THE ORIGIN AND EARLY DEVELOPMENT OF AXE-LIKE AND EDGE-GROUND STONE TOOLS IN THE JAPANESE PALAEOLITHIC

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Edge-ground and ovoid axe-like stone tools are unique features of the Japanese Late Palaeolithic. Over 200 examples of axe-like stone tools have been reported so far and about 60% of them are edge-ground. The vast majority of both the ground and the unground types of axe-like tools date to the earliest phases of the Late Palaeolithic, predating c.23,000 BP. The oldest examples are found in South Kanto in eastern Japan and may exceed 30,000 years in age. The technology diffused from Kanto to all other regions of Honshu and Kyushu, but it also disappeared earlier in Kanto than elsewhere. After a long hiatus from c.23,000 to 15,000 BP, with no evidence of axe-like and edge-ground tools, a few again appeared in sites in the central mountains. The function of these tools is not known.

INTRODUCTION

Human settlement of the Japanese islands began by at least 30,000 BP. These early people arrived from the Chinese mainland, but from the beginning they developed a unique technology using edge-grinding to produce sharp blades on axe-like stone tools. Such early development of ground stone tools is unknown outside of Japan, except for a few examples reported in Australia.

When the first edge-ground stone tool was discovered at Iwajuku in 1949 it was very controversial. But recent work in the excavation of sites dating to the early part of the Japanese Palaeolithic has confirmed over 200 more axe-like and edge-ground stone tools stratified below the AT marker tephra, giving them certain ages predating 21,000-22,000 BP. Now a fairly clear picture of the chronology and distribution of these unique tools can be described.

HISTORY OF RESEARCH

Iwajuku was the first Palaeolithic site to be confirmed in Japan. When it was excavated in 1949, two axe-like stone tools (then called ovoid hand axes) were discovered in the deepest cultural layer, Iwajuku I. One of these tools showed signs of grinding. This tool became the centre of a lively argument: was it purposefully ground, or was the grinding an

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FIGURE 1: DISTRIBUTION OF AXE-LIKE AND EDGE-GROUND STONE TOOLS OLDER THAN 20,000 OR 21,000 BP

accident of use or possibly not grinding at all? Did this ground stone tool mean that this culture was a non-ceramic Neolithic one, or a Mesolithic culture, or did this unique tool really belong to the Palaeolithic?

In time, more examples were found and their contexts left no doubt that they dated to the Palaeolithic. Finally, in the early 1970s, an edge-ground axe-like stone tool was found at the Kurihara site in Tokyo, in a deep stratum of the Tachikawa Loam. This find confirmed the very early age of ground stone tools and prompted the first attempt to summarize their chronology and distribution (Oda and Keally 1973; Oda 1976).

Shortly after that, geological research began to identify the AT marker tephra in sites all over Japan, except in Hokkaido, and showed this tephra to be 21,000 to 22,000 years old (Machida and Arai 1983). This tephra has been a major aid in chronological studies in the Japanese Palaeolithic.

During the past 15 years numerous additional axe-like and edge-ground stone tools have been recorded in many parts of Japan. But these have served only to increase the number of known examples; all this additional information has not made any fundamental change in the ideas we presented in 1973.

AXE-LIKE AND EDGE-GROUND STONE TOOLS

Distribution and Chronology

There are two types of ovoid axe-like stone tools found in Japanese Palaeolithic sites: one is edge-ground, the other is not. We recently reviewed the literature on these tools (Hiraguchi 1989; Hokuriku Kyusekki 1989; Magara 1989; Matsumura 1988; Matsuzawa 1985; Miyashita 1985; Nagasaki 1990; Shiraishi 1990; Sunada 1983, 1989). More than 200 have been reported, roughly 60% of them edge-ground (Matsumura 1988:37). It is now quite certain that the vast majority of these tools predate the AT marker tephra and that the oldest are from sites on the Musashino Upland in Tokyo (Figures 1 and 2). These tools are found in all regions of Honshu and in Kyushu, but not in Hokkaido or Shikoku.

The oldest individual examples are the eight from Stratum Xb at the Musashidai site (Figure 3) in western Tokyo (Toritsu Fuchu Byoinnai 1984; Keally and Hayakawa 1987). Six of these were edge-ground (Figure 3a,b,c,d and e) and two were not (Figure 3f and g). Probable whetstones have also been identified in this assemblage (Miyashita 1985). No absolute dates are available yet for the Musashidai Xb materials, but they very likely predate 30,000 BP and might be as old as 35,000 BP. All of the other Phase Ia (>27,000/30,000 BP) finds of axe-like and edge-ground stone tools in Japan are from sites in South Kanto, in the Tokyo, Kanagawa, Chiba and Saitama prefectures.

During Phase Ib (c. 27,000/30,000 to 23,000 BP) the technology diffused to all other regions of Honshu and to Kyushu (Figures 4 and 5). But for unknown reasons, the technology of edge-grinding was dropped from the repertoire in South Kanto about the middle of Phase Ib, and in all other regions by the end of Phase Ib.

There are no axe-like or edge-ground stone tools reported from sites that date to Phase Ic (23,000 to 19,000 BP), and only one in South Kanto from a Phase IIa (19,000 to 15,000 BP) site. Then in Phase IIb (after c.15,000 BP) the grinding technology was taken

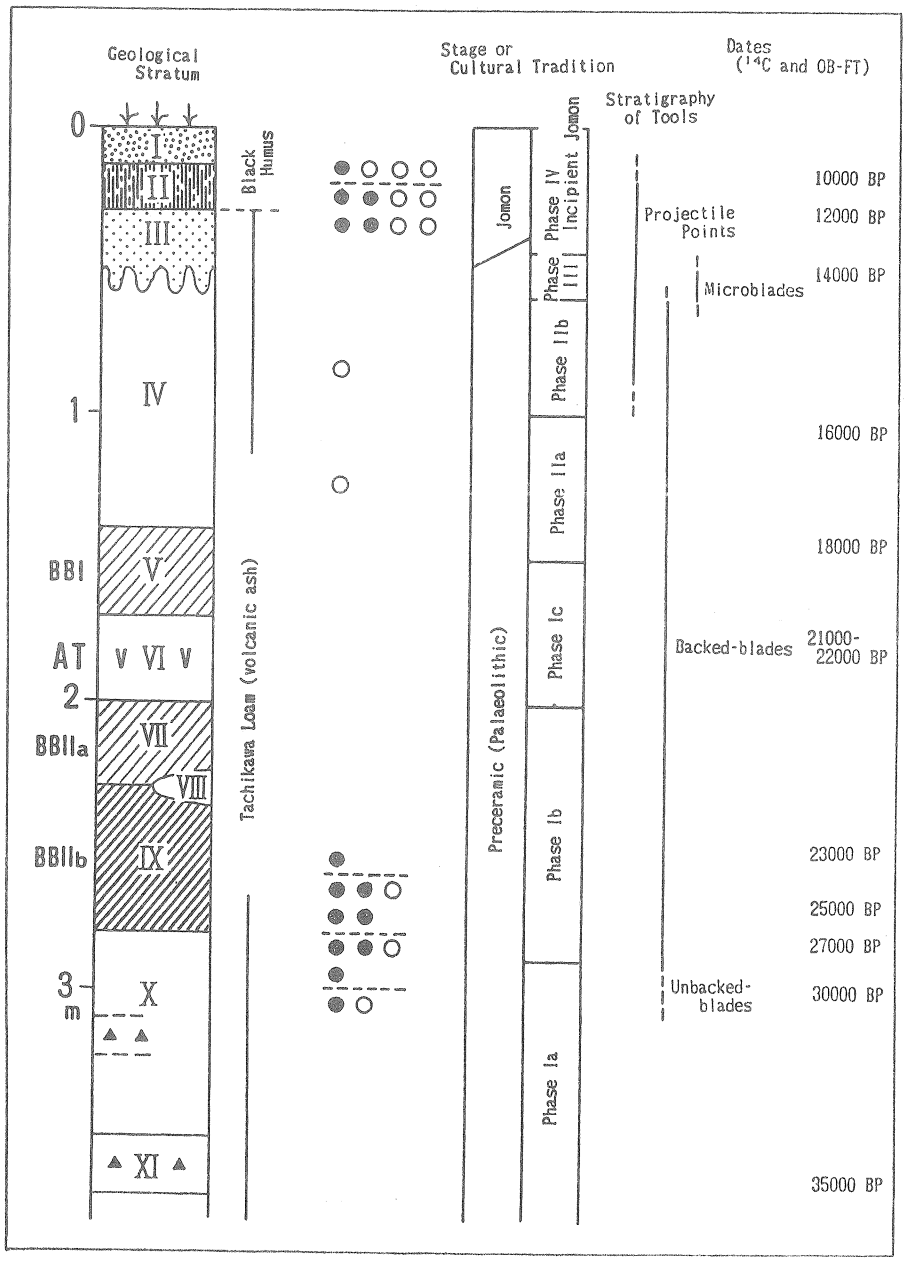

FIGURE 2: STRATIGRAPHIC CONTEXT AND CHRONOLOGY OF AXE-LIKE AND EDGE-GROUND STONE TOOLS FROM SITES ON THE MUSASHINO UPLAND IN TOKYO

Closed circles are edge-ground tools; open circles are simply chipped axe-like tools. Each dot represents 1-5 tools.

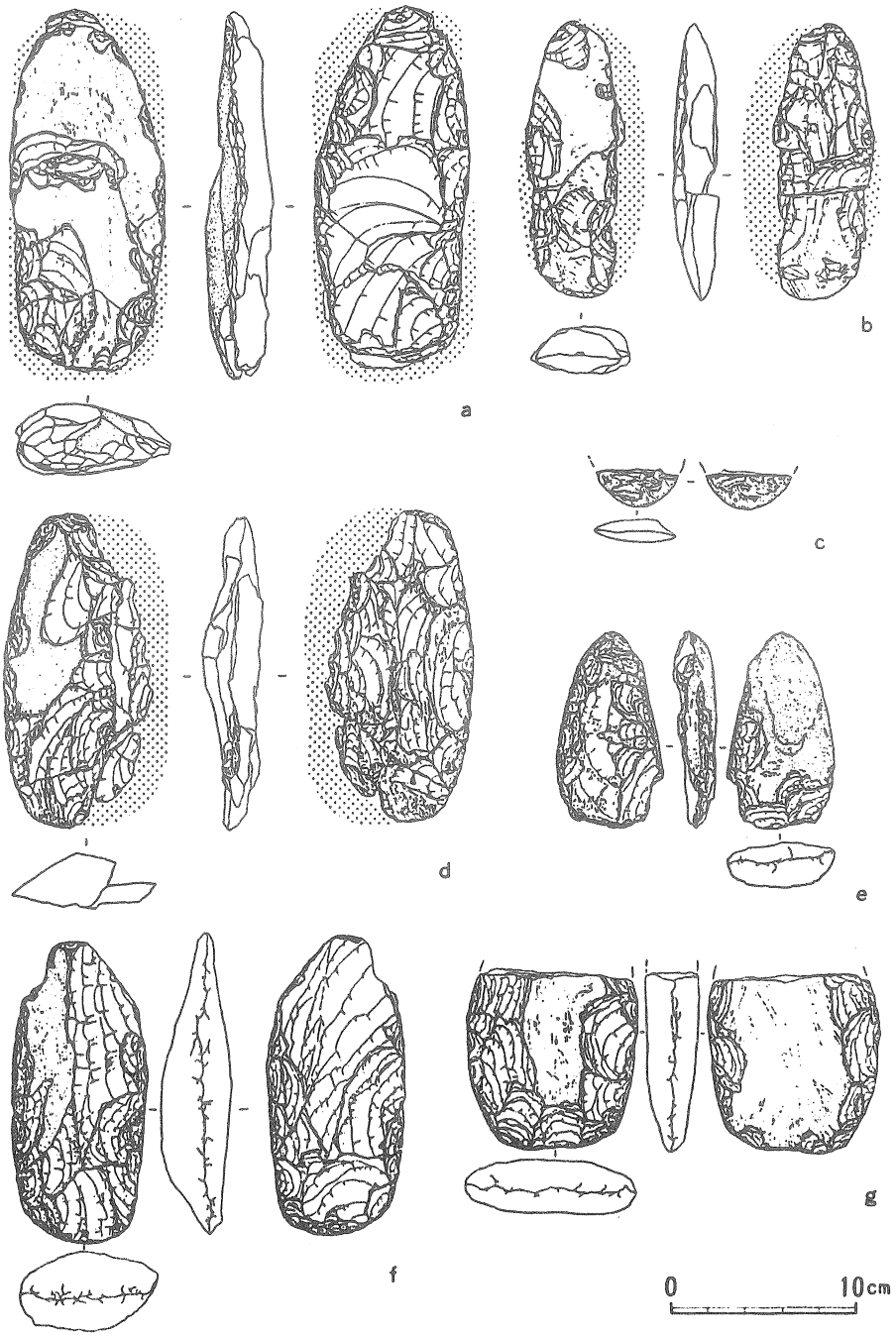

FIGURE 3: AXE-LIKE AND EDGE-GROUND STONE TOOLS FROM PHASE Ia (>30,000 BP), MUSASHIDAI Xb

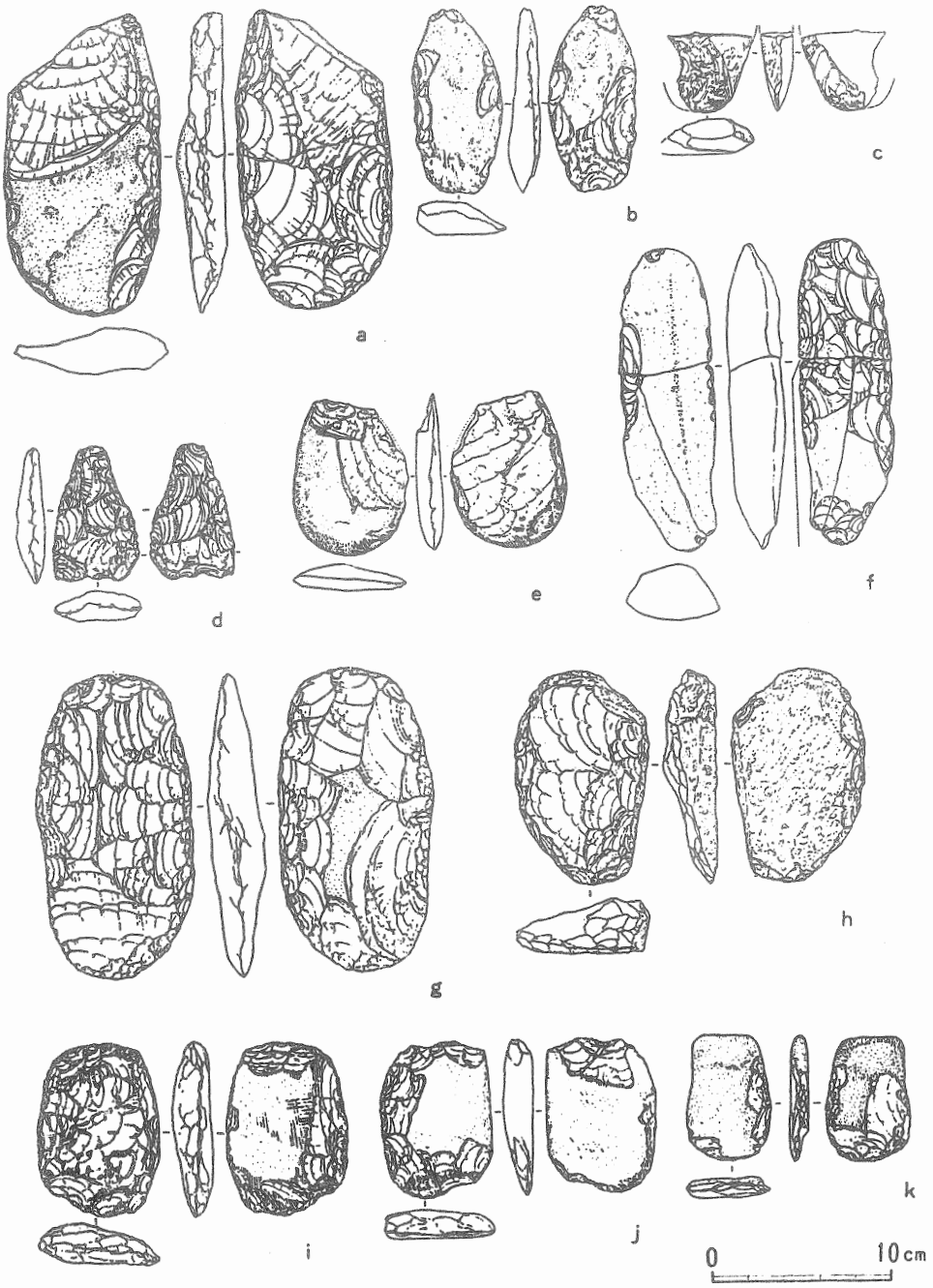

FIGURE 4: AXE-LIKE AND EDGE-GROUND STONE TOOLS FROM PHASE Ib (28,000 - 30,000 BP)
(a-c) Takaido Higashi X; (d) Musashidai Xa; (e) Kurihara X; (f) Shimoyama X; (g-k) Suzuki X.

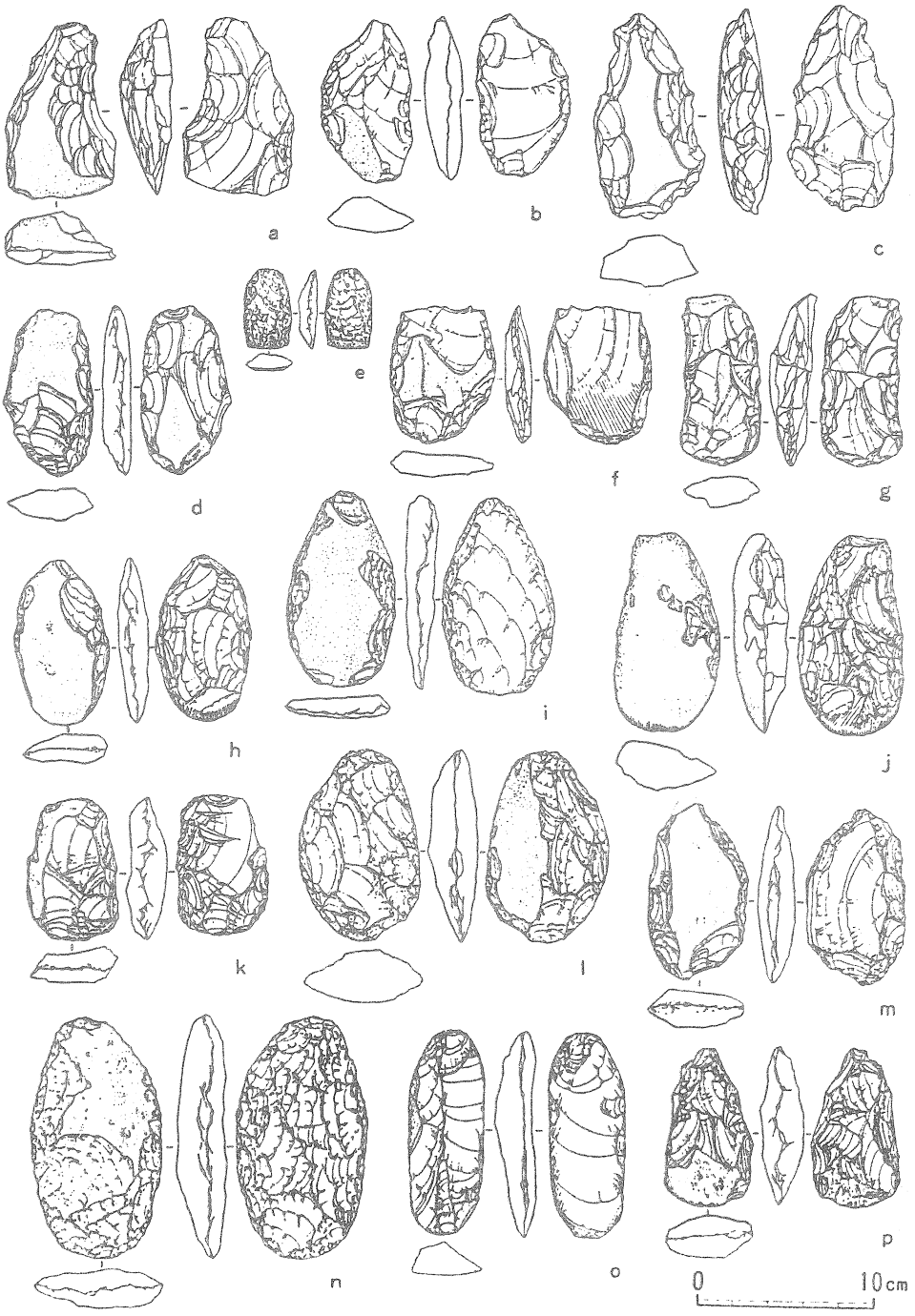

FIGURE 5: AXE-LIKE AND EDGE-GROUND STONE TOOLS FROM PHASE Ib (24,000 - 28,000 BP) (a-c) Tamonjimae IX; (d-e) Takaido Higashi IX middle; (f-g) Hakeue IX; (h) Shimozato Honmura IX; (i-p) Suzuki IX.

up again, beginning in the mountains of northern Chubu. The literature is confusing on the occurrence of such tools with the succeeding microlithic culture, but some microlithic sites do yield them. Partially ground adze-like stone tools mark the following post-microlithic culture in eastern Japan.

Functional Studies

As far as we can tell from the literature, no scientific analysis of the function of these axe-like and edge-ground stone tools has ever been conducted. There seems to be a feeling, however, that they were not axes. The older examples tend to be larger than the younger ones (Figures 3,4 and 5) and many show signs of reduction along the sides rather than along the blade (shaded areas in Figure 3). This "damage" might indicate use behaviour. These tools also appear to be prepared for hafting as adze or hoe blades rather than as axe blades.

Some researchers postulate use of these axe-like and edge-ground tools as implements for working bone or tusk instead of wood, on the basis of their supposed correlation with the extinction of Naumann's elephant. In fact, we could not find any clear statement of the age and location of the youngest dated fossils of Naumann's elephants in any region of Japan where these axe-like and edge-ground tools are reported.

Apparently, however, at Lake Nojiri in the central mountains of Honshu, Naumann's elephant did become extinct about 23,000 to 24,000 BP (Nojiriko Chishitsu Gurupu 1990; Nojiriko Honyurui Gurupu 1990), at roughly the same time that the axe-like and edge-ground stone tools disappear from the archaeological record. But this temperate elephant probably did not become extinct as early in the Kanto lowlands, where axe-like and edge-ground tool production stopped before it did in the central mountains. In other words, there does not seem to us to be a correlation between Naumann's elephants and axe-like and edge-ground tools; the function of these tools remains a mystery.

External Parallels

Sites belonging to our Phase Ia (>27,000/30,000 BP) yield the oldest fully accepted artifacts in Japan. Older materials, the so-called "Early Palaeolithic", are uncommon and highly controversial. Late Palaeolithic sites dating near this boundary between the controversial and the fully accepted are characterized by stone tools made with a unique technology, edge-grinding. This phenomenon of a unique technology appearing with the earliest fully accepted culture in a major region of the world has a definite parallel in the Americas, where controversial pre-Clovis materials predate the unique fluting technology of the fully accepted Clovis culture. Is there also a parallel in the early edge-ground axe-like tools reported in Australia?

Founder effect might explain both (all three) occurrences. The Japanese Early Palaeolithic and the American pre-Clovis materials are either geofacts or the remains of sparse populations with cultures very different from their successors. But either way they did not contribute to the succeeding Late Palaeolithic and Clovis cultures. These new cultures in Japan and America might have arrived with small pioneering populations in

which a rare behaviour, not detectable in the archaeological record in the homelands, became a common behaviour through a cultural mechanism similar to the genetic founder effect.

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