: 7-11; and others). Moreover, the stratification of the excavated sites manifests little intersite similarity, even among the 62 sites concentrated along the Eai River (Tohoku Rekishi Shiryokan 1985a).

Table 1. Size of the database obtained from the 9 excavated Palaeolithic sites in Miyagi prefecture compared to that from one moderate-size site in South Kanto.

	Site Name	Artifacts	Culture Layers	Excavation Area*
Published	Zazaragi	ca. 300	5	180 (54) m ²
	Shibiki	126	5	84 (48)
	Nakamine C	304	5	1,346
	Yamada Uenodai	<200	9	200
	Kitamae	33 (47) **	4~5	54
	Kanohara D	21	2	200
Unpublished	Babadan A	<250?	6~10	40 (240) m ²
	Aobayama B	27	3	?
	Nagakuki	?	5	?
Published	Maehara (Tokyo)	1,510 artifacts 6,962 pebbles	7	3,000 m ²

* () excavated area of deepest strata.

** () including 14 surface collected artifacts.

The data recovered from just one moderate-size Palaeolithic excavation (Maehara: ODA *et al.* 1976) in South Kanto exceeds the total for the Miyagi Palaeolithic (Table 1). Moreover, there are tens of larger and smaller excavations all over South Kanto, and the stratification of the aeolian deposits there is uniform in all sites across an area of more than 3,000 km². The small Miyagi database does not justify the claims being made from it: the Lower Palaeolithic definitely exists in Japan; *Homo erectus* lived in Japan; these tools compare to those found at Choukoutien Cave; this is the second oldest clay animal figure in the world; cord-marked pottery precedes linear-relief; and so on.

Reliability of Contextual Information: There seem to be serious problems with the information on artifact provenience. The artifacts are said to be in primary context, just as the prehistoric humans left them, undisturbed by tree roots, moles, and other natural agents. OKAMURA (pers. comm., 1986) and KAMATA (pers. comm., 1986) state emphatically that there are no signs of vertical displacement of the artifacts. Yet the geological data, artifactual data, and age measurements all speak for considerable displacement of artifacts after original deposition.

(1) The cross-sectional illustrations in all of the excavation reports show tree-throws, pits, burrows, and other recent disturbances cutting through 5 to 8 strata (Fig. 7). These must be having a good deal of effect on artifact context. In fact, the excavation reports describe artifacts coming from the disturbed matrices in old tree-throws (for example, Sekki Bunka Danwakai 1978: 10-13; SATO and SAINO 1982: 29-30), or record groups of artifacts dispersed through several strata (for example, Sekki Bunka Danwakai 1978: 16). Moreover, OKAMURA recognizes the effects of water action on some of the strata in the sites along the Eai River, particularly those between the Upper Yasuzawa Tephra and the Lower Yasuzawa Pyroclastic Flow (OKAMURA 1985a: 9), and the deeper strata at Yamada Uenodai and Kitamae are also extensively dis-

turbed by water action (WATABE and SHUHAMA 1981: 10; SATO and SAINO 1982: 12-14). And there are other descriptions in the reports that

Table 2. Fission-track ages of zircons from Nakamine C Stratum VI (KOSHIMIZU 1985).

No.	Ns	Ps	Ni	Pi	Age (10,000y)
1	2	0.48	73	1.75	139
2	3	2.26	38	2.87	397
3	0	0	162	9.72	0
4	2	1.17	289	16.9	35
5	10	4.80	159	5.71	320
6	0	0	122	1.83	0
7	4	4.80	688	82.6	29
8	0	0	54	6.15	0
9	0	0	13	0.40	0
10	0	0	46	2.76	0
11	1	1.16	446	51.5	11
12	0	0	434	47.7	0
13	0	0	58	2.70	0
14	0	0	51	6.27	0
15	0	0	712	68.4	0
16	0	0	81	52.7	0
17	3	3.12	685	71.2	22
18	2	0.85	566	24.1	18
19	1	0.24	32	0.77	159
20	1	0.60	156	9.40	33
21	1	0.65	113	7.35	45
22	28	37.8	176	23.8	810
23	13	9.10	650	45.5	102
24	0	0	26	1.30	0
25	2	0.50	54	1.35	189
26	0	0	110	12.7	0
27	0	0	114	6.38	0
28	0	0	93	3.72	0
29	2	0.48	133	3.19	76
30	1	0.84	74	6.22	69
31	4	3.24	263	21.3	77
32	0	0	295	18.3	0

Ns: spontaneous fission-track number

Ps: spontaneous fission-track density ($\times 10^4$ tracks/cm²)

Ni: induced fission-track number

Pi: induced fission-track density ($\times 10^6$ tracks/cm²)

Table 3. Comparison of thermoluminescence dates given in two different publications (upper: ICHIKAWA 1983a: 19; lower: ICHIKAWA 1983b: 96).

		Accumulated Dose (Rad)	β Rays (Rad)	γ Rays (Rad)	Annual Dose (Rad)	TL Age Years B.P.
Hijiori Pumice		1516	0.101	0.055	0.156	9700
Zazaragi	4	11720	0.113	0.055	0.168	69800
"	6c	15995	0.147	0.060	0.207	77300
"	8	24024	0.154	0.060	0.214	112300
"	9	7478	0.152	0.059	0.211	35400
"	11	7030	0.120	0.092	0.212	33200
"	12	8520	0.104	0.090	0.194	43900
"	13	7980	0.105	0.086	0.191	41800
"	15	7920	0.119	0.076	0.195	40600
"	16	6501	0.092	0.063	0.155	41900
Babadan A	14	12468	0.146	0.095	0.241	51700
"	15	14460	0.135	0.095	0.230	62900
"	16	12950	0.130	0.095	0.225	57600
"	17	16404	0.130	0.095	0.225	72900
"	18	15400	0.125	0.095	0.220	70000
Yasuzawa Lower Formation		5340	0.112	0.057	0.169	31600
"	Upper	7900	0.119	0.057	0.176	44900
"	Middle	7000	0.110	0.057	0.167	41900
"	Lower	10000	0.118	0.057	0.175	57100

		Accumulated Dose (Rad)	β Rays (Rad/Year)	γ Rays (Rad/Year)	Annual Dose (Rad/Year)	TL Age Years B.P.	Accumulated Error
Hijiori Pumice		1516	0.101	0.055	0.156	9700	$\pm 3.1\%$
Zazaragi	4	14017	0.113	0.055	0.168	83400	$\pm 14.0\%$
"	6c	15720	0.147	0.060	0.207	75900	$\pm 8.7\%$
"	8	20513	0.154	0.060	0.214	95900	$\pm 10.7\%$
"	9	7284	0.152	0.059	0.211	34400	$\pm 9.6\%$
"	11	7030	0.120	0.092	0.212	33200	$\pm 4.3\%$
"	12	8520	0.104	0.090	0.194	43900	$\pm 7.2\%$
"	13	7980	0.105	0.086	0.191	41800	$\pm 6.7\%$
"	15	7920	0.119	0.076	0.195	40600	$\pm 6.5\%$
"	16	6750	0.092	0.063	0.155	43550	$\pm 12.8\%$
Babadan A	14	12468	0.146	0.095	0.241	51700	$\pm 8.3\%$
"	15	14460	0.135	0.095	0.230	62900	$\pm 5.4\%$
"	16	14362	0.130	0.095	0.225	63800	$\pm 8.9\%$
"	17	16404	0.130	0.095	0.225	72900	$\pm 6.7\%$
"	18	15975	0.125	0.095	0.220	72600	$\pm 5.9\%$
Yasuzawa Lower Formation		5340	0.112	0.057	0.169	31600	$\pm 14.3\%$
"	Upper	7966	0.119	0.057	0.176	45300	$\pm 6.6\%$
"	Middle	8925	0.110	0.057	0.167	53400	$\pm 15.0\%$
"	Lower	9397	0.118	0.057	0.175	53700	$\pm 5.4\%$

* Yasuzawa Lower Formation: Formation deposits in the upper part of the Lower Yasuzawa Tephra (Pyroclastic Flow) at the Yasuzawa site.

Fig. 7. Cross-sectional views of the east and south faces of the Zazaragi excavation showing tree-throws and other disturbances of the geological strata (Sekki Bunka Danwakai 1983: 8).

sound very much like disturbance of the geological strata and displacement of the artifacts, particularly by water action.

The lack of simple stratigraphic comparability between nearby sites (for example see OKAMURA 1985a: 12-14) also suggests very localized disturbances have affected the sites individually (Fig. 3). Zazaragi and Babadan A are only 2 km apart, but their deposits have almost no resemblance. Yamada Uenodai and Kitamae are only 200 m apart; their "Upper Palaeolithic" strata are fairly similar but their "Lower Palaeolithic" strata are not comparable even between excavation pits within the same site (SATO and SAINO 1982: 12-

14). It is hard to imagine such diversity in the stratification of neighboring sites if the deposits are not being affected by rather powerful, localized disturbing agents, which is almost certainly the case with the deeper strata at Yamada Uenodai and Kitamae.

Pollen analysis conducted at the Shibiki site, too, suggests mixed deposits (PALYNOSURVEY 1984). There is little difference in the composition of the pollen spectra from bottom to top. But most notable is the presence of buckwheat (*Fagopyrum*) in samples from the "Lower Palaeolithic" Stratum 9 (PALYNOSURVEY 1984: 16).

Our own experience also tells us that there

must be vertical displacement of artifacts. Despite the uniformity of the aeolian deposits in all sites in South Kanto, the artifacts invariably have a 15-20 cm or greater vertical displacement, with no trace of its cause. We have even seen artifacts refit when their vertical separation was as much as 170 cm in clayey loam with no sign of disturbance (KIDDER and ODA 1975: Attached Fig. 1).

(2) The TL dates from Zazaragi (ICHIKAWA 1983b) are additional indicators that something is wrong with the geological context of the artifacts, at least at that site (Fig. 6). The dates for Strata 4, 6c, and 8 are totally out of line, nearly twice as old as the dates for the strata below them. Moreover, the other TL dates show many stratigraphic reversals. And the large plus-minus factors for all the TL dates further suggest mixing of the deposits (ICHIKAWA 1983b: 96). The equally large plus-minus factors for the FT dates (KOSHIMIZU 1983: 99) support this interpretation.

(3) And how do we explain the lack of flaking debris and refittable artifacts in the Miyagi Palaeolithic sites? Base campsites in primary context should have many small flakes and chips from the manufacture and maintenance of stone tools. But work camps and butchering sites also generally yield at least small amounts of flaking debris, the results of tool sharpening. In addition, Palaeolithic sites all over Japan always have lots of flakes and chips, with perhaps a few rare exceptions. It is difficult to believe that the Palaeolithic people who lived in Miyagi seldom found it necessary to make or repair stone tools, by some freak chance at all 6 published sites.

(4) But certainly among the most serious examples of artifacts out of their original context are the drill from Zazaragi Stratum 8 (Sekki Bunka Danwakai 1981: 17), the cord-marked potsherd from Zazaragi Stratum 6c (Sekki Bunka Danwakai 1981: 56-61), and the "clay animal figure" from Zazaragi Stratum 6 (Sekki Bunka Danwakai 1978: 16).

(a) The drill from Zazaragi Stratum 8 ob-

viously belongs to the Jomon period,⁵ probably Middle Jomon or later (Fig. 8). The Zazaragi archaeologists do say that it is a "distinctly strange artifact for the Palaeolithic period" (Sekki Bunka Danwakai 1981: 17), and they acknowledge its similarity to Jomon drills (Sekki Bunka Danwakai 1981: 40). But they still do not remove it from the artifacts assigned to Stratum 8, nor do they accept the possibility that the deposits are mixed.

(b) The Zazaragi archaeologists show the identity of the Zazaragi Stratum 6c potsherd to the late Earliest Jomon sherds found abundantly in Strata 1 to 3 at that site (Sekki Bunka Danwakai 1981: 58). Yet they say that there is no evidence that it is the same as the later Jomon sherds (Sekki Bunka Danwakai 1981: 58, 61). They even go so far as to claim it is older than the linear-relief style generally thought to be the oldest pottery in Japan (Sekki Bunka Danwakai 1981: 61; Kamata 1984: 74).

(c) And the "clay animal figure" (which actually looks like a wad of clay) from Zazaragi was found in a "shallow pit" in Stratum 8 but was assigned to Stratum 6 because the fill of the pit was thought to resemble soil from that higher stratum (Sekki Bunka Danwakai 1978: 16). The pit is probably a natural disturbance. Nevertheless, the Zazaragi archaeologists claim positively that this thing is the "world's second oldest clay animal figure" (Sekki Bunka Danwakai 1978: 16).

5. This statement is based on the chronology of stone drills suggested by those illustrated in the excavation reports from the sites at Shibiki (KAMATA 1984: 38), Zazaragi (Sekki Bunka Danwakai 1978: 67), Kanohara D (OKAMURA *et al.* 1980: 19), Yamada Uenodai (WATABE and SHUHAMA 1981: 65), Kitamae (SATO and SAINO 1982: 94), Aokibata (KATO 1982: 11, 27), Nashino A (SATO *et al.* 1981: 37; SATO and SAINO 1983: 74, 76, 249-251, 274), Sugouda (NIWA *et al.* 1982b: 169), Shobuzawa (NIWA *et al.* 1982a: 214), Futayashiki (KATO *et al.* 1984: 414-415), Yamaguchi (SATO *et al.* 1981: 173, 181), and Numahara A (SATO and SAINO 1983: 370).

Fig. 8. Chronology of stone drills from Jomon sites in Miyagi and the Zazaragi "Palaeolithic" stone drill (shaded drill). 1 Nashino A (SATO *et al.* 1980: 37), 2 Futayashiki (KATO *et al.* 1984: 415), 3 Aokibata (KATO 1982: 27), 4 Futayashiki (KATO *et al.* 1984: 414), 5 Nashino A (SATO and SAINO 1983: 74), 6 Shobuzawa (NIWA *et al.* 1982a: 214), 7 Kitamae (SATO and SAINO 1982: 94), 8-9 Zazaragi (Sekki Bunka Danwakai 1978: 67), 10-11 Kanohara D (OKAMURA *et al.* 1980: 19).

Accuracy of Dating: Faced with incompatible TL, FT, and radiocarbon dates, OKAMURA and KAMATA use some of the TL and FT dates, but they disregard many (most?) of the TL and FT dates and all of the radiocarbon dates (Fig. 6). Their selectivity seems arbitrary: the TL and FT dates as a series have many stratigraphic reversals, disagreements, and quite absurd age determinations, whereas the radiocarbon dates

are wholly consistent within their own series.

The TL ages for Zazaragi Strata 4, 6c, and 8 are so blatantly out of line that OKAMURA and KAMATA ignore them. Moreover, the series of other TL dates for Zazaragi has several stratigraphic reversals; the TL and FT dates for Zazaragi Stratum 16 differ considerably; and there is a sudden large jump in the TL age from Babadan A Stratum 18 to Stratum 19, and from Nakamine C Stratum VI to Stratum VII. Further, all of the TL and FT dates have large plus-minus factors, suggesting contamination of the samples (ICHIKAWA 1983b: 96), and consequent unreliability of the dates. OKAMURA and KAMATA seem to select those dates that fit their purposes, and ignore the remainder. They even use an average of the TL and FT dates for Zazaragi Stratum 16 and Babadan A Stratum 19, the Ichihazama Pumice. And they use the estimated ages of ash falls from Kyushu and Hokkaido, even though the stratigraphic positions of these ashes in the Miyagi sites is far from clear.

We also have reservations about the method used to calculate the FT ages. For example, KOSHIMIZU (1985) analyzed 32 zircons from Nakamine C Stratum VI. Taken individually, 15 of them had no tracks and hence ages of zero; the other 17 had ages ranging from 110,000 to 8,100,000 years (Table 2), as we understand the raw data given by KOSHIMIZU (1985: 167). He selected out 6 of the zircons as intrusive on the basis of their Poisson distribution, and calculated the age of Stratum VI from the remaining 26 zircons (KOSHIMIZU 1985: 166-168). In the original publication he gave that age as 211,000 years (KOSHIMIZU 1985: 168), an age that does not agree at all with the 140,000 years given by TL (ICHIKAWA 1985: 163). Later, at the symposium on Babadan A, held at the Tohoku Museum of History on February 2, 1986, KOSHIMIZU said he had recalculated the FT age of Nakamine C Stratum VI and this time had gotten 141,000 years.

We have similar reservations about the TL method. Those dates have been published twice

(Table 3) (ICHIKAWA 1983a: 19, 1983b: 96), and the two listings have some notable differences.

The Miyagi archaeologists frequently mention the correlation of terraces on the Sendai Plain with terraces in South Kanto, and use these correlations to support their claim of great age for the deeper strata in the Miyagi sites (FUJINUMA *et al.* 1985: 2, 4; OKAMURA *et al.* 1980: 1; Sekki Bunka Danwakai 1983: 103; Sendai-shi 1982: 11; YAMADA and SHOJI 1985: 16). However, the publications cited for these correlations seem to be rather old (NAKAGAWA 1961, 1965), when geological studies for that purpose were not reliable. Before this information can be taken as a good basis for dating, a lot more and better work on inter-regional terrace correlation needs to be done.

Radiocarbon seems to us to be the simplest way of determining the ages of the Miyagi Palaeolithic materials. First of all, the problems in the methodology are well known and understood. And secondly, the radiocarbon dates for the Miyagi Palaeolithic are consistent. Four age measurements for the Hijiori Pumice place that stratigraphic unit between about 9,500 and 11,000 years, the minimum age for cultural components in the Miyagi Palaeolithic sequence. The age of the lake formations that probably correspond to Zazaragi Stratum 12, between Phases V and VI, is about 25,000 to 28,000 years. And the Nizaka Tuff has an age of about 41,000 to 42,000 years, providing a maximum age for Phase VIII, Babadan A Stratum 10. The exact stratigraphic position of the Aira-Tanzawa ash is not certain but is said to fall somewhere near Zazaragi Stratum 9 or 10, Phase V. This position is consistent with the 21,000 to 22,000 years radiocarbon age of the ash. Also, because we lack the information to correlate the cultural materials from the Yamada Uenodai and Kitamae sites with the Eai River sequence, we cannot be certain of the stratigraphic position of the Kawasaki Scoria, which is dated between 26,000 and 32,000 years by radiocarbon. Our own view is that the cultural materials indicate the age of this scoria

could be applied to Phases VI or VIII. This is reasonably consistent with the other radiocarbon dates.

Dismissal of the Lower Palaeolithic: If we do not hold exactly, as some archaeologists do (SERIZAWA 1979: 3; and others), to the theoretical proposal of >30,000 years to demark the Lower Palaeolithic in Japan, then the "Lower Palaeolithic" components from Zazaragi Strata 9-11, 12 and 13, and from Babadan A Stratum 10 can be considered "Upper Palaeolithic". These components are all certainly younger than the Nizaka Tuff, which is 41,000 to 42,000 years old according to radiocarbon, and the artifacts in these components also share numerous characteristics with later "Upper Palaeolithic" ones. Elimination of these components from the "Lower Palaeolithic" effectively eliminates the Lower Palaeolithic in Miyagi prefecture, because the dubious lithics from Zazaragi Stratum 15, Babadan A Strata 14 to 33a, Nakamine C Strata IV and VII, and Shibiki Stratum 9 are most likely naturally formed objects and not artifacts of human manufacture (Fig. 5). And with the exception of the collection from Zazaragi Stratum 15, these are the only collections of lithics that certainly exceed 30,000 or 40,000 B.P., following the dates given by radiocarbon.

OKAMURA (1985b) claims that the human workmanship of these dubious older lithics is an irrelevant question because the sites are on the flat tops of hills and the deposits are not the kind that can form such lithics naturally. His reasons do not constitute reasonable scientific proof of his claim, and we find nothing in the literature to indicate that he or anyone else is making any effort to prove that these older lithics cannot be natural occurrences. The Zazaragi Stratum 15 lithics are a good example of this. Geologists say Zazaragi Strata 12 through 15 have the characteristics of a single depositional unit, a pyroclastic flow (MACHIDA *et al.* 1984: 906; SODA, pers. comm. 1986), including a lack of plant opal (SASE 1986: 13) and homogenous TL dates (Fig. 6) (ICHIKAWA 1983b 96). Humans do not nor-

mally live in the middle of pyroclastic flows. Yet OKAMURA, KAMATA, and other archaeologists still claim the broken rocks from the lower part of this unit (Stratum 15) are true artifacts. OKAMURA (1986a, 1986b) and KAMATA (pers. comm., 27 April 1986) recently acknowledged that much of this unit is a pyroclastic flow, but KAMATA explained that Stratum 15 is thought to be a tephra.

Typologically the lithics from the dubious older collections generally look like angular gravel and broken stones found in talus and wash from mountain sides, and not like stone tools manufactured by humans (Fig. 5). Some are large, broken stones such as those from Zazaragi Stratum 15, and others are small, often chunky pieces such as those from Babadan A Strata 20 and 33a. Many of the small pieces of agate and chalcedony from Babadan A Strata 20 and 33a are too small to have been useful. In addition, the flaking technique shows none of the patterning expected of human behavior. Instead it looks like the unpatterned breakage caused by natural forces, clear bulbs of percussion notwithstanding. Furthermore, the sites were not always flat hill-tops, free of deluvial and alluvial action, and we have seen nothing in the geological studies that shows anyone has tried to demonstrate that these deposits cannot contain these lithics naturally. And finally, the collections do not manifest a logical evolutionary sequence: collections of large and small lithics alternate and mix through time in ways that just do not seem to mark evolving technologies (Fig. 4). This fact is amply demonstrated by the difficulty the Miyagi Palaeolithic archaeologists have making a simple one-to-one intersite comparison of these dubious lithic collections.

The researchers counter that these older lithics have the marks from use by humans. We do not have the experimental data to dispute that fact. However, we would like to see the proof that the same kinds of marks definitely cannot be produced by nature. It might be noted here that the same team of researchers has found evidence

of use-wear on the lithics from the deepest levels at the Hoshino site (SERIZAWA 1980: 465) even though most archaeologists consider those lithics to be non-artifacts.⁶ Such results indicate there are limits to the application of microwear analysis for distinguishing natural stones from human artifacts.

The lithic raw materials in those older collections also suggest natural occurrence rather than human selection (Fig. 9). The most common materials are andesite, dacite, tuff, rhyolite, and other coarse-grained rocks, or wood opal, chalcedony, agate, jasper, chert, and other fine-grained rocks. The collections usually include a wide mixture of lithic raw materials. The materials can be found in the local gravels and do not include non-local obsidian or hard shale unquestionably obtained from across the mountains in Yamagata prefecture. Most of the artifacts in the younger and valid collections are made of hard shale from Yamagata prefecture, or in some

Fig. 9. Lithological composition of components at Nakamine C (FUJINUMA *et al.* 1985: 145) and Shibiki (KAMATA 1984: 63).

6. Apparently OKAMURA and KAMATA also reject the Hoshino lithics: they never make reference to them in their inter-regional comparisons.

cases of non-local obsidian, and look nothing at all like the lithics in the older and dubious collections. We doubt that Lower Palaeolithic peoples could have lived in Miyagi prefecture for over 100,000 years and remained ignorant of the source or uses of the hard shale that the later Palaeolithic and Jomon peoples seem to have valued so highly. Or, looked at the other way, we doubt that the later Palaeolithic peoples would have all but discarded the use of the local lithic raw materials in favor of imported materials, if the local materials were really useful to humans.

Environmentally, too, we find compelling reasons to doubt the human workmanship of the older lithic collections from Miyagi prefecture. Descriptions of the geology there all indicate the sites were subjected to pyroclastic flows, large pumice falls, erosion and flooding, and other natural disasters at regular intervals. Why would Lower Palaeolithic peoples find such an environment a desirable place to concentrate their settlements, while completely ignoring the eminently habitable locations in South Kanto, for example? The aeolian Tama, Shimosueyoshi, Musashino, and Tachikawa Loams there accumulated slowly over several hundred-thousand years. Especially in Tokyo, Saitama and Chiba prefectures there are almost no heavy pumice falls, and no pyroclastic flows. Large excavations in South Kanto have been unearthing extensive areas of these loams for at least the past 15 years, without finding so much as a single flake to show that humans ever lived in the strata predating the Tachikawa Loam, the base of which dates to about 30,000 to 35,000 years ago. Archaeologists at sites such as Takaido Higashi, Nishinodai B, Suzuki, and Musashidai in Tokyo, and at many sites in Kanagawa and Chiba prefectures have searched the older strata for signs of the Lower Palaeolithic, yet they have found nothing. In recent years the excavations at Tama New Town in Tokyo have been digging 15 hectares annually, often as deeply as the Tama Loam. There, too, nothing has been found yet in the strata older than 30,000 years. Again we ask, why do Lower

Palaeolithic sites concentrate in such relatively unstable regions as Miyagi prefecture? Their concentration in Miyagi prefecture has every argument going against it.

Media Sensationalization: Our criticisms demonstrate beyond question the extreme disputability of the Miyagi Palaeolithic and Lower Palaeolithic materials. Nevertheless, those materials are being sensationalized in the mass media long before the reports are published and other archaeologists can evaluate them. We deplore this use of the news media to mislead the public.

A New Palaeolithic Chronology for Miyagi Prefecture

Our first impression of the Miyagi Palaeolithic was that it was very different from the Palaeolithic in other regions of Japan. But once we had penetrated the confusion in the scattered, published descriptions of it, the similarities with other regions became more outstanding than the differences. Allowing for regional variation in the culture, we offer the following (Figs. 4, 10 and 11) as the best presently possible chronology of the Miyagi Palaeolithic, and its correlation with the Musashino Upland chronology we have published elsewhere (ODA and KEALLY 1979).

(1) The components from Zararagi Strata 5, 6b and 6c, Babadan A Stratum 3, Kanohara D Stratum 3, Nakamine C Stratum IIb, and Shibiki Stratum 3 are Incipient Jomon or our Musashino Upland Phase IV, and they date between about 10,000 and 12,000 years. These components are assigned to Phase I and II in the Eai River sequence, where they just predate the 9,500 to 11,000 years of the Hijiori Pumice. Their characteristic artifacts are linear-relief pottery, foliate and stemmed points, spatula-shaped tools, axes, scrapers, and large blades.

(2) Components belonging to the Microlithic, our Musashino Upland Phase III, are not clear among the Miyagi collections, but the materials from Strata 5 and 6 at the Myoudate A site (Tohoku Rekishi Shiryokan 1985a: 84) might fit this phase. And the keel-shaped tools and possi-

Period	Phase	Locality				Oda & Keally
		Eai River (Northwest)	Shibiki (East)	Nakamine C (Central)	Kitamae, Yamada Uenodai (South)	
Mesolithic	I	Zazaragi 5 Babadan A3,B,C Uranokoshi Higashi Izumisawa	Shibiki 3	Nakamine C IIb Kanojara D 3		Jomon
	II	Zazaragi 6b, 6c Nandayama Shin-Tsutsumiue Iwadeyama Bokujo			Yamada Uenodai 5	IV
Upper Palaeolithic	III	Gofukuzawa Koderagakoi		Kanojara D 5 a	Yamada Uenodai 6	III
	IV	Zazaragi 8 Tsukahara Ochiai Akebizawa		Nakamine C IIc	Kitamae 5	II
	V	Zazaragi 9 ~11 Yasuzawa A	Shibiki 4	Nakamine C III		
	—	Zazaragi 12	Shibiki 7			I
Lower Palaeolithic	VI	Zazaragi 13 Babadan A 7	Shibiki 8		Kitamae 15-17	
	VII	Zazaragi 15			Yamada Uenodai 21-31	
	VIII	Babadan A 10				
	—	Babadan A 14~17		Nakamine C IV (c.f. below BP)		
	IX	Babadan A 19a	Shibiki 9			
	X	Babadan A 20				
	XI	Babadan A 33a		Nakamine C VII (c.f. Z15, BA20)		

Fig. 10. Miyagi Palaeolithic cultural chronology based largely on correlations given in the excavation reports (shaded: probably not artifacts; dotted: somewhat dubious as artifacts).

Fig. 11. Columnar sections on the same scale comparing Miyagi Palaeolithic sites with the South Kanto geological and cultural sequences.

ble microblades in the Eai River Phase III components might fit here, too. Perhaps the Kanohara D Stratum 5a component also belongs here. These components should date about 12,000 to 13,000 years, and their characteristic artifacts would be microcores and microblades.

(3) The components from Zazaragi Strata 8 and 9-11, Babadan A Strata 4, 6 and 7, Nakamine Strata IIc and III, and Shibiki Stratum 4 are similar to the components in our Musashino Upland Phase II, and should date around 13,000 to 20,000 years ago. These components are in Phases IV and V in the Eai River sequence, which probably postdate the 21,000 to 22,000 years of the Aira-Tanzawa Pumice. Knife-shaped stone tools, small blades, blade-flakes, and flake tools are characteristic of these components.

(4) The components from Zazaragi Strata 12 and 13, Babadan A Stratum 10, Shibiki Strata 7 and 8, and some of the materials from Kitamae Strata 15 and 17 resemble components in our Musashino Upland Phase I, which dates from 20,000 years to 30,000 or 35,000 years. These components belong to Phases VI and VIII in the Eai River sequence, with the addition of the component from Zazaragi Stratum 12 which is between Phases V and VI in that sequence, and the elimination of the Zazaragi Stratum 15 materials which are probably not artifacts, invalidating that Phase VII. The Eai River phases fall between radiocarbon ages of 22,000 and 42,000 years, and the materials from Kitamae Strata 15 and 17 just predate 26,000 years. Most of the stone tools in those components are undefined flake tools, but ovoid ax-like tools, sometimes called spatula-shaped tools or end-scrapers, are present. The skreblo-like large flake tool is also seen in some components.

(5) And the components from Zazaragi Stratum 15, Babadan A Strata 14 to 33a, Nakamine C Strata IV and VII, and Shibiki Stratum 9, and probably also Yamada Uenodai Strata 21 through 31, are not artifacts; they do not belong in the cultural chronology.

This chronology fits the information that is

available and most likely to be reliable. And it brings the Miyagi Palaeolithic chronology into line with the Palaeolithic chronologies in other regions of Japan. We have tried to give a clear, coherent presentation of the Miyagi Palaeolithic materials. We invite comments and criticism.

抄 録

宮城県の旧石器及び「前期旧石器」時代研究批判

小田静夫・C.T. キーリ

日本の旧石器時代の研究において、一つの関心事は日本列島に最初に渡来した人類の問題であろう。現在多数の研究者は1万～3万年前頃の旧石器時代人類の存在は認めているが、3万年前に遡るとされる所謂「前期旧石器時代」になると、その存在に賛否両論があり現在未解決の問題として残されている。日本の前期旧石器時代については、1969年頃から芹沢長介により本格的に研究され始め、全国に遺跡、遺物の発見があった。しかし、ここ数年、岡村道雄・鎌田俊昭らが宮城県内で推進している「新たな前期旧石器時代」の提唱は、芹沢により研究されてきた本来の「前期旧石器問題」を解決させることなく、これこそ真の石器であり、遺跡も完璧なものであると力説する。現在宮城県内で33カ所の前期旧石器時代遺跡が発見されており、その中でも座散乱木、馬場壇A、志引、中峯C、北前、山田上ノ台遺跡等が有名である。

筆者らは上記遺跡の報告書、論文、東北歴史資料館の実物資料、現地、1986年2月2日のシンポジウムの聴聞を通してこれらを検討した結果、宮城県の旧石器、前期旧石器時代の研究はかなり不十分であり、彼らが公言するほどの明確な編年や周辺との対比は無理であることが確認できた。こうしたデータベースの不備が、独自の編年観、年代観を生み出し、孤立した旧石器時代相を作り出す要因になっている。つまり、隣接した山形県、秋田県は言うに及ばず、汎日本的な旧石器時代研究の正道からはずれ、ひたすら古い年代値のみを追い続けるあまり、無理な「前期旧石器時代像」を宮城県に現出させてしまったのである。

宮城県の前期旧石器時代を批判しようとすれば、同県の旧石器研究全体を対象にしなければならないことに気がつく。したがって、現在までに提唱されている宮城県の旧石器時代編年を彼らの最新の資料に基づい

で解説し検討してみることにする。宮城県の同時代の研究は江合川流域に遺跡が集中していることもあり、この地域の資料が最も充実している。江合川流域には現在62カ所の旧石器時代遺跡が発見されており、この数は同県の約半数に当り、このうち前期旧石器時代に属するものは13カ所にものぼっている。石器が包含される地層は、各遺跡で複雑な様相をみせている。層序は隣接遺跡でも対比が難しく、降下火山灰、火砕流が複雑に重層し、水成堆積物、二次堆積物などの区別も未だ正確に把握されていない。わずかに表土黒色土の下部に約1万年前頃の肘折パミス (HP) が、幾つかの遺跡に確認され、時期判定と共に層序対比の鍵層となっているにすぎないのである。また、広域火山灰の始良 Tn 火山灰 (AT-約 21,000~22,000 年前頃) の検出がこの地域にあるが、遺跡との関係はこれからの課題になっている。

宮城県の旧石器時代編年は以前5期に区分されたことがあるが、最も新しい報告書にはⅠ~Ⅵの11区分が図示という形で提示されている。それらを筆者らのフェーズという呼称で整理し解説することにする。

フェーズⅠ (中石器時代) は、爪形文、隆起線文土器と有舌尖頭器、篋状石器、片刃石斧、鎌状小形尖頭器などがあり、珪質頁岩を石材の主体にしている。

フェーズⅡ (中石器時代、旧石器時代末期) は、有舌尖頭器、木葉形尖頭器、篋状石器と馬の土偶、羽状縄文の土器などがある。珪質頁岩、黒曜石が石材として主体を占めている。

フェーズⅢ (中石器時代~後期旧石器時代) は、舟形石器、細石刃があり、珪質頁岩、黒曜石を使っている。

フェーズⅣ (後期旧石器時代) は、ナイフ形石器、両面加工尖頭器と、問題の錐があり、珪質頁岩が主体でメノウ、黒曜石も使われている。座散乱木8層上面資料。

フェーズⅤ (後期旧石器時代と前期旧石器時代の過渡期) は、ナイフ形石器、石刃剥片があり、珪質頁岩が中心。座散乱木9~11層上面資料。このフェーズⅤとⅥの間に座散乱木12層上面資料が入り、楕円形石器、篋状石器、尖頭器、円盤形石核がある。珪質頁岩が主体に使われている。

フェーズⅥ~Ⅺ (前期旧石器時代) は、不定形剥片が多く、同一母岩資料、接合関係が見られない。

フェーズⅦは、礫器が中心で、安山岩製がほとんどである。座散乱木15層上面資料。

フェーズⅧは、不定形石器で珪質頁岩の使用が多い。未発表。馬場壇 A10 層上面資料。

フェーズⅧ~Ⅸは、楕円形石器、礫器など。安山岩、珪質凝灰岩、珪質頁岩、チャートの順で少なくなる。断面採集品。馬場壇 A14~17 層上面資料。

フェーズⅨは、石片の形態、石質も粗雑。詳細は未発表。馬場壇 A19a 層上面資料。

フェーズⅩ, Ⅺは、小さな色々な型をした石片、石塊。玉髄質の石材が主体。詳細は未発表。馬場壇 A20・30a 層上面資料。

ここで他の発掘された遺跡を見てみよう。志引遺跡は5枚の文化層が設定され、7~9層上面が前期旧石器である。全体に層が薄く、自然攪乱の堆積状況も看取できる。9層上面資料は自然石の可能性が高い。中峯C遺跡も5枚の文化層があり、Ⅳ, Ⅶ層上面が前期旧石器で、Ⅶ層上面は7カ所の集中部と106点の遺物が出土した。石器とされる多くの資料は、不定形で板状の折れ面剥片で全て単品である。石材は碧玉、玉髄が主体で、粗雑な石材使用例が大形品に顕著に存在する。接合や同一母岩が見られないのも他の遺跡と同様である。山田上ノ台遺跡は9枚の文化層が発見され、6~9層上面が前期旧石器であるが、残念ながら6~9層は水による二次堆積層であった。珪質頁岩、安山岩、流紋岩を使用したもので、自然破砕品の可能性が高い資料である。北前遺跡は5枚の文化層で、9, 15, 17層上面が前期旧石器である。やはり15, 17層上面資料は水による二次堆積部分出土である。打製石斧、スクレパーがあり、珪質頁岩、チャート、玉髄などが石材として選ばれている。鹿原D遺跡は2枚の文化層があり、5層上面は細石刃文化に入り、座散乱木6層上面に対比されている。

次に年代について触れておきたい。この地域では45点の年代が熱ルミネッセンス法 (TL), フィッション・トラック法 (FT), ^{14}C 年代測定法により出されている。しかし、各層順による年代のバラツキが大きく、また逆転もみられることから、資料として使いにくい状況であるが、宮城県の前期旧石器を推進する岡村、鎌田らは、この中から都合の良い年代資料のみを利用している。概して TL, FT 法は古い時代を測る場合に便利であるが、この程度の年代値は ^{14}C 法が充分使用できる時代である。ちなみに荷坂凝灰岩中の木材は 41,000~42,000 年前と ^{14}C 法で測れるのに、同層準中の石英粒子を TL 法で測ると、73,000年前の古さになってしまう。このことは座散乱木11層にも言え、 ^{14}C 年代で 26,000年前より新しい層準であるのに TL 法では 33,200年前となっている。 ^{14}C 年代値をほとんど用いない宮城県の前期旧石器研究者の、測定資料

並びに測定方法にも多くの問題点をかかえている TL, FT 年代値を, 検討することなく便利に利用する研究姿勢は不可解としか言いようがない。

ここまでくると批判したいと誰でも思うであろう。その誤は簡単である。これだけの日本考古学史上重大な見解を提唱するには、あまりにも宮城県の旧石器時代基礎資料は不十分ということである。県内 130 カ所の遺跡、発掘遺跡はその中で 9 カ所、報告書は 6 カ所しか出版されていないし、発掘面積も宮城県全体で東京の武蔵野台地の中程度の遺跡一つの面積にも満たない狭さのうえ、出土石器数も比較にならないほど少ない。そして、致命的なことに石器が包含されている各遺跡の地層は、数百メートルも離れると比較ができなくなってしまう複雑さである。関東地方では 3,000 km² で同じ火山灰の分布と層準の対比が可能である。また、石器や石製資料の出土状況にも問題が多い。宮城県の旧石器は地層と地層の間に石器が水平に出土するという。この理由を遺物の上下もなく、当時の地表面が一次的に良好に保存されている結果であると説明しているが、はたして事実であろうか。筆者らの経験では遺物は 15~20 cm 程度上下して出土するのが一般的であり、それが上下せず層理面にのみ出土するとすれば、異常な出土状態と見るのが常識である。恐らく、水の影響や二次堆積環境がこうした現象をつくり出しているであろう。また、地層の攪乱証拠は、TL 年代や花粉分析結果にも表われている。座散乱木 4, 6, 8 層の年代は、その下 9~11 層の年代の倍もあり、逆転しているし、志引遺跡の層別花粉分布は土壌の攪乱を正しく証明してくれている。

また、遺跡から出土する石器は全て単品であり、石器を作った形跡が認められず、剥片、碎片、そして接合資料も無い事実である。どんな使われ方をした遺跡でも、製品、剥片、碎片という組み合わせは少なからず認められている。偶然としてもこの地域の前期旧石器人は居住地内で石器を製作または加工せずに暮していたとは考えられない。もっと基本的な誤ちは、当然新しいとされる土器片を隆起線文土器より下層に位置づけたり、縄文中・後期の石錐の型式を持つ石器を 1 万 5 千年前の錐にしたり、風倒木の攪乱ビット中の粘土塊を 1 万年前の世界的に珍しい馬型土偶と発表するなどの行為である。当然学界でも議論を呼ぶ重要な資料だけに考古学者であれば、特に慎重に取扱うべき内容と考えられる。

ここで彼らの時代観の根拠になっている年代を見てもみよう。まず彼らの測定値は TL, FT 法が中心であ

る。TL 法の石英粒子、FT 法のジルコンについては、その鉱物の供給起源を検討する必要がある。残念ながら宮城県地方はかなり地層の自然攪乱、二次堆積状況が顕著に認められることから、同層中及び同層準から採取した資料と言えども混合体と考えることができる。こうした測定資料の基本が不確かであることが、TL, FT 法測定年代が逆転していたり、相互に一致しないどころか連続的につながらぬ結果や、かけはなれた年代値が生じる原因の一つになっている。また、彼らは段丘面形成が古いことを理由に、その上面の遺跡の古さを結びつけて説明しようとするが、これは無理な援用と考えられる。第三紀の段丘礫層の上に縄文時代の包含層が直接堆積している遺跡を筆者らは発掘調査したことがある。

それに、前期旧石器時代を 3 万年を境に区分することである。この 3 万年という数字に何の意味が有るのであるか。普通、時代や文化を画する場合、文物、社会などにそれを特に区分する必要があるほどの変革や画期が認められる場合、その境をもって区分するのが一般的である。武蔵野台地では石器組成の流れ、礫群、配石の有無などにより、第 I 期から第 IV 期まで設定された。そして、現在最も古い石器群は立川ローム層の下部に含まれる第 Ia 文化期のもので、¹⁴C 年代によると約 3 万年前後の値が出されている。しかし、この程度の古さになると年代値はバラツキが大きくなり、正確な数値は出ないとみる方がよい。こうした状況を考慮に入れて、宮城県の前期旧石器資料を検討すると、座散乱木 12, 13 層上面、馬場壇 A10 層上面石器群は、南関東の第 I 文化期の石器群に型式学的に類似している。とすれば、この地方の ¹⁴C 年代などを考慮に入れば、確かな石器群の出土層準は南関東の立川期に充分入り得る年代値におさまるのである。そして、座散乱木 15 層上面、馬場壇 A14 層上面以下及び中峯 C IV, VII 層上面資料は人工品としての検証も乏しく、自然物の可能性が大きいとすれば、宮城県から「前期旧石器」は消失してしまう結果となる。

宮城県の前期旧石器推進者らは、座散乱木 15 層上面、馬場壇 A14 層以下、中峯 C IV, VII 層上面、志引 9 層上面の石器とされる資料について、自然物ではないという明解な証明を行っていない。筆者らはこの程度の資料なら、自然堆積破砕礫層中や、原産地の自然剥片などに類品を探すことは困難ではないと考える。座散乱木 15 層上面の大型で粗雑な石片、馬場壇 A20~33 層上面、中峯 C VII 層上面の小形で不定形な石片類はとも人工品には見えない。たとえば、人工品であ

ば、石器としての統一した製品、また二つ以上の同型式例が存在するはずである。しかし、そうした人間の意志による製作形態が認められないし、それに小形すぎるのも使用に適さない。もっと不利な点は層位的に石器群変遷が読みとれないことである。それと、彼らは石器の証拠として、石器に使用痕が認められる事実をあげているが、芹沢長介が以前栃木県星野遺跡下層の石片でも同様の使用痕の存在を指摘しており、同じ検鏡方法で宮城県のものにも確認されたとすれば、岡村、鎌田らは星野下層を石器と認定していないので、両資料の矛盾をどう説明するのであろうか。

また石材撰択の上でも不可解な点がある。この地方の石器には珪質頁岩が多用されていることは周知の事実である。しかし前期旧石器には、凝灰質頁岩、石英安山岩、凝灰岩、流紋岩と、緻密な玉髄、メノウ、碧玉、チャートなどの二種の石材利用がかなりのバラツキとしてどの包含層にも認められている。どうして、縄文、旧石器期に多用される石材として良質の珪質頁岩、黒曜石などを10万年以上生活していながら知らなかったのであろうか不思議である。もっと大切な問題は生活環境でも指摘できる。宮城県北部は多数の火山が分布し、多量の火砕流が頻繁に流れ出し、軽石の降下、大雨による洪水など自然災害が多発している様子が地層に明瞭に刻まれている。たとえば、座散乱木13～15層は火砕流であるし、この地域のプラントオーバー分析では、極端に検出量が少なく、地表下草の繁茂も貧弱であった。こうした生活環境が不良な場所に連綿と居住した要因は何んであろうか理解に苦しむ。南関東地方は富士山から適度な火山灰の降下があり、火砕流も見られず、少なくとも宮城県より当時の生活条件は良好と考えられるが、前期旧石器の発見はない。彼らは南関東地方の発掘が武蔵野ローム層にまで及んでいないと力説するが、筆者らは武蔵野台地の遺跡でこの程度の層準までは掘り下げの大小はあるが、文化層の追及はしているのである。最近神奈川、千葉県でも立川ローム下部から多くの石器群が検出されており、東京都多摩ニュータウン地域では毎年15ha以上の広い面積を全掘しており、多摩ローム層以降の全層準が各所で露出し、研究者の眼も行きとどいていのである。しかし、依然として3万年を越える古さの遺跡は発見されていない。なぜ、日本の前期旧石器時代の遺跡は、生活環境条件が劣悪な宮城県にのみ集中するのか説明して頂きたい。

以上ながながと、宮城県の前期旧石器時代についての率直な疑問を提示してきたが、今後の新しい事実

よってはこれらの批判が全て徒労に終る日も来るかもしれない。しかし、少なくとも筆者らが指摘したような多くの問題点が、宮城県の前期旧石器時代には存在するということとはご理解いただけたと思う。したがって、彼らが好んで使う前期旧石器問題は「決着」という単語は訂正しなければならないであろう。もっと残念なことは、1985年10月26日の日本考古学協会レジュメでの岡村の「石器か否かという基本的な問題は、水掛論となり易い」という内容である。宮城県の考古学者が全てこのような無暴な発言を支持するはずもないし、考古学者が石器か否かをそれこそ真剣に決着させずに誰れが解決させるというのであろうか。

最後に宮城県のための新しい編年を筆者らが、汎日本的な資料を基礎に作成してみたので、以下に解説してみたい。

(1) 座散乱木6b, c, 馬場壇A3, 鹿原D3, 中峯CIIc, 志引3層上面文化は、縄文草創期または、武蔵野台地フェーズIVに相当し、年代は約1万～1万2千年前。江合川のフェーズI, II。

(2) 鹿原D5a層上面文化。細石刃文化で武蔵野台地フェーズIII。年代にして約1万2千～1万4千年前。宮城県ではこのフェーズはまだはっきりしない。

(3) 座散乱木8, 9, 馬場壇A4～7, 中峯CIIc, III, 志引4層上面文化。ナイフ形石器文化。武蔵野台地フェーズII。年代にして約1万3千～2万年前。江合川のフェーズIV, V。ATより新しい層準。

(4) 座散乱木12, 13, 志引7, 8, 北前15～17層上面文化。武蔵野台地のフェーズI。年代にして約2～3万及び3万5千年前。江合川のフェーズVI～VIII, プラス座散乱木12層上面。マイナス座散乱木15層上面で、江合川の約2万2千～4万2千年前に入る。

(5) 座散乱木15, 馬場壇A14以下33a, 中峯CIV, VII, 志引9層上面資料。これらは全て石器と考えられないので文化編年は存在しない。

(1)～(5)までの説明は十分に信用の高いデータに基づいたもので今後の宮城県の正しい編年として他地域とも、十分に比較検討できるレベルに訂正されたものである。現在、宮城県の旧石器時代研究は“日本の前期旧石器問題”という非常に重大な課題に取り組みながら、最も基本である多くの事実を解決することなく独走している感がある。学問に修正は付きもので、ここで早く正しい旧石器研究に立ちもどっていただきたい。

まとめ

筆者らは宮城県における旧石器及び“前期旧石器”

時代に関する多くの文献と実物資料、現地を詳細に検討した結果、3万年以前に遡る人工遺物についての確かな証拠は未だ存在しないという結論に達した。

最近、岡村道雄、鎌田俊昭らは、宮城県地方に正しい前期旧石器時代の存在が確定したと公言しているが、その裏付となるデータベースは不十分である。石器及び石器と認定する石製資料の多くは、丘陵、道路、畑などの地層断面からの採取品であり、なかには、明確に縄文時代の遺物と考えられる資料が、旧石器時代品として公表されるなど、資料検証の厳密さが欠除している。

発掘調査された遺跡も少なく、当然発掘面積も微小であり、宮城県全体の旧石器時代遺跡調査面積は、東京の武蔵野台地の中程度の一遺跡にも満たない狭さである。遺跡の立地条件、地層の堆積状況も悪く、通常の遺跡で観察される炭化した木材の細片分布も認められない。しかも、遺物は地層と地層の境に水平に出土するという異常性も認められる。こうした事実は、水の影響、二次的堆積環境を示す証拠にはかならない。

また、彼らが唯一3万年以前の位置づけに利用する年代測定値は、測定資料の安定性、測定方法の信頼度などの問題点が山積みされている現状からして、直ちに使用できない。そして、石器として提示される下層の資料は、自然物では無い理由の根拠に乏しく、筆者らの鑑定では人工品とは判定できないほどの石片、石塊であった。

したがって、このように不確実要素を多く持つ宮城県の「前期旧石器」問題を、真剣に議論することなく、あたかも真実であるかのように宣伝、報道する行為は研究者として厳に慎むべき態度と考え、ここに敢えて批判に踏みきった次第である。

この批判に対し、是非ともコメント、反論を頂きたい。

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