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DISTRIBUTION OF THE LITHIC REFITTINGS AND PRODUCTION SKILLS (THE CASE STUDY FROM THE SHIRATAKI SITE GROUP, NORTHERN HOKKAIDO, JAPAN)

More than a hundred sites have been found at the Shirataki, which is situated in a small basin on the northeastern side of the Taisetsu Mountains in Hokkaido. Most of these sites are located on the fluvial terrace of the Yubetsu River flowing through the southern base of Mt. Akaishi. Due to the substantial volume of obsidian produced at Mt. Akaishi, the Shirataki site group is known as places where large amounts of obsidian stone artifacts were made.

A total of 17 sites (approx. 100,000 m^2) in this area were excavated by the Hokkaido Archaeological Operations Center at the time of the construction of an expressway (*Hokkaido Archaeological Operations Center 2000, 2001, 2002, 2004a, 2004b, 2006, 2007*). Approximately 5 million lithic artifacts totaling 11 tons were unearthed from the 17 sites. Of these, 14 sites belong to the Upper Paleolithic age, where a considerable amount of lithic artifact assemblages were uncovered (fig. 1A). The largest number of lithic artifacts was found at Kami-shirataki locality 8, where 1,350,000 articles were unearthed. Many large sites, including those of Kamishirataki, are located near the junction of streams flowing from Mt. Akaishi and the Yubetsu River.

Most of the unearthed relics were flakes and fragments. Only about 0.3% of the totals were processed stone tools, and many of them were damaged. As a result of restoration work, 35,000 refittings and 3,200 lithic artifacts of identified raw materials were obtained from 125,000 flakes. Analysis of these materials revealed the stone shapes, modes of transportation into the sites, lithic artifacts production techniques and the condition of stone tools carried outside the sites, used by the people of those ages. Because such conditions vary by stone artifact assemblage, we can realize the characteristics of different periods in the similar stone environment.

In most cases, lithic artifacts of identified raw materials were distributed in an area called a “stone artifacts block (sb),” where lithic artifacts were concentrated. Some other specimens of lithic artifacts of identified raw materials were unearthed from two or more distant points. While some individual stone tools were found at distant points, there were also cases where flaking occurred

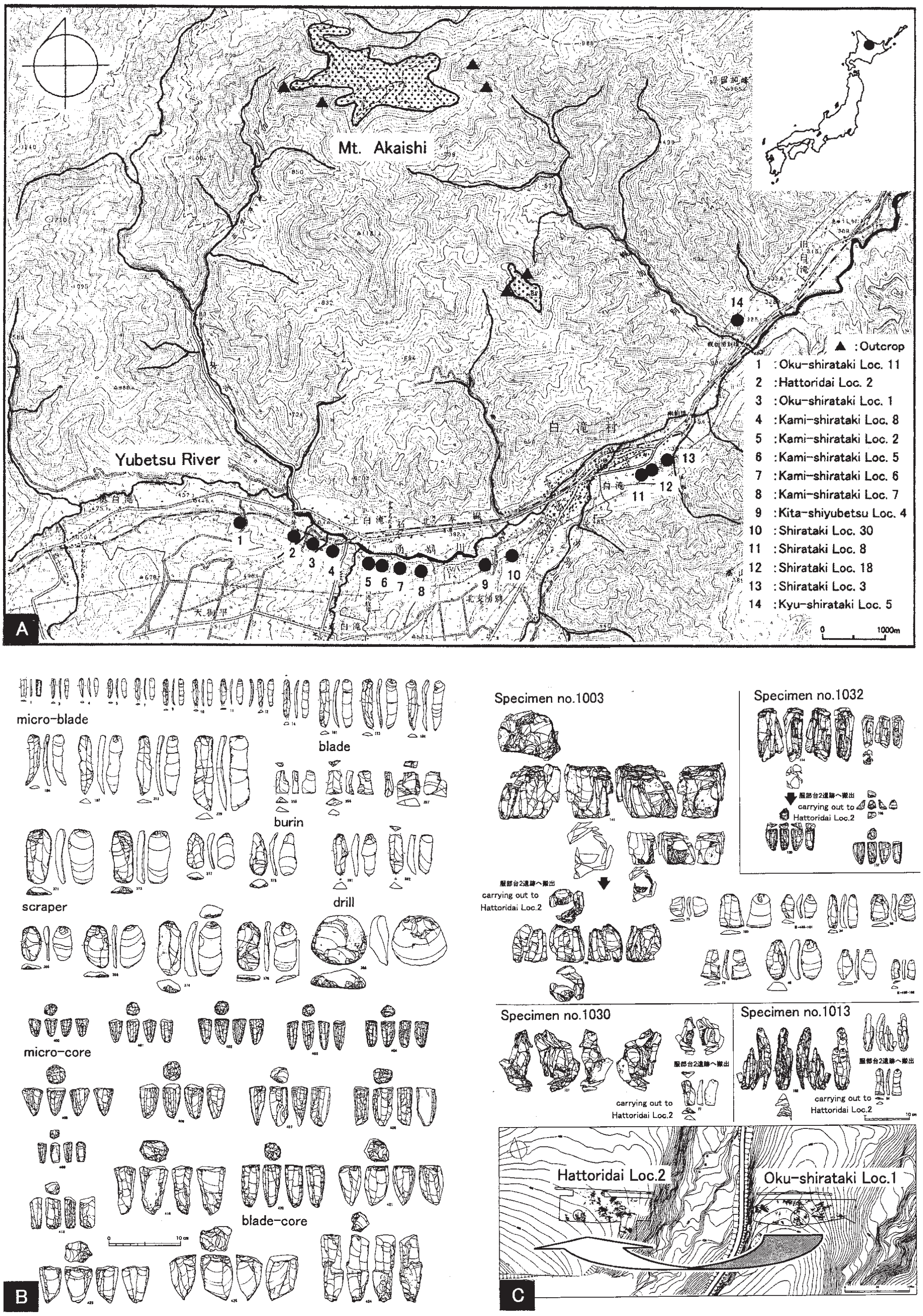

Fig. 1. A, Map showing location of Shirataki sites in relation to Mt.Akaishi obsidian flow; B, Stone tools of Sb-7 to 10 at Oku-shirataki locality 1; C, Refittings of identified raw material between Oku-shirataki locality 1 and Hattoridai locality 2

at respective, different points. In the case of the longest distance, pieces found at Hattoridai locality 2 and Oku-shirataki locality 1, which are approximately 350 meters apart, were bonded together. These were micro-blade lithic industry including Momijiyama-type micro-blade cores (fig 1B). Four lithic artifacts of identified raw materials were confirmed and all of them were found to have been moved from Oku-shirataki locality 1 to Hattoridai locality 2 (fig 1C) (*Hokkaido Archaeological Operations Center* 2002, 2007).

In Sb-55 to 63 of Hattoridai locality 2 (fig 2A), lithic artifact producing skills seemed to vary by blocks. A detailed explanation on this is provided below. Sb-55 to 63 consists of 9 stone artifact blocks and contains micro-blade lithic industry, including Horoka-type micro-blade cores. It is presumed from the refitting relationship among the stone artifact blocks that they represent almost the same period group (fig 2B). In this area, many large blade flakes and large boat-shaped stone tools were produced and micro-blade flaking was conducted in small quantities. The majority of the stone tools are gravers, end-scrapers and side-scrapers made of stone blades, and boat-shaped stone tools made of large flakes and rejuvenation core tablets. Micro-blade cores were produced based on boat-shaped stone tools (fig 3A).

As a result of restoration work, we have 25 lithic artifacts of identified raw materials which are reconstructed to original stones. And they stemmed from four stone artifact blocks, Sb-56, 58, 59 and 62 (fig 3B to 5B). The lithic artifacts of identified raw material assemblages, where flaking began in Sb-56, 58 and 59, had similar characteristics concerning (1) Types of materials, (2) Core consumption rates, (3) Movements of cores between groups of stone artifact blocks, (4) Movements of produced stone tools to the other stone artifact blocks and (5) Transport of cores from the sites, but these conditions varied by blocks (Table 1).

From (1), it was possible to assume the places from which stone materials were collected. It was presumed that breccia could only be collected near the outcrop on the hillside of Mt. Akaishi, and was more difficult to obtain compared with sub-breccia because the former was farther from the site. Many

Table 1

	Assemblages where flaking began at Sb-56	Assemblages where flaking began at Sb-58	Assemblages where flaking began at Sb-59	Assemblages where flaking began at Sb-62
(1) Types of materials	sub-breccia core	breccia	breccia	sub-breccia breccia
(2) Core consumption rates	low	high	high	low
(3) Movements of cores between groups of stone artifact blocks	8/10 Only Sb-56: 7 Sb-56~Sb-62: 1	4/4 Only Sb-58: 1 Sb-58~Sb-56: 1 Sb-58~Sb-56 ~Sb-59: 2	5/9 Only Sb-59: 3 Sb-59~Sb-56: 2	2/2 Only Sb-62: 2
(4) Movements of produced stone tools to the other stone artifact blocks	Long-Flakes: 3 End-Scraper: 1	Flakes: 19 Long-Flakes: 3 Blades: 10 End-Scraper: 1 Side-Scraper: 1 Retouched-Flake: 1 Materials of Boat-shaped stone tools: 5	Flakes: 21 Long-Flakes: 5 Blades: 13 End-Scraper: 1 Side-Scraper: 1 Burin: 4 Boat-shaped stone tools: 1 Materials of Boat-shaped stone tools: 15 Materials of Cores: 2	Flakes: 9 Blade: 1
(5) Transport of cores from the sites	2/10	0/4	4/9	0/2

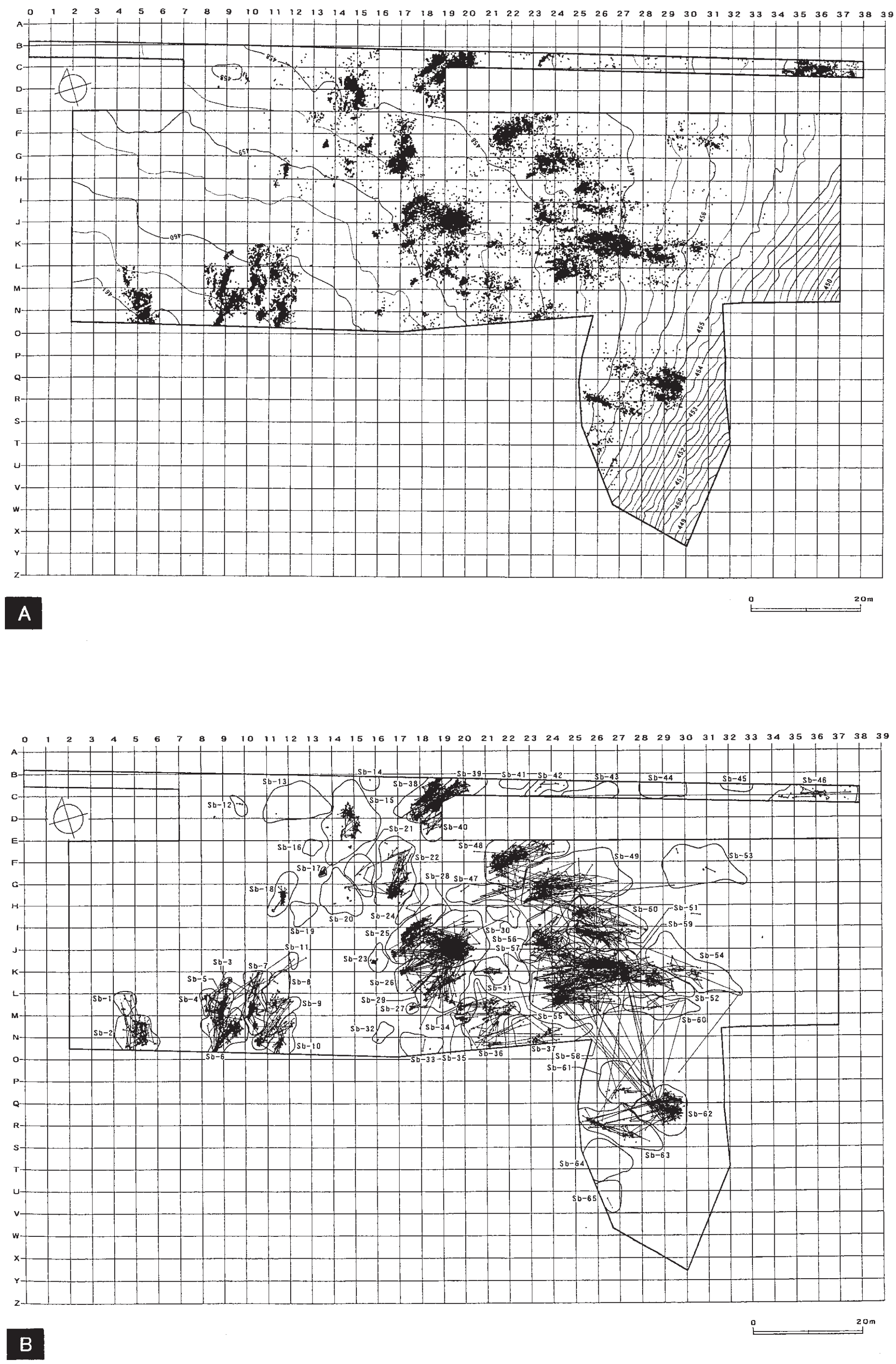

Fig. 2. A, Distribution of lithic artifacts at Hattoridai locality 2;
B, Lines showing relation to refittings at Hattoridai locality 2

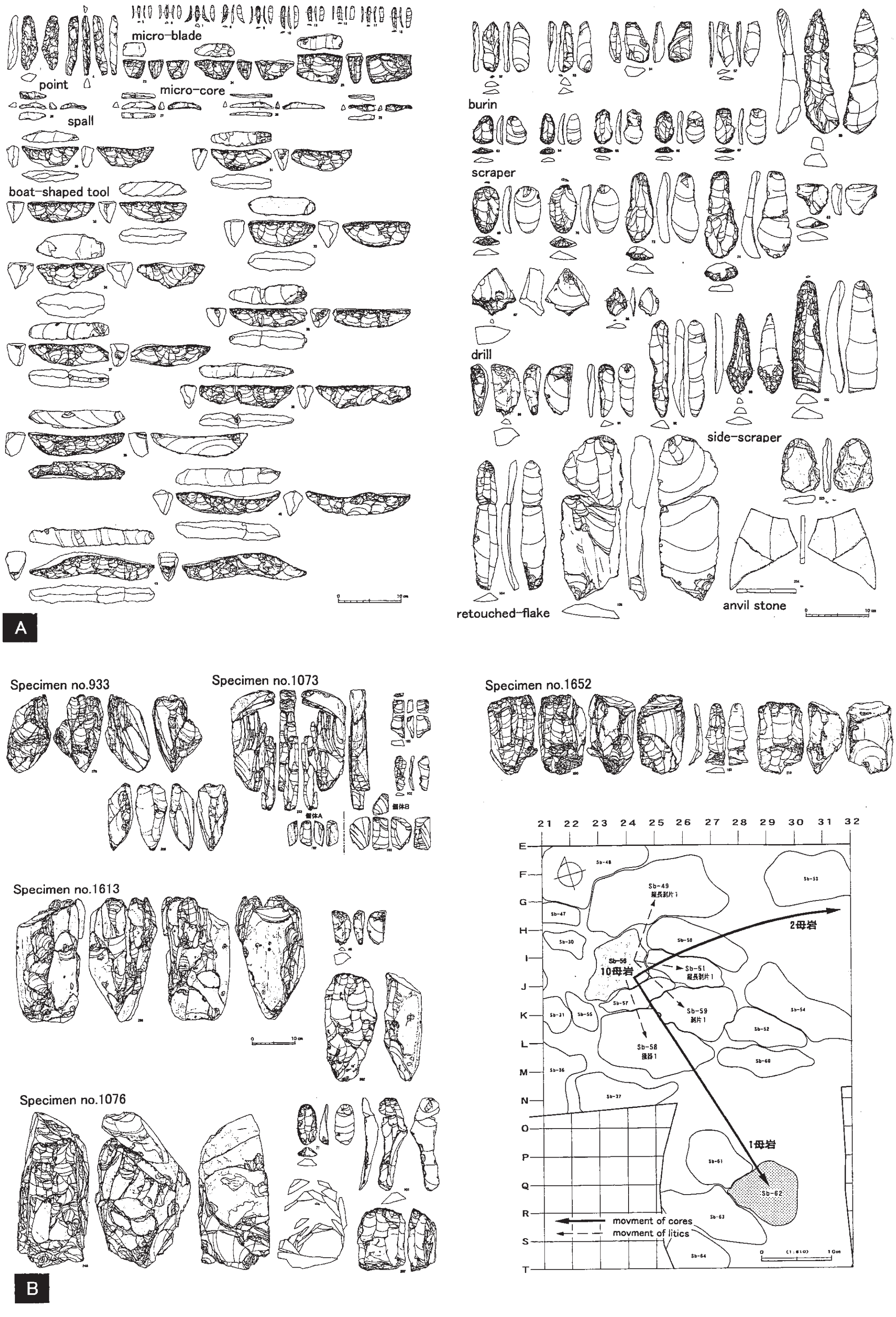

Fig. 3. A, Stone tools of Sb-55 to 63 at Hattoridai locality 2; B, Lithic artifacts of identified raw material assemblages where flaking began at Sb-56 and those movements

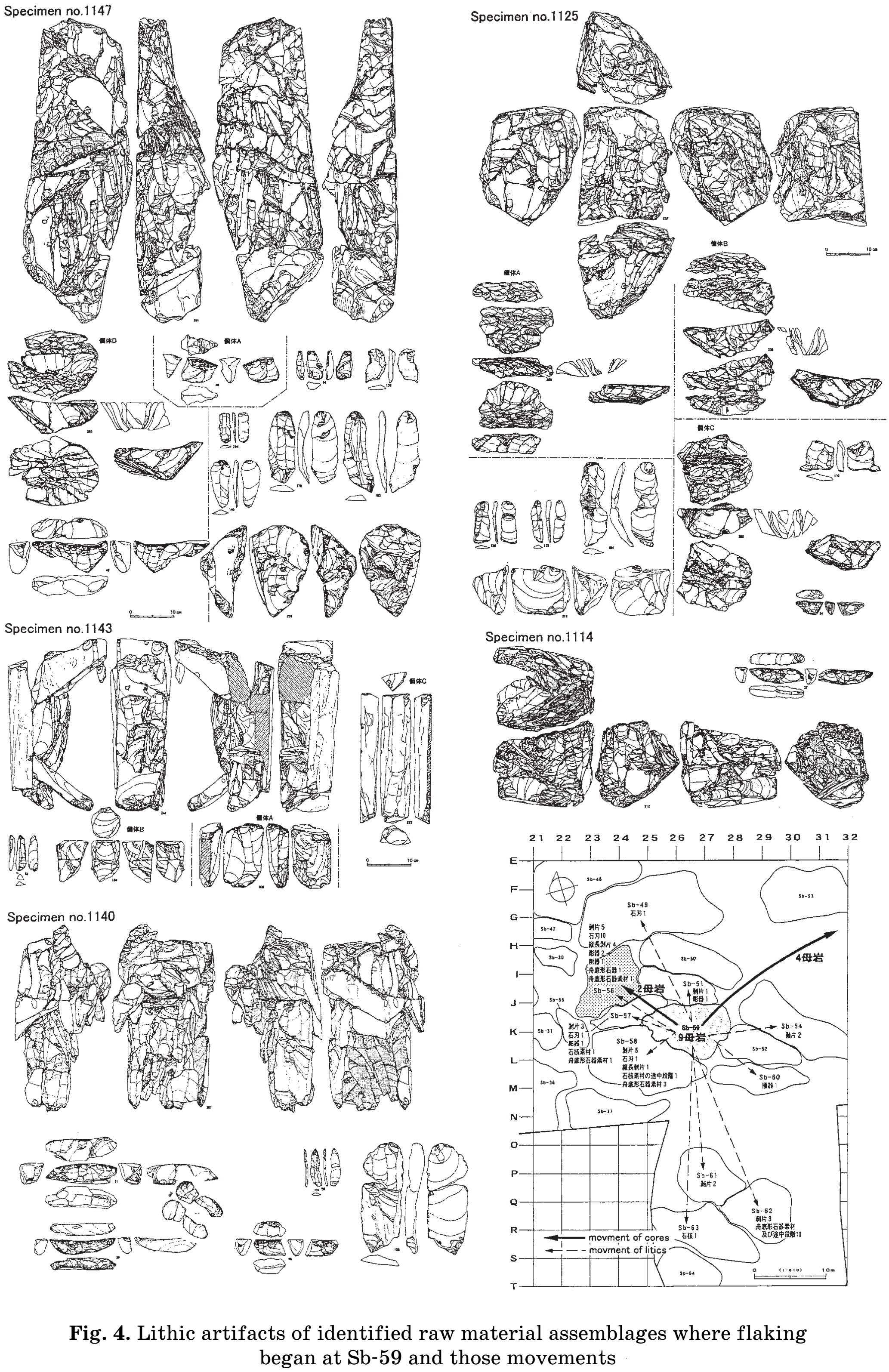

Fig. 4. Lithic artifacts of identified raw material assemblages where flaking began at Sb-59 and those movements

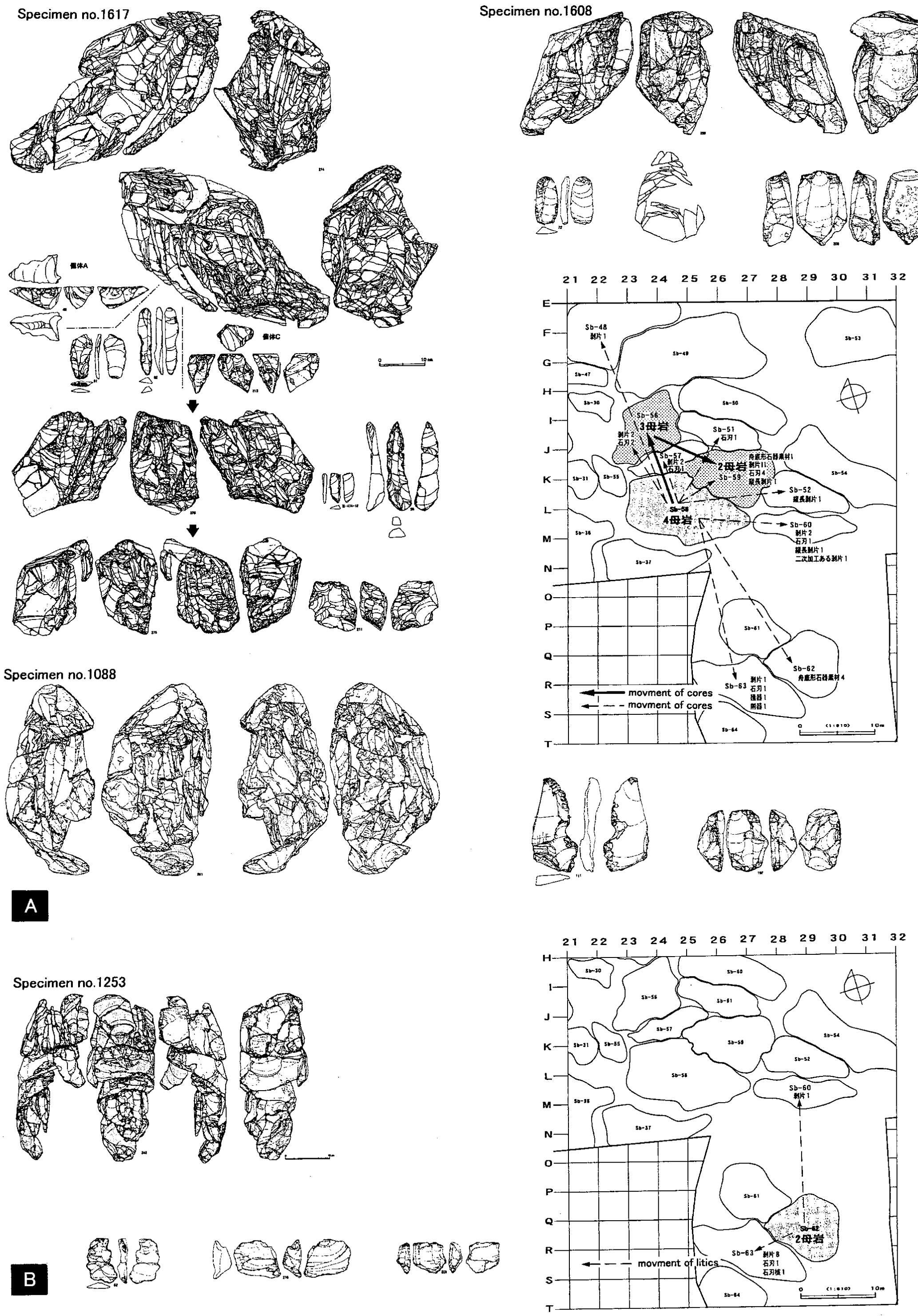

Fig. 5. A, Lithic artifacts of identified raw material assemblages where flaking began at Sb-58 and those movements; B, Lithic artifacts of identified raw material assemblages where flaking began at Sb-62 and those movements

pieces of breccia were large and had shapes suitable for blade flaking. The difference of (2) was thought to be due mainly to the ways of using materials, accurate preparation of core and precise flaking techniques. The difference of (3) will be described after considering the overall conditions. The condition of (4) was thought to indicate whether materials of appropriate shapes were flaked from lithic artifacts of identified raw materials. Transported cores of (5) were thought to be the ideally shaped ones selected from a number of cores, on the assumption that they would be used in places where the supply of stone was difficult.

As shown in Table 1, lithic artifacts of identified raw material assemblages where flaking began at Sb-56 and Sb-59 were in contrast with each other concerning all the items except for (3). While the assemblages where flaking began at Sb-58 and Sb-59 had many points in common, differences were found in (3) and (5). The differences in (2), (4) and (5) were thought to be due to variations in stone artifact production skills (Abe, 2003). It can be interpreted that the lithic artifacts of identified raw material assemblages of Sb-56 contained the works of individuals or groups whose level of skill was low, while the assemblage of Sb-59 contained the works of highly skilled individuals or groups. If that is the case, the difference of (1) means that highly skilled persons were using breccia as the first choice and used sub-breccia for practice. It can thus be interpreted that there were rules on use of stone materials within individual groups.

Because the conditions of (1), (2) and (4) are similar for the Sb-58 and Sb-59 assemblages, they were thought to be flaked by individuals or groups of similar levels of skills. Looking at the difference of (3) in detail, the flaking of the artifacts began at Sb-58 and then was interrupted during transportation to Sb-56, where flaking was resumed. It is thus possible to think that the individuals or groups that conducted flaking at Sb-58 were handing down their stone artifact production skills to the people who made stone tools at Sb-56.

As mentioned above, from the distribution of lithic artifacts of identified raw materials and the details of works conducted at Sb-55 to 63 of Hattoridai locality 2, it was presumed that stone artifact producing skills varied by stone artifact block while skills were handed down. Lithic artifact production skills naturally vary by individuals, and no one is born with such skills. It must have been necessary to teach and hand down skills to persons with low-level skills and beginners in order to maintain and continue the existence of the groups. Also, since stone materials were expendables, minimizing the teaching and handing down of skills at stone consuming areas and instead conducting them in areas where stone materials were produced in large quantities, such as the Shirataki Site, must have been a strategy to reduce the risk of traveling.

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