

# Technological Characteristics of Some Wedge-Shaped Cores in Northwestern North America and Northeast Asia

*Received 23 April 1976*

RICHARD E. MORLAN

OVER FORTY years have elapsed since wedge-shaped cores were first recognized as possibly representing an intercontinental "early migration" (Nelson 1935, 1937; Teilhard de Chardin 1939). The formidable geographical gap between Shabarakh Usu in Mongolia and the Campus site in Alaska seems to have dampened interest in the problem until subsequent research had produced similar specimens in southern Siberia, northern China, Japan, and the New World Arctic (Morlan 1967a: 209). In 1959, MacNeish (1959: 12) identified wedge-shaped cores (which he called tongue-shaped cores) as one of the diagnostic characteristics of the Northwest Microblade Tradition, and these specimens figured prominently in Irving's (1962) "provisional comparisons" of Alaskan and Asian stone industries. My interest in the subject developed during the course of research on the preceramic period of Japan, and a preliminary study of the distribution of wedge-shaped cores showed them to be widespread in both the Old World and the New World (Morlan 1965). I devoted the summer of 1966 to laboratory work in Japan and was afforded an opportunity to examine numerous assemblages containing these cores and to develop a systematic technique for recording both their metric and nonmetric attributes. Subsequent modifications of this technique have resulted in a list of 67 nonmetric and four metric attributes for most wedge-shaped cores and 84 nonmetric and seven metric attributes for all others. This may seem excessive, but, after some practice, one can learn to complete this list in only ten to fifteen minutes per core; the result is a relatively complete, easily reproducible description of each specimen.

Richard E. Morlan is affiliated with the Archaeological Survey of Canada, National Museum of Man, Ottawa, Ontario.

In order to facilitate the collection of these data, the attribute list has been coded in terms of four major topographical elements, much like the code devised by Binford (1963) for projectile points. These elements are illustrated in Figure 1 and include the platform element, the flute element, the wedge element, and the face element. Each wedge-shaped core has one platform element and one wedge element, most of them have one flute element (though a few have two flute elements), and each has two face elements. The face elements are named: with the platform up and the flutes to the right, the visible face is the obverse face; the opposite face is the reverse face. We can ignore the specifications for cores with two flute elements and note that by defining these four elements in the above orientation we have also defined wedge-shaped cores as a general class. To state this definition explicitly, wedge-shaped cores are those cores which possess two faces, one margin of which comprises a platform while an adjacent margin constitutes a fluted area from which blades or microblades have been removed. The remaining margin or margins consist(s) of a flat surface or a sharp edge which is called, for want of a better term, the wedge element. Other cores which fall outside this category, for example, some tabular forms, have facially distributed flutes, while others, such as conical and cylindrical cores, lack the opposing faces and the wedge, and are fluted around the entire perimeter. It should be noted, however, that this definition of wedge-shaped cores is not entirely adequate, for it can embrace certain specimens which are probably better classified as burins as well as some so-called scrapers of high form. I am not convinced that a universally discrete definition is possible or necessary and am thus far satisfied to try to work with this one.

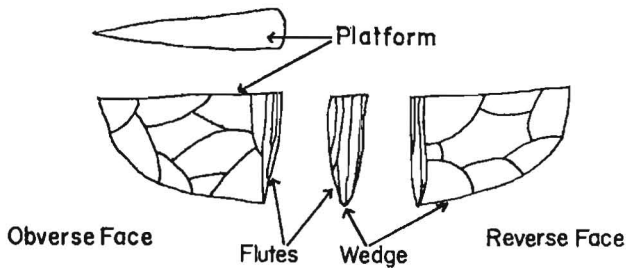


Fig. 1 Terminology of four topographic elements of wedge-shaped cores.

It should be clear that this terminological maze serves a descriptive purpose, but as a framework for the attribute list it also provides a guide to analysis, if only because the list systematically organizes a large amount of information. Each of the four elements is described in the attribute list in terms of geometrical and technical attributes so that uniform comparisons can be made between any two cores. The immediate goal of these comparisons is the reconstruction of manufacturing techniques which would organize groups of cores according to the ways in which they are made. There are at least three ways to approach this goal: (1) by trying to duplicate archaeological specimens by means of experimental stone-knapping; (2) by gluing together the products and byproducts recovered from the site; and (3) by inferring the knapping process from the orientation and condition of flake scars. I am not prepared to try the experimental approach which, incidentally, I would

certainly pursue were I concerned with function. The gluepot approach has been successfully employed by several Japanese and American workers, and I, traveling rapidly from one museum to the next, have had to resort to the inferential method. It is in the attempt to infer manufacturing techniques that I have found the attribute list most useful, for it provides a systematic record of the orientation of flake scars as well as of the condition of the bulbs of percussion. My interest in techniques of manufacture stems from my belief that such techniques constitute the second lesson of a knapper after he has acquired certain basic skills in working stone and that these techniques were most often transmitted either by imitation or deliberate instruction.

Though Hokkaido is a relatively recent addition to the wedge-shaped core distribution, it offers a good starting point in view of the occurrence there of several persistent and consistent techniques of manufacture which are relatively easy to isolate from one another (see Morlan 1967*a*, 1967*b* for summaries with references). Perhaps the first clear-cut, formal reconstruction of a wedge-shaped core manufacturing technique—the Yubetsu technique—was made by Yoshizaki (1961). The Yubetsu technique is shown in Figure 2 and can be described as follows. A large biface, from 10 cm to 40 cm in length, is struck longitudinally so that long, narrow flakes called ski spalls are removed to expose a flat platform along one margin of the biface. Blows struck on one end of this platform produce microblades and give the biface a fluted appearance. (The word “blows” is almost certainly inappropriate for every core I have examined. Although it may be possible to produce microblades by means of direct percussion in some instances, the use of indirect percussion is much more likely to provide consistent control of the core; most microblades were probably removed by means of a pressure flaker as seen in Bonnichsen, Morlan, and Keenlyside [1975].) Thus a wedge-shaped core is formed with this technique by producing the faces first (the original face of the biface), the platform second (by removing ski spalls), and finally the flutes (by removing microblades). This technique occurs in several excavated sites in northeastern Hokkaido, dating from about 15,500 B.P. to 12,500 B.P., as well as in a number of surface finds.

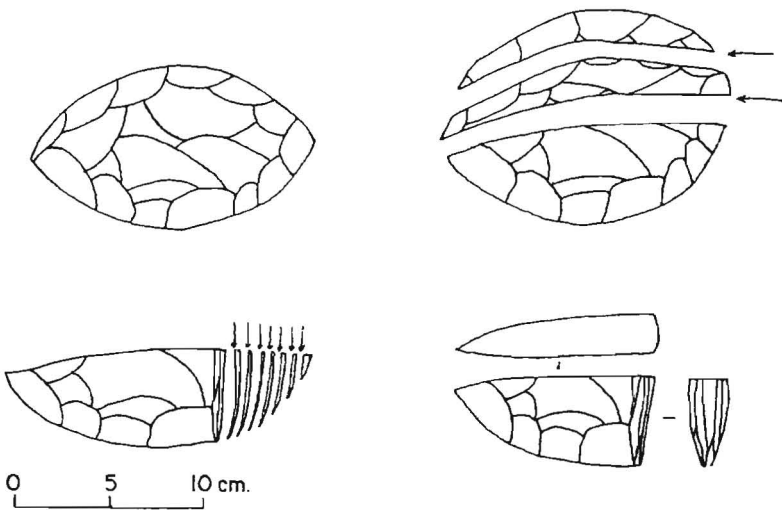


Fig. 2 Schematic drawing of the Yubetsu technique (redrawn after Yoshizaki 1961: Fig. 5).

A number of techniques based upon flake production are generally later in time than the Yubetsu technique. Among these, a category which Yoshizaki (1964: 77-78) calls the Oshorokko burin is distinctive for its bifacial workmanship. As depicted in Figure 3A, Oshorokko burins are made on bifacial points, probably fashioned from flakes, by breaking off the tip of the point with a diagonal burin blow which forms a platform for the removal of microblades. Here again the faces are fashioned first and are followed by the formation of the platform and finally of the flutes. Unlike the Yubetsu technique, the blank for an Oshorokko burin is only about 5 cm long, and the platform frequently extends only about one-fourth of this length. The other three-fourths of the platform element (i.e., the margin along which the platform is located), consists of a bifacial edge described in the attribute list as an obverse-reverse juncture; this juncture, when it occurs on Oshorokko burins, is always a bifacially worked edge.

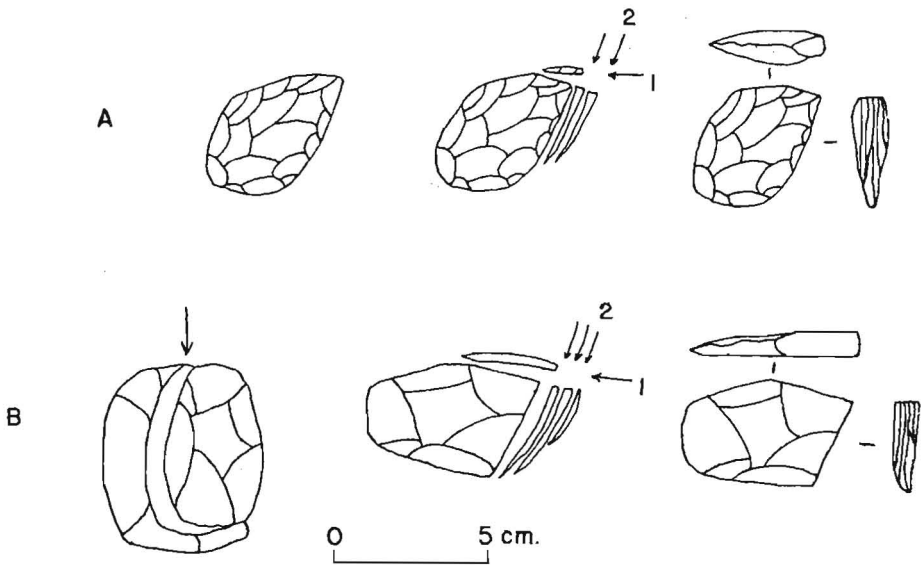


Fig. 3 Schematic drawings of manufacturing techniques based upon flake production: A, Oshorokko burin; B, Towarubetsu and Togeshita burins (based upon original laboratory notes).

Two other forms, known as Towarubetsu and Togeshita burins (Yoshizaki 1961), are also made on flakes but are not bifacially worked. They are illustrated as Figure 3B. The ventral surface of the flake is nearly always the reverse face of the core, though it occasionally forms the obverse face, and it receives little or no facial retouch. The platform is produced by a burin blow along one long margin and spans 50-100 percent of the platform element. The obverse-reverse juncture in the platform element, when it occurs, is a unifacially flaked edge on which the flaking sometimes becomes so steep that it can be described as a laterally flaked part of the platform itself. More frequently, however, the platform consists entirely of a longitudinal burin facet on the proximal end of which blows are struck to remove microblades.

It is not necessary, for our purposes, to make the subtle distinction between

Towarubetsu and Togeshita burins. They, along with the Oshorokko burin, are widespread in Hokkaido between about 12,500 B.P. and 11,500 B.P.

Another technique in Hokkaido, which I have named the Horoka technique (Morlan 1967a: 173), is less clearly defined on the basis of a few presumably unfinished specimens and numerous observations of peculiar flake scar truncations. As shown in Figure 4, a flake as long as 20 cm or longer is detached from a large cobble or nodule, and its ventral surface, instead of forming a face of the core, forms the platform. Thus the platform is produced first, and the faces are formed by striking blows on this platform until two more or less parallel edges take shape. As a result the scars which form the faces of the core are not truncated; their bulbs may be seen intact along the edges of the platform; and the wedge is formed by the intersection of the scars from the two faces. Finally, the microblades are detached by blows at the end of the platform. In contrast to the Yubetsu technique, the wedge often lacks any direct flaking and frequently consists partially of a small cortical surface, and the blow which forms the platform can be struck in any direction relative to the final long axis of the platform. The Horoka technique appears at the very beginning of the known sequence of preceramic industries in Hokkaido. In the earliest sites (around 17,000 B.P.), it is used for the production of boat-shaped tools which differ from wedge-shaped cores only in the absence of fluting on one end and which appear to have been utilized as a kind of keeled scraper. Soon thereafter fluting appears on these specimens, and wedge-shaped cores made by the Horoka technique continue to appear until about 12,000 B.P. (Morlan 1967a: 200). In the form of wedge-shaped cores or boat-shaped tools, the Horoka technique occurs in association with all of the other techniques mentioned above. This ubiquity suggests that the Horoka technique might be subdivided in order to be made comparable to the other techniques, but this will require much more labora-

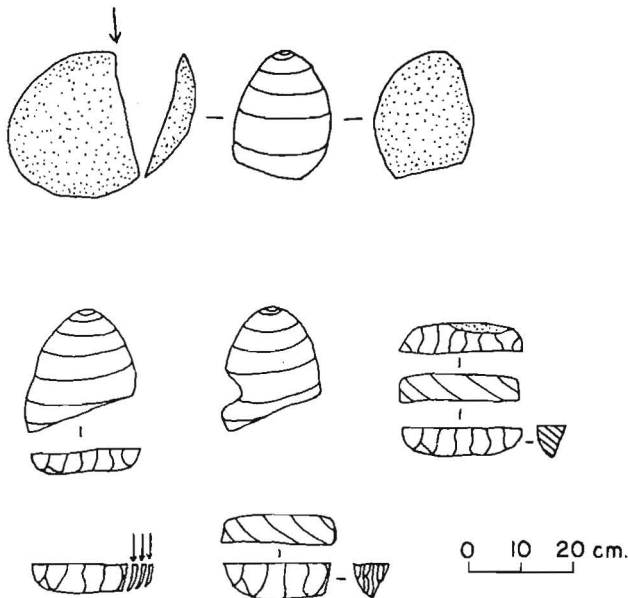


Fig. 4 Schematic drawing of Horoka technique (redrawn after Morlan 1967a: Fig. 6).

tory work since its waste flakes are less easily recognized than the distinctive ski spalls of the Yubetsu technique.

Finally, it should be mentioned that a number of unique wedge-shaped cores occur in Hokkaido, though their number is far less than might be expected. Several specimens are made on cobbles by simply striking a platform with one or more blows and then detaching microblades; the faces of these specimens are variously worked, usually from the wedge, or they may be cortical. Such cores tend to have shorter platforms than flutes; two excavated specimens could be given estimated dates of 12,000 B.P. (Morlan 1967a: 190).

Having examined several manufacturing techniques in some detail, we can now touch more briefly upon other areas. Across the Sea of Japan in the Maritime Territory, the Tadusha site (Chard 1958: 15-16; Okladnikov 1965: 39; 1966) has produced a series of wedge-shaped cores and boat-shaped tools which appear, on the basis of published drawings, to have been made by the Horoka technique. Though geographically more distant, the Ushki site in central Kamchatka (Dikov 1965, 1968; Shilo, Dikov, and Lozhkin 1968) is even more significant because of its stratigraphy and radiocarbon dates. From levels 6 and 5a were recovered wedge-shaped cores which appear to have been made by the Yubetsu technique and with which are associated ski spalls and microblades as well as other artifacts. The next highest level, level 5, yielded a wedge-shaped core which Yoshizaki (personal communication in 1966) believes is an Oshorokko burin. A radiocarbon date of  $10,360 \pm 350$  B.P. (MO-345) has been obtained on charcoal from this level (Chard and Workman 1965: 150); this date and sequence agree well with the Hokkaido chronology.

Detailed comparisons between Hokkaido and the Baikal area seem inadvisable at this time since they could be based only upon published sources (summary in Morlan 1967a: 208). In air miles the distance is nearly equivalent to that between the east and west coasts of North America, and a range of mountains which intervenes seems in later times to have acted as a barrier between interior and coastal Siberia. It can be noted, however, that most wedge-shaped cores illustrated for sites in the Baikal region appear to be made on cobbles since one or both faces and sometimes even the platform are frequently cortical. The next most frequent class of techniques involves flake production, but even then the cores are seldom so elongate as the Hokkaido examples.

I am in a somewhat better position to mention the Shabarakh Usu materials from Outer Mongolia which constituted half of Nelson's original evidence (Berkey and Nelson 1926; Nelson 1926, 1935, 1937; Maringer 1963; Fairservis 1963). Though I would classify many Shabarakh Usu specimens as wedge-shaped cores, very few of them are closely similar to the Hokkaido cores. Generally speaking their shape is different, their manufacturing techniques are based upon the use of cobbles, and the uses to which the cores themselves were put probably differ from the functions of the cores from Japan. Platforms are nearly always shorter than the flute elements and frequently are shorter than the flute chord, that is, the straight-line distance between the lateral edges of the most lateral flutes. Flaking of the faces on many specimens originates entirely from the wedge, which more frequently forms an effective and apparently more often utilized cutting edge than in Hokkaido. The faces were almost always formed before the preparation of the platform. While the

use of cobbles as blanks for these cores is primarily controlled by the nature of the available raw material, and thus is of limited significance, the range of variation at Shabarakh Usu is significantly different from that in Hokkaido. The Mongolian specimens intergrade continuously from wedge-shaped cores to conical cores on the one hand and to tabular cores on the other. My definition of wedge-shaped cores is severely strained by this collection, and the lack of consistent landmarks on the non-wedge-shaped cores makes them impossible to describe with my attribute list. This is in marked contrast to the collections from Hokkaido in which nearly all the cores are either wedge-shaped or tabular or conical, with very few intermediate specimens. It is difficult to assess the significance of these differences, partially because we know so little about the age of Shabarakh Usu; scanty evidence would place it at the close of the last glacial period, probably somewhat later than comparable material in southern Siberia.

In Alaska, the Campus site was the first to produce wedge-shaped cores and constituted the other half of Nelson's argument (Nelson 1935, 1937; Rainey 1939, 1940). (Wedge-shaped cores from North America have been described in some detail in a more recent paper [Morlan 1970].) I am familiar with about twenty of these cores and would recognize manufacturing techniques based upon flakes as well as upon bifaces or bifacially worked flakes. A major difference between these cores and similar Hokkaido examples, however, is the method of preparing and rejuvenating the platform. Whereas the entire platform was usually removed in one piece in Hokkaido, the Campus site cores more often show multiple longitudinal blows or else lateral flaking, usually from the reverse face, truncated by a short longitudinal blow. There is also more abundant retouch on one or the other edge of the platform, usually associated with the flakes produced in platform preparation.

West (1967) has defined the Denali complex to include the Campus site as well as his Mt. Hayes and Teklanika material. The cores in the complex are very similar to one another, and, though they are based on flakes for the most part, I would also agree that their manufacturing process is very similar to the Yubetsu technique. They are even more similar to the flake-based techniques of Hokkaido which succeed the Yubetsu process. The major differences seem to reside in the more delicate treatment of the platforms and the consistently smaller size of the Denali specimens. A few cores from the Otter Falls site in southwest Yukon also fit well within this category.

At least two of the four wedge-shaped cores found in the Kukpowruk Valley by Solecki (1950) are remarkably similar to the Yubetsu technique specimens from Hokkaido and differ from members of the Denali complex mainly in size, proportions, and details of platform treatment. Other surface finds from the Brooks Range also fit this category as does the excavated specimen from Band 8 at Onion Portage (Giddings 1967: Fig. 142).

Two sites in Alaska thus far have yielded wedge-shaped cores in association with other forms which, like Shabarakh Usu, constitute a broad intergrading series. The first of these is Anangula (Laughlin and Marsh 1954; Laughlin and Aigner 1963), containing at least eight cores which can be described as wedge-shaped, as well as a large range of conical, cylindrical, tabular, and irregular forms. The variation of the wedge-shaped forms overlaps that of the Shabarakh Usu specimens and, like

Shabarakh Usu, the manufacturing techniques are based upon cobbles; but these are general similarities and there are few specific ones.

Cores from the other site, the Garden site from Healy Lake (McKenna and Cook 1968; Cook and McKenna 1968), show very detailed similarities to those from Shabarakh Usu, in spite of the fact that most of the Healy Lake wedge-shaped cores are made on flakes. The range of variation at Healy Lake extends from nearly conical specimens through wedge-shaped forms to tabular cores of the Tuktuk variety. Other similarities point elsewhere, however, as a few bifacially flaked specimens resemble the Denali material and one of the cores made on a large thin flake is nearly identical to the Togeshita burins of Hokkaido.

The other major group of wedge-shaped cores occurs in Alaska and elsewhere in the North American Arctic and characterizes the Arctic Small-tool Tradition (see definition in Irving 1962: 56; 1964). I have examined only about a dozen of these specimens, so I cannot speak in detail about them. One set of major differences between these and other Alaskan cores may be noted: the platform is usually formed first, often as the ventral surface of a flake; the faces are formed by blows struck along the edges of the platform and the bulbs in these scars are usually intact; and the wedge is frequently formed by the intersection of the blows which formed the faces and bears little or no direct flaking. It may be recalled that this sequence of steps characterizes the Horoka technique of Hokkaido and is in marked contrast to the process involved in the Yubetsu technique.

This leads me to a conclusion which may deserve closer scrutiny: (1) that the so-called Northwest Microblade Tradition, distributed for the most part in the interior of Alaska and the Yukon, is characterized by wedge-shaped cores with marked similarities to the Yubetsu technique of Hokkaido and possibly the Ushki site as well as to sites in the Baikal region of southern Siberia; (2) that the Arctic Small-tool Tradition, in technological and distributional contrast to the Northwest Microblade Tradition, possesses cores with greater similarity to the Horoka technique of Hokkaido; and (3) that at least two Alaskan sites are characterized by a range of variation in core manufacture which in the Old World is best expressed at Shabarakh Usu.

It is tempting to speculate concerning the possible significance of these comparisons, but I think it would be unwise to do so. Time has not permitted a discussion and comparison of the artifacts associated with these wedge-shaped cores, but I am willing to state flatly that the associated complexes differ markedly; this is to be expected since we have leaped through some 5000 miles and twice as many years. I am unable to link confidently any two regions except possibly Hokkaido and central Kamchatka. Though I am convinced that the resemblances discussed above are results of close technological connections throughout this region, I am compelled to conclude, at the present time, that even closer links of more than technological significance will eventually come to light in the numerous areas of Siberia and Alaska which have yet to yield to the archaeologist.

#### ACKNOWLEDGMENTS

This paper was presented to the 33rd Annual Meeting of the Society for American Archaeology in Santa Fe, New Mexico, May, 1968. It is published here with only



a few minor grammatical changes and with gracious thanks to our Japanese hosts (enumerated in Morlan 1967a) and to Douglas D. Anderson, John P. Cook, Walter A. Fairservis, William N. Irving, William S. Laughlin, and Frederick Hadleigh West for allowing me to examine their archaeological collections. C. S. Chard deserves special acknowledgment since this research could not have been accomplished without his guidance and his extensive library of Japanese and Russian literature. In 1968 I did not expect to publish this paper, and it has only now been dusted off because of its role in an experimental procedure presented in the form of a color videotape at the symposium reported in this volume. The videotape (Bonnichsen, Morlan, and Keenlyside 1975), now available for distribution, focuses upon the experimental duplication of the Yubetsu and Horoka techniques described in this paper. We do not regard this effort as a definitive replication since the knapper (Bonnichsen) has not had an opportunity to conduct firsthand studies of the Hokkaido preceramic materials. We believe, however, that the basic techniques have been faithfully reproduced, and we were gratified to find that even the metric characteristics of the microblades from these two techniques match their Japanese counterparts quite exactly.

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