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大分県早水台遺跡第８次調査の研究報告

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Preface: Research of the Early Palaeolithic Industry discovered at the Sozudai site, Oita Prefecture, Kyushu Japan (2)

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Re-excavation of the Sozudai site: the 8th investigation in 2002

The present volume, herein published as No. 10 of Bulletin of the Tohoku University Museum, reports the results of the excavation at the Sozudai site, Oita Prefecture in 2002. It also includes the final interpretation of the Early Palaeolithic industries found there since 1964 through 2002, analyzed by Yanagida. Re-excavation of the Sozudai site was conducted in February and March, 2001 (the 6th term research of the site), September, 2001 (the 7th term), and September 2002 (the 8th term). The original excavation by Prof. Chosuke Serizawa in 1964 was the 5th term. The English summary presented here also includes a part of the final report of the 6th and 7th term excavations, which was published as the Bulletin of the Tohoku University Museum, No.7, edited by Prof. Yanagida and Mr. Ono (The Tohoku University Museum, 2007). The excavation in 2001 (20 days of research for two terms) was supervised by Prof. emeritus Serizawa and Prof. Suto, directed by Prof. Yanagida, as a joint project of the Tohoku University Museum and Department of Archaeology, Graduate School of Arts and Letters, Tohoku University. An area of about 36 m^2 was excavated at stratum 5.

The excavation in 2002 (12 days from September 16 to 27) was conducted by Prof. Serizawa. After basic transactions such as cleaning, labeling, ordering records of the excavation at Tohoku University, all artifacts and records were analyzed by Prof. Serizawa himself at Tohoku Fukushi University. He published a preliminary report of the 8th excavation (Serizawa 2003), comparing with his own 5th excavation in 1964. He continued analysis of these artifacts, but to our regret he passed away suddenly on March 16, 2006. The study of the site came to a halt. In December 2006, his wife Keiko donated all archaeological materials to Tohoku University, including Sozudai lithic artifacts. Since then Yanagida resumed the analysis, resulted in the present volume in 2011.

The Sozudai site is located in Hiji-machi township (N33°21’15” - E131°32’52”), Oita Prefecture, Kyushu Island, Japan. The site is situated at the southwest edge of the basal portion of the Kunisaki peninsula in the northeastern part of the Kyushu Island, about 11 km northeast from the famous hot spring resort of Beppu. The site exists on a coastal terrace of about 35m above sea level. It commands a good view of the Beppu bay area. The site is situated on a middle level terrace formed after the last interglacial period. The location and stratigraphy, as well as lithic technology and typology, led Serizawa to the age estimation between 100,000 ybp to 120,000 ybp (Serizawa 1982).

The site was re-excavated after an interval of 37 years in 2001. A trench of 3m by 9m was excavated in the 6th term on a gentle hilltop area along the seashore. It was extended east with another 3m by 6m trench in the 7th term. Lithic artifacts were found mainly in stratum 5 which is a gravel layer of angular andesite. It is the same layer that Serizawa originally discovered 425 artifacts and raw material stones. Analysis of tephro-chronology was carried out by Soda to date stratum 5, but the result only indicates a rough time period between 50,000 and 110,000 BP so far. All artifacts and stones except

andesite gravels were piece-plotted. The results from 2001 season were already published as was mentioned above.

The investigation in 2002 included five excavation grids, the total area being 36 m^2. They are AR-07 (3m x 2m), AG-18 (3m x 2m), AH-18 (3m x 2m), AP-16 (3m x 3m), and AI-12 (3m x 3m) (Fig. 3). A total of 846 stone materials were recovered. They are, 395 tools and debitage, 95 chunks, and 339 pebbles. OSL dating and tephra analysis were conducted. A monolith (soil section peeling off) was obtained at the west wall of AR-07. During the analysis, Prof. Li Chaorong of IVPP, China, as visiting professor of the Tohoku University Museum in 2008, participated in the work of classification and technological interpretation, with fruitful discussions with Yanagida and Akoshima during his stay in Sendai. Prof. Li extended his analysis of Sozudai artifacts to a comparative study with the Xujiayao site (Li 2010).

Yanagida and Akoshima also visited Beijing in October, 2009, to participate in an international symposium held by IVPP. We presented a paper on re-excavation at the Sozudai site in 2001 (Akoshima and Yanagida 2009). During our stay at IVPP, we had opportunities to observe lithic artifacts from Xujiayao and Zhoukoudian loc.15 for comparative purposes. In September, 2010, we had opportunities to visit laboratories of Prof. Bae Ki-dong at the Hanyang University in Seoul, and Prof. Lee Gi-kil at the Chosun University in Gwangju, for comparative research with the Middle Palaeolithic industries in the Korean Peninsula. The analyses in the present volume, including those international researches, were funded by Grant-in-aid for Scientific Research, the Ministry of Education, Culture, Sports, Science and Technology of Japan.

Excavation by Serizawa in 1964: Recognition of the Early Palaeolithic culture in Japan

This site was well known as a major Initial Jomon settlement in Kyushu District. The stratigraphic chronology of Jomon pottery began in 1930s by such scholars as Sugao Yamanouchi and the typological study was then extended nationwide through 1950s. The site was the type site for the Initial Jomon ‘Sozudai type’ pottery that is a variation of roller stamped pottery (Sozudai-shiki doki). It also yielded an Upper Palaeolithic industry. The site was excavated four times between 1953 and 1964. It also belongs to the Early Palaeolithic period of Japan, which made the site globally very famous. The Early Palaeolithic industry was originally excavated by Prof. Chosuke Serizawa of Tohoku University in 1964 (the 5th term excavation).

He thought the existence of the Early Palaeolithic industry in Japanese archipelago for the first time that parallels the Lower Palaeolithic cultures in the Asian continent (Serizawa 1965). His hypothesis was based on the artifacts discovered from the andesite gravel bed covering a Tertiary bed rock at Sozudai. He reported about 500 artifacts obtained both from the excavation and also from surface collection. Of these, 225 were excavated in situ in trench P in 1964.

According to Serizawa, the characteristics of the Sozudai industry are summarized as follows. The industry is composed of flake-tools made from prepared cores (“proto-Levallois” technique) and crude core-tools worked from tabular or round pebbles. Typologically, they were classified into proto-handaxes, proto-ovates, rhomboids, picks, chopping-tools, choppers, points, discs, prepared cores, flakes, and hammer stones. Technologically, the techniques of alternate flaking and twin-bulbar percussion are their characteristic features. These artifacts were made in quartz vein and quartz rhyolite. His investigation compared the Sozudai industry with artifacts discovered from the Fujiyama site and the Gongenyama site in Gunma Prefecture, which were, at that time, considered to be the oldest Palaeolithic sites in Japan. He concluded that the Sozudai industry was older than these two sites.

The Sozudai industry exhibits similarity to the Chou-Kou-Tien (Zhoukoudian) Locality 1 in China and the Patjitanian in Java in three aspects, that is, the technology, the tool form, and the assemblage composition. He thought that the cultural characteristics of the Sozudai site were clearly included in the Lower Palaeolithic tradition of Asia, and assumed to have the antiquity of about 100,000 years. Geological interpretation of the locality as situated on a last interglacial coastal terrace by Nakagawa (1965) supported the archaeological hypothesis.

After the publication of the Sozudai report from Tohoku University, a controversy arose over the Early Palaeolithic. Although some overseas specialists were in support of the man-made nature of the lithics (e.g., Bleed, 1979), a considerable number of scholars were in the negative camp, or remained at least skeptical. The criticism included the criteria for differentiating between naturally broken fracture and artificial technology. There were also difficulties in precisely dating the artifact bearing stratum, that is, the angular andesite gravel layer. The tentative date of ca. 100,000 years BP, was an estimate from the coastal terrace formation after the last interglacial transgression (the Shimosueyoshi transgression). Then, Serizawa continued his research for the Early Palaeolihtic in the north Kanto area, at such sites as the Iwajuku site, D locality (Gunma Prefecture), and the Hoshino site, the Mukoyama site, the Okubo site (Tochigi Prefecture). However, the ‘Early Palaeolithic controversy’ continued.

In the meantime, the forgery of Palaeolithic sites out of malice by Shin-ichi Fujimura by himself began in early 1970s beginning with locations in Miyagi Prefecture in such sites as Zazaragi (e.g., Okamura et al. 1983), and spread throughout

eastern Japan, until its revelation by newspaper crews in November, 2000. Unfortunately, Palaeolithic archaeologists nationwide could not reveal the infamous acts by Fujimura, to the regret of archaeological societies as a whole. In historical perspectives, the Early Palaeolithic controversy before 1980 was not evaluated properly because of this forgery period. After the investigation of the scandal, Palaeolithic archaeologists in Japan are divided in their opinions concerning existence of the earlier sites before 40,000 ybp.

Stratigraphy

Stratigraphic situations at the Sozudai site in different excavation terms (from 1955 to 2002) are synthesized by Yanagida (pp.79 - 86). Soil sections are compared (Fig. 68). The basic stratigraphy of Sozudai is represented at sections of grid AR-07 (west wall), and the east wall profile in 6th and 7th term investigation as was described in the previous report (Yanagida and Ono 2007, pp.9-12).

The deposit was divided into 7 geological strata above the bedrock layer (Stratum 8). Soil descriptions of these layers are as follows. These are considered to be the basic strata at Sozudai.

Stratum 1 is black silt layer (10YR1.7/1). This layer is surface soil and disturbed.

Stratum 2 is dark brown silt (10YR2/2 – 2/3). The lower part of this layer is a main cultural layer belonging to the Initial Jomon Period.

Stratum 3 is brown clayey silt (10YR3/3). This layer corresponds to “Black Band” layer which is widely recognized in Kyushu Island. The top part of Stratum 3 contains a widespread tephra called the Aira-Tanzawa volcanic ash (AT) (24,000～25,000 yr BP). Stratum 3 includes lithic artifacts of the Upper Palaeolithic such as blades and backed knives.

Stratum 4 is yellowy brown silt (10YR5/4) which includes sandy silt partially. The layer contains very small quantity of andesite gravels. From this layer on and downwards there were lithic artifacts of quartz rhyolite.

Stratum 5 is dark yellowy orange (10YR6/4) silty sand layer with andesite gravels. The cultural industry of the Early Palaeolithic Age was found. Lithic artifacts were found in large quantity from this layer. However, Stratum 5 turned out to be a layer of re-deposition.

Stratum 6 is light yellowy brown silt (10YR6/6). The upper part is sandy, and the lower part is clayey. Lithic artifacts of quartz vein and quartz rhyolite were found within this layer in 2002 (8th term). This stratum is considered to be the original cultural layer at the Sozudai site. There were refits of artifacts in this layer (AR-07). In the excavation last time in 2001 (6th and 7th term), no lithic artifacts were found in this layer.

Stratum 7 is yellowy orange layer (10YR7/8) which mainly composed of the clayey quality silt. No lithic artifacts were found in this layer. The reddish color of the layer suggests the period of deposition after the formation of the coastal terrace (during the Shimosueyoshi transgression).

Stratum 8 is yellowy orange (10YR8/8) clayey silt. The layer contains a large quantity of weathered andesite of various sizes. The andesite gravels are generally very soft from weathering. This layer is thought to be the Pliocene bedrock at the site.

Additionally, locations of excavation trenches within the Sozudai site are shown in Figure 67, from 1953 to 2001. The topography map was from Kagawa and Yawata (1965) and it denotes the hill before the agricultural land alteration for development of mandarin orange orchard in the site area. So the topography is different from the present day map (Figures 2 and 3). Trenches A, B, C are of 1953 and 1955 dig (1st and 2nd term). Trench KSF1 (by Kagawa, Kamaki, and Serizawa) and KSF2 (by Kokubu and Sato) were excavated in 1964 (in 3rd term) and reported as belonging to the Early Palaeolithic in Kagawa and Yawata (1965)). Trenches T1 and T2 are by Tsunoda in 1964 (4th term). Locations of Trench P which was by Serizawa in 1964 (5th term) and the trench by Tohoku Univ. in 2001 (6th and 7th term) were adapted to the past map here. The stratigraphy in these trenches exhibits basically the same order. The andesite gravel layer included lithic artifacts of quartzite rocks (vein quartz and quartz rhyolite).

Re-excavation in 2001 for comparison with the present results

In the excavation in 2001, 2,070 lithic materials were collected from Stratum 1 through Stratum 5. Among them, 473 lithic materials are considered to be cultural artifacts of the Early Palaeolithic Age. Besides, 1,609 lithic materials are considered to be natural gravels. The main cultural layer was Stratum 5 which is andesite gravel layer. There are 333 lithic artifacts excavated from Stratum 5. But upper layers also yielded artifacts which are considered to have originated from the same cultural horizon as Stratum 5. For details please refer to the previous report (Yanagida and Ono 2007).

Lithic artifact assemblages excavated from Stratum 1 to 5 are summarized as follows: 10 choppers, 9 chopping tools, 1 biface, 6 proto-burins, 15 pointed tools, 9 awls, 6 burins, 4 tranchets, 16 notches, 73 scrapers, 1 base retouched tool, 25 piece-esquillees, 89 cores, and 209 flakes. Their breakdown by stratum is as follows: 2 from Stratum 1, 2 from Stratum

3b, 33 from Stratum 3c, 103 from Stratum 4, and 333 from Stratum 5 as mentioned above. Artifacts were not discovered from Stratum 6 in 2001. Typological classification was combined with technological comprehension in the analysis. The tool assemblage consists of 12 types of tools, and a distinctive characteristic is abundance of small tools. The most numerous tool type is the scraper. Seventy three scrapers include small tool types. A fan shaped type is noteworthy. Piece-esquillees were produced by bipolar technique.

Artifact criteria and lithic technology

A total of 846 lithic materials were recovered in 2002, from excavation grids of AR-07 and AG･AH-18. All lithic materials were basically piece-plotted. The number does not include natural andesite gravels which were numerously contained in the layer matrix, especially in the case of Stratum 5. The grid AP-16 retained similar stratigraphic situations and yielded a small number of lithic materials, which is not reported in the present volume. The grid AI-12 had been completely disturbed due to previous agricultural activities of the mandarin orange orchard fields. Explicit criteria were applied to all the lithics. As a result, 412 were recognized as artifacts, and 434 were considered as natural stones, or undecided. The latter were excluded from further analysis of lithic technology or assemblage composition.

Classification criteria of lithic materials excavated in the 8th term basically followed those in the 6th and 7th term investigation which was already published in details (Yanagida and Ono 2007). In addition for the present volume, international cooperation with Prof. Li of IVPP and joint work with Akoshima from Asian perspectives brought about a more objective interpretation. Prof. Serizawa analyzed the artifacts to his last days, and the conclusions here are presented as inclusive results from all of these efforts.

Differentiation between artifacts and natural stones is based on criteria in the case of reports from 2001 season. Space here does not allow full presentation of classification processes, but the analytical procedure includes the following criteria; recognition of naturally patinated surface which is considered as cortex, distribution of the cortex surface on the stone leading to exclusion of natural cobbles, observation of a fractured surface to recognize conchoidal flake features, comprehension of each stone as an artifact with special attention to consecutive flake scars - negative or positive, the relationship and location of these flake scars as opposed to overall morphology, including the natural surface. Simple fracture scars were not part of the artifact criterion, because a variety of natural processes might produce conchoidal flaking per se. In identification of individual flaking, the criteria of flake that are bulb of percussion, striking platform, conchoidal morphology of the main flake surface, etc. are considered.

However, a criterion in the case of chert artifacts from the Hoshino site in Tochigi Prefecture (Serizawa, ed. 1967), that is, “*Hige-jou* fissure” (radiating lines on flat planes) was NOT adopted here. The quartzite artifacts from the Sozudai site (quartz vein and quartz rhyolite as mentioned below) exhibit clear traces of flaking as conchoidal fracture, although the surface of these rocks is very coarse grained and retains granular surface structure.

There are 79 flakes, 112 chips, and 34 cores in 2002. Flake production techniques are relatively simple. There are two sorts of production techniques in case of 8th term: single platform core type (59%) and polyhedral core type (41%). The former is one platform reduction, with one or a few working face(s) to detach flakes. Flakes are basically not elongated. The discoidal core technique or the 'proto-Levallois technique' in which a final flake is detached from one face, was not found in 8th term, though.

In contrast, secondary retouch technique is characterized by marginal retouch operation. Generally retouch scars do not extend onto the interior portions of tools. There are also bipolar techniques which are relatively common in all excavation terms.

In the present analysis, a new category of lithic materials was considered. The category of “chunks” means those materials which were probably artifacts but the flaking characteristics are not clear. The category was considered as a result of discussions with Prof. Li.

Lithic raw materials

Lithic raw materials of artifacts excavated in 2002 are basically the same as those in previous investigations. A total of 271 artifacts were identified as to their rock types (Fig. 32). The most numerous rock type was quartz vein (190 specimens). Quartz vein accounts for 70% of identified rocks. The next numerous was quartz rhyolite (60, that is, 22%). Other materials are as follows: 4 quartz (1%), 11 agate (4%), 4 rhyolite (1%), and 2 shale (1%). The great majority of artifacts are made of quartzite rcoks. Quartz vein artifacts usually have white or yellowy white color, and their fracture edges are relatively sharp. Quartz rhyolite artifacts mostly have brown or light brown color, and their fracture edges tend to be dull.

It is notable that the lithic raw materials are not uniform, but they are composed of several different rock types, testifying

their man-made nature. Including natural cobbles which were excavated, the raw materials are not from the bedrock at the site location, or they were not contained in the andesite gravel layer of Stratum 5.

Utilization of rocks for specimens from 2002 season exhibits the same pattern of selection as previous investigations. Relatively coarse grained materials such as quartz rhyolite and quartz vein were mainly worked, but more fine grained, siliceous materials such as agate, quartz crystal, were also utilized. There is a relationship between the type of raw materials and tool classification. Relatively coarse grained materials were used more frequently for larger tools such as choppers, chopping tools, and bifaces (that is, heavy duty tool category), while fine grained materials were favored for smaller tools such as scrapers and burins (that is, light duty tool category). The preference is also reflected in the size of cores and flakes without secondary retouch.

Tool assemblage from re-excavation in 2002

The assemblage composition of artifacts from grid AR-07 and AG･AH18 combined is as follows.

Stratum	Stratum 5	Stratum 6	total
Type of specimen			
Chopper	1	1	2
Chopping tool	5	1	6
Biface	1	2	3
Pointed tool	1	2	3
Notch	9	9	18
Proto-burin	7	6	13
Burin	10	2	12
Scraper	53	52	105
Piece-esquillees	5	2	7
Flake	54	25	79
Core	18	16	34
Chip	94	18	112
Hammer-stone	1	0	1
Artifact total	259	136	395
Chunk	52	43	95
Pebble	289	50	339

Assemblage composition for each excavation grid is shown in p.33 and p.40 respectively. Cutlural horizons of Stratum 5 and Stratum 6 are considered to belong to the same lithic industry. Combined percentage of artifacts is shown in Fig.34 (p.70), and that of tools exclusively is shown in Fig.36 (p.70).

Lithic materials except andesite gravels were all recovered and piece-plotted, including natural pebbles. There is a noteworthy pattern observed here. The ratios among artifacts, chunks, and pebbles show significant differences between Stratum 5 and Stratum 6, as follows.

In Grid AR-07 from Stratum 5, there were 198 artifacts, 26 chunks, and 151 pebbles.
In Grid AR-07 from Stratum 6, there were 118 artifacts, 34 chunks, and 25 pebbles.
In Grid AG･AH-18 from Stratum 5, there were 63 artifacts, 26 chunks, and 138 pebbles.
In Grid AG･AH-18 from Stratum 6, there were 16 artifacts, 9 chunks, and 25 pebbles.

The lower ratios of pebbles in relation to the number of artifacts are observed for both excavation units. The phenomenon still needs geological explanation, but it is considered to reflect some differences in formation processes between two cultural horizons, that is, between Stratum 5 and Stratum 6. We evaluate this as a sign of relatively stable depositional conditions of Stratum 6 for original cultural layer of Sozudai. There are a small number of refit artifacts in Stratum 6.

Illustrations and photographs are presented for each category of tool classes. The illustrations are made according to the Japanese style of drawing lithic artifacts. The Japanese style illustrations are somewhat different from those of French style. The drawing method was originally conventionalized by T. Matsuzawa in 1960s and then widely adopted by lithic analysts nationwide. Conventions for flaking features (conchoidal fracture, rings and fissures, platform, bulb of percussion and distal features) are intentionally expressed in drawings according to the recognition of lithic analyst. Temporal successions of flaking scars are also expressed in the drawing by crosscutting ring lines and fissures. In the case of Sozudai artifacts, the raw materials are relatively coarse grained in many instances, but efforts were made to recognize flaking characteristics for each specimen. In this sense, illustrations and photographs are mutually supplementary in the present report.

Representative tool classes of Sozudai Lower industry

Synthesis of analytical results of four excavation terms (1964, 2001, 2002), from technological and typological viewpoints, reveals that artifacts of Sozudai are composed of the following classes of tool categories. The classification system was schematized by Yanagida, but the typology is based on repeated discussions among Yanagida, Ono, Li, and Akoshima, in addition to revised typological classification by Serizawa until 2006.

Figures 71 to 78 are representative artifacts for each category of tool classes. They are selected as typical tools from the Lower horizon of Sozudai, that is, from 5th term to 8th term excavation campaigns herein combined. Please refer to the illustration No. (numbers) for these figures. Here, some noteworthy types are described as major components of the Sozudai Lower horizon.

Chopper (No.1 to 3) and chopping tool (No.4 to 7)

Choppers are unifacially retouched tools. They were made from pebbles or large flakes. There are two groups, large and small type. Chopping tools are bifacially retouched tools. They were made from pebbles or large flakes. There are also two groups, large and small type. Alternate flaking was often exerted to produce the working edges. As the result, the edge exhibits a zigzag pattern when it was seen perpendicular to the edge line.

Biface (No.7 to 17)

There are large bifacial tools. Some of them can be called “hand-axes”. They share a common typological pattern: the pointed portion was produced with bifacial retouch, the basal portion is thicker and widest, aspects of natural cortex surface often remain around the basal portion of the “hand-axe” morphology. There are also “ovate” shaped bifaces. Bifaces are often characterized by alternate flaking, resulting in the zigzag pattern of the edge. Bifaces are usually large, and they are heavy duty tool category at Sozudai.

Pointed tool (No.18 to 24)

Pointed portions were produced by either unifacial or bifacial retouch. Pointed tools are small or middle sized.

Proto-burin (No.25 to 30)

A particular type was noticed by Prof. Serizawa and was named as “proto-burin”. A pointed portion was produced with small retouches on one side and one or a few crude burin blows on the other side. The size varies from middle to small. Originally he named it as pickaxe shaped (“tsuruhashi shaped”) tool in 1965. However, Serizawa brought a typical specimen to France to show to Dr. F. Bordes. He suggested the term of “proto-burin”. In 2001 and 2002, a group of this type was discovered and we recognize that they constitute a tool type.

Burin (No.31 to 35)

Burins at Sozudai are generally small and burin facet(s) is identified.

Notch (No.36 to 40)

A number of notches are found in 2001 (14 specimens) and in 2002 (20 specimens). They are usually small. Notched portion was produced on flat flaked face or natural face.

Awl (No.41 to 45)

Small pointed part is produced with secondary retouch. Pointed portions are often sharp.

Tranchet (No.46 to 48) and Base retouch tool (No.49)

Small triangular shaped tranchets are bifacially retouched at the triangle tip. The edge is sharp and straight. We call a small minutely retouched piece a “base retouched” or “base trimming” tool. The tip part is broken. It is made of good quality siliceous raw material.

Piece-esquillee (No.50 to 53)

They were made by bipolar flaking. Overlapping step fracture scars are seen on opposite edges.

Scraper (No.54 to 74)

Tools with edge(s) of continuous secondary retouch are classified as scraper. There are many small scrapers of various

shapes. They are classified into 5 types, according to shape, size, and retouch technique. Scrapers turn out to be the most numerous type of tools at Sozudai in 2001 and 2002. Serizawa (1965) already noticed small retouched tools, but he emphasized large bifacial tools. Re-excavations (6th to 8th term) and analysis revealed that this type of small tools, especially scrapers is an important part of the entire assemblage. Actually, the Sozudai Lower horizon is characterized as a small tool industry, with some large tools.

Conclusions from four investigation campaigns: synthesis from re-excavation in 2002 and previous results of excavations in 1964 and 2001

The result of the present excavation (8th term) is synthesized by Yanagida with results from the previous investigations in 1964 and 2001. We conclude from these researches that the Sozudai industry of the Early Palaeolithic in Japan has evident characteristics as follows.

1. The Sozudai site is situated on a coastal terrace which was formed during the Shimosueyoshi transgression of the last interglacial period. There is a reddish layer (Stratum 7) on top of the terrace bedrock. There are two artifact bearing strata, that is, Stratum 6 (light yellowy brown silt) and Stratum 5 (silty sand layer with andesite gravels). It was revealed that lithic artifact industry contained in stratum 5 at Sozudai (1964, 2001) had existed within stratum 6 in the state of original positions. Stratum 5 is considered to be a layer of re-deposition.
2. The lithic materials excavated from Sozudai are classified into categories of artifacts (tools and debitage), chunks (man-made but not clear as flaked products), manuports and pebbles. The ratios among these categories indicate overall man-made nature of the Sozudai industry. Especially the different proportions of artifacts to natural pebbles between Stratum 5 and Stratum 6 indicate differential formation processes of these strata. However, artifacts from Stratum 5 and Stratum 6 share common characteristics in terms of assemblage composition, secondary retouch techniques, and flake production techniques.
3. The main raw materials for lithic artifacts were rough surface quartzite rock (quartz rhyolite), and quartz vein. Meanwhile, utilization of stones such as quartz, agate, chert, and a type of obsidian was not significant. Although the numbers are small, the use of variable lithic raw materials indicates selection of materials for tools by the inhabitants of Sozudai. There are differential use of rock types between larger heavy duty tools and smaller light duty tools.
4. It is confirmed that choppers, chopping-tools, and bifacial tools in large size were included in the assemblage. Bifacial tools include handaxes and crude “proto-handaxes” (named by Serizawa). There is a type of handaxe which retains original pebble surface, retouched by alternate flaking technique, and maximum breadth being at its basal portion. These large tools account for less than 10 percent in the assemblage.
5. Furthermore, various kinds of small tools such as scrapers, burins and proto-burins were recognized as an important addition to the assemblage composition. We think that the small type of tools, especially a variety of scrapers, and proto-burins occupy an important portion in typological aspect of the Sozudai industry. A particular type of small tools which exhibits a pointed portion with small retouches and one or a few burin blow is named here as “proto-burin” (Figure 74). Scrapers include various types such as trapezoidal, fan shaped, and horseshoe shaped. Generally scrapers are in small size.
6. The blanks for tools were mostly flakes. There are elongated flakes and sideblow flakes. Flakes were detached mainly from polyhedral cores. Some flakes were detached from discoidal cores and prepared cores (including “proto-Levallois type” by Serizawa).
7. Morphology of flakes is variable, but there are many trapezoidal and triangular products. Most numerous are small flakes between 2.0 and 4.0 cm. There is a group of larger thick flakes between 6.0 and 8.0 cm whose platform is large and has salient bulb of percussion.
8. The technique of alternate flaking was an important feature of Sozudai industry. Their results are zigzag patterned edges when viewed vertically. Also, production of flakes with twin-bulbar percussion was common. Especially, the bipolar technique was applied to manufacture stone implement blanks in high frequency.
9. Overall feature of secondary retouch on tools of Sozudai is peripheral modification along the edge. Namely the secondary retouch is restricted to peripheral portions of the blank, rather than covering the interior portion of the tool. Also, there are many tools, flakes, and cores which retain their natural cortex surfaces.
10. All tools from Sozudai lower horizon which were obtained from excavations in 1964, 2001, 2002 are classified into types. They are listed here as an assemblage composed of, chopper, chopping tool, biface, pointed tool, notch, proto-burin, burin, scraper, base retouched tool, tranchet, awl (perforator shaped tool), and piece esquillees (wedge shaped tool). The majority is of smaller type, so as a whole Sozudai is characterized as a small tool industry.
11. As a result of tephra analysis in 2001, it turned out that the following tephra were contained in stratum 5. Kujuu-

Shimosakata tephra (Kj-Sm) or Kujuu-Daiichi (Kj-P1), and Kikai-Tozurahara (K-Tz) were included. According to the tephrochronology, it is inferred that the Sozudai industry falls to the time period between 50,000 and 110,000 years ago. Soda et al. (2001) point out that there was Kj-P1 at the top part of Stratum 5 at loc. W, thus the industry is older than 50,000 ybp.

From a comparative examination of stone artifacts so far discovered in Kyushu Island in terms of stratigraphy, typology, and lithic technology, Yanagida postulates that the Sozudai industry belongs to the period around or before 70,000 to 80,000 years ago (Yanagida and Ono 2007).

In February 13, 2011, an international symposium was held at the Beppu University, entitled “East Asian Palaeolithic cultures and the Sozudai site”. The symposium coordinator, M. Shimizu emphasized the importance of the Sozudai site as representative cultural properties for Oita Prefecture. Akoshima, Y. Wada (Hitoyoshi City), Kiryong Kim (Hanyang University) discussed some common characteristics of the Sozudai and the Ohno sites (Kumamoto Prefecture) lithic industries in relation to the middle Palaeolithic sites in Korea (to be published by the Beppu University).

Yanagida and Akoshima recognize that the Sozudai industry has some fundamental characteristics which have similarities with some Middle Palaeolithic industries in mainland China and Korean peninsula. We would like to discuss elsewhere the characteristics of the East Asian Palaeolithic cultures before 30,000 ybp. from comparative perspectives. Based upon the analytical results described in the present volume, we think it is possible to establish the Early Palaeolithic Age in the Japanese archaeological chronology. It is the first stage of our Age Division system when the oldest inhabitants produced clear traces of their existence in the Japanese archipelago.