THE ORIGIN OF EARLY POTTERY IN NORTHEAST ASIA IN THE CONTEXT OF ENVIRONMENTAL CHANGE

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ABSTRACT

At present, the earliest pottery in the world occurs in northeastern Asia. The first pottery appeared during the transition from the Late Pleistocene to the Early Holocene as a result of new subsistence practices provoked by climatic changes. On the basis of technological features and accompanying lithic assemblages, early pottery may be divided into two groups: Northern (Amur River Basin, Japanese Archipelago) and Southern (the south of China). This distinction may be a result of variations in paleoeconomy; in the north invention of pottery may have been stimulated by the shift from nomadic hunting to a semisedentary life due to more active use of riverine resources. In the south pottery appeared with primitive forms of agriculture. Once present, pottery use spread very quickly.

INTRODUCTION

Prior to the 1960s, the earliest form of pottery in the Angara-Baikal was considered to be one of the oldest forms in northeastern Eurasia. This assumption was based upon typological associations of prehistoric ceramics with stone tool assemblages constructed by A. P. Oladnikov. These typologies related to the origins of early Neolithic cultures in Siberia and the Far East and suggested that the earliest forms of ceramics originated 4,000 years B.P. (Oladnikov 1950). Early research in to the origins of Jomon ceramics relied upon comparisons with the Siberian data and formulated typologies for Japan that suggested an origin of approximately 5,000 years ago (Yamanouchi 1969).

The excavation and discovery of pottery at Fukui cave on the southern most Japanese Island of Kyushu altered these early conceptions dramatically. This site was excavated by Serizawa and Kamaki in 1960 and yielded stratified remains of human occupation from the Middle Paleolithic to the Early Jomon Period (Serizawa 1979:340-349). The site yielded several styles of ceramic decoration in direct association with different lithic traditions. The first layer contained rotated stump pottery in association with small flat-based arrow points. The second layer contained fingernail incised pottery and wedge-shaped microcores and microblades. The third layer contained pottery with linear band applique which was also accompanied with microblade type tools (Figure 1). Radiocarbon dates indicate the oldest ceramic bearing layer to be 12,400 $\pm$ 350 (Gak949) and 12,700 $\pm$ 500 (Gak950) years B.P. The layer beneath the third layer was without ceramics and possessed semi-prismatic microcores, microblades, unifacial scrapers, burins and points.

Thus, this site clearly demonstrated the consecutive transition from microblade industry to that of arrowheads in the Late Pleistocene and the emergence of pottery during the final stages of the microblade tradition. This has led to the formation of a chronologically based typology of early microblade tradition to that of a microblade tradition in association with appliqued ceramics to that of bifacial arrowheads in association with non-decorated ceramics and finally cord-marked pottery (Kurishima 1995:117-129). It is felt that the transition of lithic traditions and the origin of ceramics during this period is directly related to climatic changes in the post-glacial period and subsequent alterations in subsistence strategies.

EARLY POTTERY ON THE JAPANESE ARCHIPELAGO AND ITS RELATIONSHIP TO THE CONTINENT

The antiquity of ceramics dating to the Final Pleistocene has been confirmed by a number of

other sites on Honshu and Shikoku Islands. The most significant sites are Senpukuji, Isigoya and Kamikuroiwa. Dates from the 6th layer of Kamikuroiwa are 10,085 B.P. (B320 I-943) and the 9th layer at 12,165 B.P. (B600 I-947) (Figure 1). At this time the microblade industry was prevalent throughout Japan. This lithic technique may have entered Japan either from the Korean Peninsula in the south or from Primorye and Sakhalin in the north (Serizawa 1975:92-102). Between 12,000 and 13,000 B.P. these microblade industries were replaced with small bifacially flaked tanged and leaf shaped projectile points.

The appearance of ceramics in the Far East corresponds with the climatic amelioration during the Final Pleistocene and the transition from tundra and coniferous forests to that of broad-leafed forests. This transition took place in a south to north direction between 12,000 and 10,000 years B.P. (Kurishima 1995; Kajiwara 1996:92-98, 1998). The spread of pottery northward from Kyushu to the Island of Honshu was largely associated with the tanged and leaf-shaped point lithic industries, as revealed at the sites of Maedakochi, Shimomouchi, Katsusaka, Kamino, Nasunahara, and Hanamiyama which yielded dates of 10,280 B.P. (B550) and 11,360 B.P. (B650 by thermoluminescence). The ceramic types found in these sites correspond to those identified at Fukui Cave (Figure 1). The concentration of early ceramics in the south, as well as the discovery of the Kosanri site with early ceramics in Korea (Li 1996:155-161), suggests the likelihood of a diffusion route from the Korean Peninsula.

The microblade industries of Japan can be typologically divided into two main groups. The north is characterized by microcores made on bifacial preforms called Yubetsu, along with araya-type burins and boat-shaped microcores. This industry is most directly associated with the lithic tool industries of Eastern Siberia and the Russian Far East. In the south there are semi-prismatic microcores of the Yadegawa type (Serizawa 1975:92-102). These early industries were subsequently replaced by bifacial point types of Yanagimata in the south and the Tachikawa type in the north.

This northern and southern dichotomy in lithic industries suggests the existence of two distinct cultural traditions in Japan during the Final Pleistocene. There are some indications that ceramics may have developed independently in the northern regions of Honshu and Hokkaido during the Pleistocene-Holocene transition. In the site of Okaiyamomoto 1 ceramics have been dated to 12,000 years B.P. by association with volcanic ash tephra deposits (Miyake et al. 1979). These ceramics exhibit a coarse preparation with undecorated surfaces and their poor preservation prevents comparison with southern types. The Higashi-Rokugo site on Hokkaido has also yielded similar ceramics in association with tanged projectile points, as has the Shimomouchi site, which has been dated to at least 15,000 B.P. by tephra-chronology techniques.

EARLY POTTERY COMPLEXES IN THE AMUR RIVER BASIN

The lithic industries and ceramic types found in northern Japan at the Pleistocene-Holocene transition are analogous to those of the Osipovka Culture from the Amur River Basin. This is a vast territory that extends from the Mongolian plateau down to the Sea of Okhotsk (Figure 2). The environment of this river basin was similar to that of Hokkaido and northern Honshu during the Final Pleistocene and may partially explain the commonly shared lithic tool assemblage and subsistence focus. This linkage places further emphasis on the importance of the discovery of early pottery in the Amur River basin and its relationship to the early ceramics found in Japan.

The Amur River flows through the Trans-Baikal Valley between the Yablonoi Mountain range and the Mongolian plateau and forms the Russian-Chinese border. The Trans-Baikal forms the eastern part of Lake Baikal. Usti-Karenga and Usti-Kyakhta are located in the Trans-Baikal on the upper reaches of the Lena River basin, which parallels the upper tributaries of the Amur. Inter-communication between these river systems through the mountain passes during prehistoric times would not have been difficult. While the pottery fragments from Usti-Kyakhta are not sufficiently preserved to be typed, they have been dated to 12,595 $\pm$ 50 B.P. (SOAN 1553) and 11,505 $\pm$ 100 (SOAN 552). The ceramics from Usti-Karenga are better preserved and

exhibit horizontal running zig-zag lines incised by a comb-like instrument and herringbone stamping under the rim on the exterior, and horizontally scratched lines on the inside (Vetrov 1985). The Usti-Karenga pottery is dated to 11,240 ± 180 B.P. (GIN8066) and 10,750 ± 60 (GIN8067) (Figure 3). The lithic industry which accompanies these ceramics is represented by wedge-shaped microcores, araya burins and bifacial scrapers.

The archaeological material from the Amur River basin have yielded evidence of the consecutive development of a unified Paleolithic tradition dating from the Sartan glaciation to the Early Holocene. The stratified sites of Usti-Ulima 1 and 2, located on the Selemzha River which is a tributary of the Amur, are considered to be type sites for this period (Derevyanko and Medvedev 1995:7-9). The Selemzhinskaya Culture provides a fine example of cultural transformation from the Paleolithic to the Early Neolithic. This cultural tradition is typified by ceramics dating from 12,000 to 10,000 B.P. in association with laurel-leaf bifacial points and wedge-shaped microcores. The Selemzhinskaya Culture provided the basis for the emergence of the Final Pleistocene Osipovskaya cultural tradition, which spread throughout the Amur River basin in a variety of different forms (Derevyanko and Zenin 1996:78-82).

The most recognized site of the Osipovskaya Culture is Gasya, which possessed ceramics from two stratified deposits dating to 12,960 ± 120 (Le1781) from the lower horizon, and 11,340 ± 60 (GEO1413) and 10,875 ± 90 (Le13393) from the upper stratum (Derevyanko and Petrin 1995:13-25). The Gasya 1 type of ceramics is typified by thick and brittle walls, horizontally running scratches inside the wall, and vertically scratched or a wiped exterior with what was likely cord wound on a stick. Gasya 2 type pottery had a fairly well burnt wall and cord-marked ornamentation on the rim and surface. This pottery is associated with wedge-shaped microcores, laurel-leaf bifaces, tanged points and bifacially retouched adzes.

Another site which contains pottery and is located in the Amur Region is Goncharka 1 which is dated to 12,500± 60 B.P. (LLNL102168) for the lower horizon, and 9,890 ± 230 B.P. GaK18981) and 10,590 ± 60 B.P. (LLNL102168) for the upper horizon (Shevkomud 1996:237-248, 1997). Pottery from Goncharka 1 is divided into 3 types. The first resembles that found at Ustinovka 3 in that there is a row of perforations just below the rim. The second type has zig-zag lines similar to that found at Usti-Karenga in the Trans Baikal. The third type has thick walls and vertical scratches on the surface with horizontal scratches on the inside similar to the Gasya 1 type. The discoveries at Goncharka 1 have permitted the linkage of ceramic traditions spanning from the Trans Baikal, through the Amur Basin, and into the Primorye coastal region. In addition to the Goncharka 1 site, other sites with early ceramics have been identified on the Amur. These include the Khummy site with Gasya and Osipovka type lithics with two early dates of 13,260 ± 100 (AA13392) from the lower horizon and 10,345 ± 110 (AA13391) from the upper horizon (Lapshina 1995:104-106).

In the upper and middle Amur Region two Early Neolithic cultures have been defined. These include the Novopetrovskaya and the Gromatukhinskaya cultures which date to approximately 9,000 to 10,000 years ago (Oladnikov and Derevyanko 1977:134-198). Novopetrovka lies on the left bank of the Amur near Blagoveshchensk. At this site sophisticated blade techniques provided blanks for blade arrowheads and other blade tools. Pottery with linear band ornamentation is associated with it. Derevyanko dated this cultural tradition to about 10,000 B.P. through analogy with the site of Busse (Derevyanko and Petrin 1995).

The Gromatukha site on the Zeya River is a stratified site with three cultural levels and dates to the Final Pleistocene. The lithic industry from this site is analogous to the Osipovka Culture (Okladnikov and Derevyanko 1977). Derevyanko has assigned the Gromatukha site to the final stage of the Osipovka culture dating around 8,000 to 10,000 B.P., and it is considered to slightly postdate the Novopetrovka Culture (Derevyanko and Petrin 1995). Gromatukha pottery is decorated by rotated cord (Kani 1992), and is perforated under the rim, with inside scratches. Along the Ussury River basin, which is a tributary of the Amur, the Xiaonanshan site in Heilongjiang province of China might be a variant of the Osipovka Culture. The site contains a lithic assemblage of laurel-leaf bifacial points, tanged

points and adzes, along with pottery with a close resemblance to that of Gasya.

While, in the maritime region, the earliest pottery was discovered at Ustinovka 3 for the first time as a result of Russian-Japanese joint works in 1995 (Kononenko 1996:117-137). This pottery was burnt at a comparatively low temperature. It has no ornamentation except the row of perforations under the rim and shallow horizontal scratches on the inside surface (Figure 3). The associated lithic assemblage exhibits a developed laurel-leaf bifacial industry, which resembles that of Osipovskaya Culture in Russia and the Japanese Final Paleolithic (Kononenko 1994:108-148). However, the microblade industry has already disappeared. Although Optical-stimulus Luminesscence dating yielded a date of 10,500 years B.P., typologically this site appears to date between 11,000 and 9,000 years B.P. (Garkovik 1996:58-67; Kononenko 1994:108-147; Kajiwara 1996:99-100).

The Ustinovka pottery type is similar to that found in Japan. Pottery with perforations around the rim is also found in the Jim site in Niigata, Japan. Also, pottery with scratched inside preparation is characteristic of that found in the Katsusaka site in Kanagawa, Japan. A reconstructed profile of the pottery indicated a rectangular shape similar to those commonly found in Japan.

Based upon manufacturing technique, surface treatment and ornamentation styles, it has been possible to link the ceramic traditions spanning the areas of the Trans-Baikal through the lower Amur River and into Japan. It is evident that this cultural tradition existed coincidentally along the length of the Amur River basin and nearby river systems and into Japan throughout the Final Pleistocene. Generally speaking, the Amur river served as a powerful conduit for the spread of information and technology throughout this region during prehistoric times.

THE NEOLITHIC TRANSITION

Paleobotanical data at the beginning of the Holocene indicates a broad-leaf birch and oak forest with elements of conifers covering the vast geographic region of Priamurie, Primorye, Sakhalin, Hokkaido and northern Honshu (Korotkii et al.1996:35-36; Kononenko and Garkovic1997:77-88). This is in considerable contrast to the forest tundra landscape of the Final Pleistocene. This expansion of deciduous forests is seen to coincide with the invention of pottery. This relationship of climatic amelioration, in association with a closed forest habitat of small game and an enriched botanical array, is assumed to be linked the origin of pottery in Northeastern Asia. The precise causal linkage of these processes, however, is still a matter of debate. Early pottery is spread over a wide and diverse area of northeast Asia and a number of alternative uses have been envisioned. In northern Eurasia, pottery may well have been employed both for cooking and also in various manufacturing activities such as the rendering of fish oils, the processing of bones for glue, and the preservation of meats for storage. All of these uses have been recorded in ethnographic settings. Especially important among northern Eurasian groups was the rendering of fish and meat oils as a dietary supplement (Kato 1986). These models must be tested against the data obtained from ethnographic research in the regions of the Amur and Lena River Valleys.

In the Lower Amur region the Osipovskaya Paleolithic Culture transitioned into the Malyshevskaya Neolithic Culture, which possessed both well developed pottery and pit-dwellings (Derevyanko and Medvedev 1995:7-9) (Figure 4). In the Upper Amur region of China, the Anaxi Culture is presently the earliest known Neolithic complex in this region dating between 7,000 and 6,000 B.P. This culture is characterized by blade arrowheads in association with linear banded pottery and is assumed to have close relationships to the Novopetrovskaya Cultural Tradition (Alkin 1996:7-9).

Similarly, Neolithic cultures of the Maritime region also appear to originate around 7,500 years B.P. The earliest maritime adapted Neolithic expression known at the present time is the Boisman Culture. This tradition was situated on the Sea of Japan in western Primorye and yields evidence of pit-dwellings, burials and shell middens. In contrast, the slightly later Rudnaya cultural tradition is situated along the eastern

Primorye Coast and is comparable to the Early Jomon, dating between 7,000 and 6,000 years B.P.

At the present time, there appears to be an approximately 2,000 year gap between sites yielding Final Pleistocene pottery and the onset of fully developed Neolithic cultures in this region. In order to address this discrepancy, we must more precisely define the contexts of each known cultural tradition and develop improved techniques for their micro-analysis. This will require the dividing of the present typologically defined cultural traditions into shorter time ranges. Further, efforts to identify new sites that shed light on this period of transition must be intensified. At the present time, the scarcity of radiocarbon dates and ambiguity in the stratigraphic record serves as a hindrance in the formation of fine-grained chronological sequences for the development of early ceramics in this region.

THE EARLY POTTERY IN THE SOUTH OF CHINA

There also was another early pottery tradition in the south of China in Jiangxi, Guanxi and Guandong provinces (Figure 5). These contained the sites of Binbala, Nanninbaozitou and Fusuijiangsiyan in Guandong province, and also the sites of Dashachan, Cingtanzhubuyan and Huangganment 1-3 in Guanxi province (Jiao 1994:6-16). Most of these sites were located in caves with fine material preservation. The lithic assemblages included adzes, scrapers, bifacial tools and arrow points along with large quantities of bone tools. The pottery recovered from these sites exhibited a very coarse structure and was fired at low temperatures. Some pieces were decorated with cord markings or incised with a pointed implement. The majority of these sites date in the range of 9,000 to 8,000 years B.P., but there are some that fall in the 13,000 to 10,000 year range (Jiao 1994:6-16).

The best documented early ceramics in China come from the sites Xianrendon and Diaotonghuan in Jiangxi province. Both of these sites are located in caves and provide comparable stratigraphic data. At the Xianrendon site there were four cultural layers identified with a layer of roof-fall dividing the third from the second layers. These two layers appear to contain different lithic traditions. This allowed the separation of a possible seasonal occupation possessing a microblade industry and one of bifacial points in association with polished stone tools during a more stable occupation period. The first horizon from Diaotonghuan Cave, which is comparable to the same stratigraphic layers as Xianrendong Cave, is thought to represent a temporary hunting site for the same cultural group. The earlier cultural layer is thought to date to between 20,000 and 15,000 years B.P., and the later layer is situated in the 13,000 to 11,000 year range. At the time when pottery first appears the climate seems to have been dryer and colder. Ceramics seem to date in the range of 13,000 to 11,000 years ago, although one recent date appears older at 14,520 ± 140 B.P. (MacNeish 1996:15-35). These early ceramics are associated with polished and bifacially reduced stone tools. Ninety percent of the pottery exhibits cord marked decoration.

The quantity of plant remains in these sites, including wild rice, bamboo and acorns increases considerably during this period. Additionally, the faunal assemblage indicates that the subsistence focus had shifted to a wider range of resources including shellfish, small mammals, birds and plant gathering as compared to previous stages. Simultaneously, the presence of large mammal remains, such as the giant deer, decreased dramatically.

Rice phytoliths from both caves have been identified as mainly wild rice, but a small proportion of phytoliths may be that of domesticated rice (MacNeish 1996:15-35). If this proves true, then it appears that a new strain of domesticated rice may have appeared by this time, but it seems unlikely that it was being intentionally cultivated. Supporting evidence for rice harvesting appears in the form plant polish use-ware identified on a large mollusk shell which also possessed a single hole pierced through it. The above evidence strongly suggests that the subsistence economy had shifted away from that of hunting and possibly fishing to that of a more diversified foraging pattern which placed heavy emphasis upon the gathering of plants. Even during the coldest periods, this southern region supported a broad-

leaf deciduous forest cover which would likely have supported a semi-sedentary subsistence strategy. In contrast, the more northern latitudes were typified by a conifer and tundra landscape and required a nomadic existence through the hunting of migratory large game. Thus, the timing and motivations for the manufacture of ceramics in these diverse regions were most likely complex processes which responded to a number of different contextually conditioned variables.

DISCUSSION: A NEW MODEL FOR THE ORIGIN OF POTTERY MANUFACTURE AND DISPERSAL TO THE JAPANESE ARCHIPELAGO

The above data have led to the formulation of new models relating to the origin of pottery manufacture and dispersal to the Japanese Archipelago. In Japan, recent excavations show that by around 11,000 B.P. the semi-sedentary Jomon lifestyle had commenced on the southern island of Kyushu. This mode of subsistence included pit-dwellings, ceramics, and lithic tools adapted for the processing of plant resources such as acorns. Over time, this mode of subsistence spread from the southern to the northern latitudes of Japan as part of a climatic amelioration (Shinto 1998).

During the final glacial period in southern China, the landscape was dominated by a pollen assemblage of mixed forests consisting of conifers (*Abies, Pinus, Alnus*), mixed with deciduous broad-leaved trees (*Betula, Quercus, Ulmus, Tilia*), as well as grasslands of *Germineae* (Zheng et al. 1994). It is evident that even during the glacial maximum this area maintained a broad-leaved floral community including oaks which produced edible acorns.

In summary, it can be hypothesized that pottery was invented by Late Paleolithic people soon after the last glacial maximum in the region of southern China where deciduous broad-leaved forests persisted as patchy concentrations among conifers and grasslands. Accompanying an increasing emphasis on these scattered biotic communities it is likely that mobility strategies began to be de-emphasized in favor of one focusing upon more localized hunting, fishing, and gathering. As part of this transition, pottery manufacture might have emerged to address the need for processing and cooking of newly exploited plant, riverine and lacustrine resources. As the climate continued to warm, the landscapes dominated by deciduous forests appear to have spread to the more northern and eastern regions. It was this complex system of transition to new subsistence strategies which arrived in the Amur River basin in the Final Pleistocene and provided the foundation for the regional shift to Neolithic cultural traditions stretching from the Trans-Baikal to the maritime environments of Primorye.

The relationships between the early ceramic complexes throughout northeast Asia and southern China are still undefined. In the north, the first pottery originated during the shift from a forest-tundra environment to one dominated by broad-leaf trees. With the glacial retreat and the spread of dense deciduous forests, human subsistence strategies were forced to adapt to new demands as reflected in sequential changes in the lithic industries. The intensified exploitation of riverine resources appears to have been a major focus of this new economic orientation. At present, there is no direct evidence of specifically adapted fishing gear from these sites. However, the site of Maedakochi in Japan has yielded large quantities of salmon remains. In the Russian Far East the site of Ustinovka 3 has revealed stone fish effigies, and the Gasya site has yielded stone net sinkers. Such items begin to hint at the importance of fishing during the Final Pleistocene period. In the area of 55 degrees North Latitude, and farther north, several different species of salmon frequent the local rivers throughout the year and provide a potential basis for a semi-sedentary settlement pattern. This in turn would support the development of new technologies such as pottery.

After the first appearance of ceramics in the Amur River basin, this new technology spread rapidly throughout adjacent areas that shared similar environmental conditions. It is evident that the Amur River functioned as a major corridor of commerce in technologies and ideas during the Final Pleistocene (Kajiwara 1998). In contrast, it is evident that the occupants of south China never were subjected to the severe climatic oscillations of the north. Even during the glacial maximum

they had access to an enriched plant community and had the advantage of developing new subsistence strategies over extended periods of time. It should be appreciated that the causal factors for the adoption of ceramics in these diverse regions is a response to multiple factors which are specific to the particular environmental contexts. The coarse-grained nature of the data does not permit a fine-grained solution to these questions at the present time, but this should be a major focus of future research. The regions of eastern Eurasia, Priamurie, Primorye and China are still in the exploratory stage of data recovery. Anticipated discoveries pertaining to early pottery types and the onset of Neolithic modes of subsistence practices will continue to shed light on this problem.

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Fig.1 Representative sites with ancient pottery in Japan
1-8 Odaiyamamoto, 9-13 Higashirokugo, 14-20 Zazaragi, 21-26 Jin, 27-30 Tsukimino-Kamino, 31Hanamiyama, 32-37 Kamikuroiwa, 38-45 Fukui, 45-50 Sojiyama,

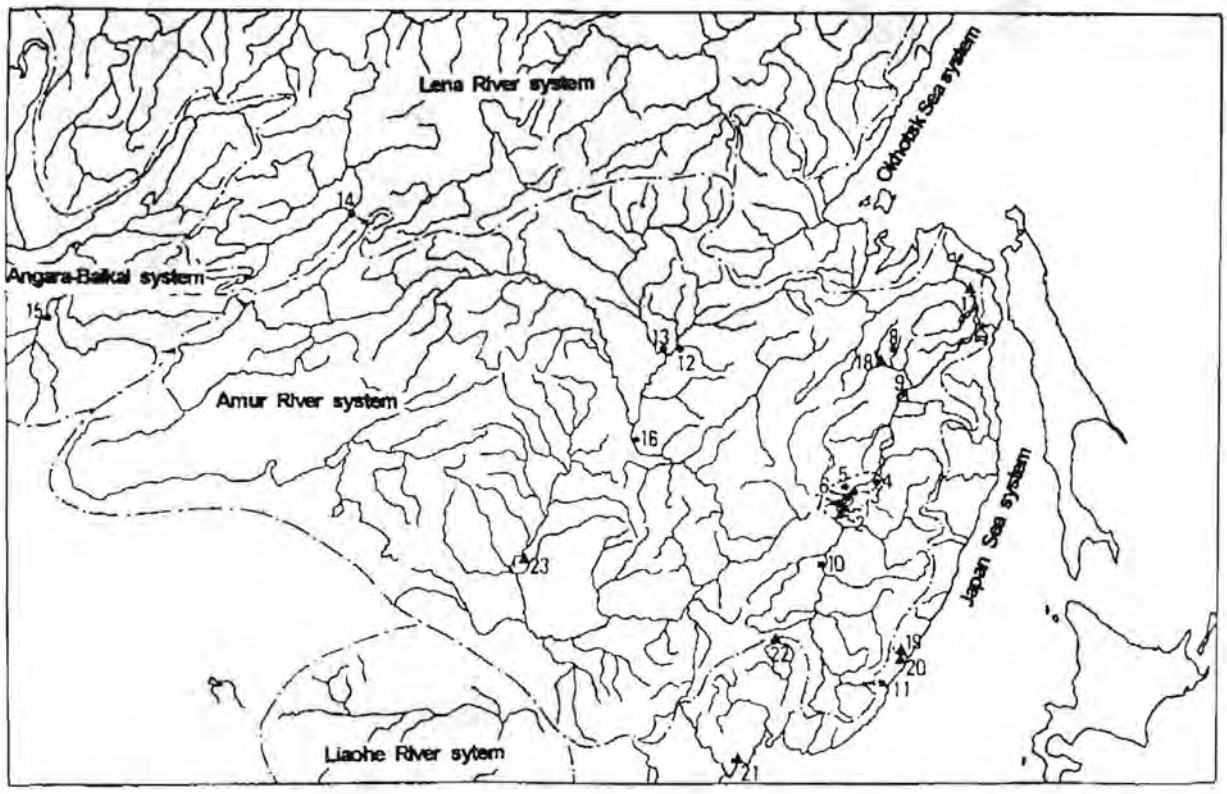

Fig.2 River systems in the North-Eastern Eurasia and the sites with ancient pottery

1.Goncharka 1, 2.Kazakevitchevo5,7, 3.Gasya, 4.Chelny, 5.Dabanda-2, 6.Osipovka- Ⅰ, Ⅱ, Ⅲ,Bogdanovka, Rubinui Port, 7.Osinovaya Rechka-1.Novotroitskoe-1,3-5 8.Chendoka, 9.Khumy, 10.Raohe-Xiaonanshan, 11.Ustinovka, 12.Usti-Ulima, 13.Gromatukha, 14.Usti-Karenga, 15.Usti-Kyakhta, 16.Novopetrovka, 17.Malaya Gavan', 18.Kondon, 19.Chertvy Borota, 20.Rudnaya Pristan', 21.Boisman, 22.Xinkailiu, 23.Angangxi,

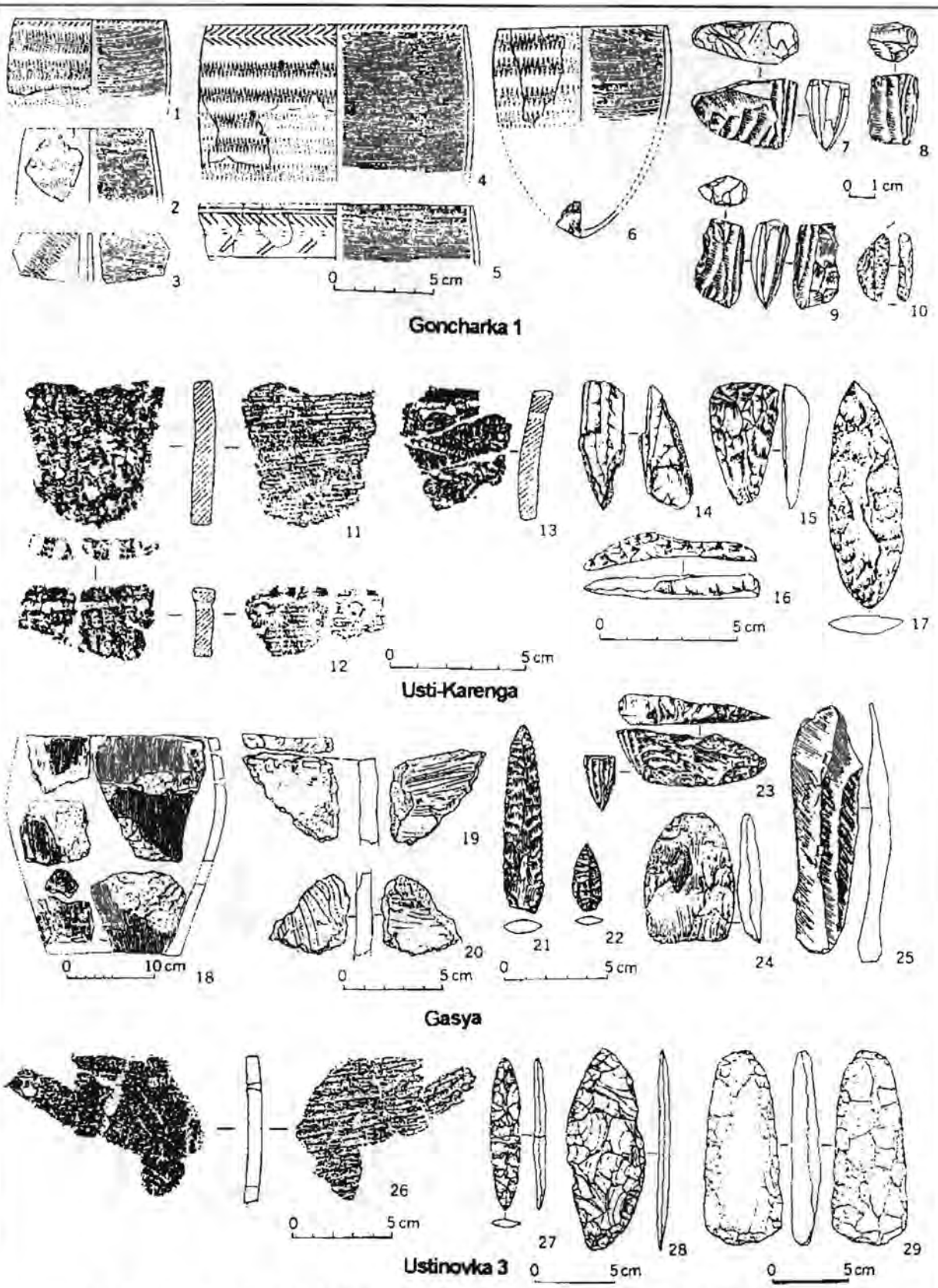

Fig.3 Representative sites with Ancient pottery in the North-Eastern Eurasia

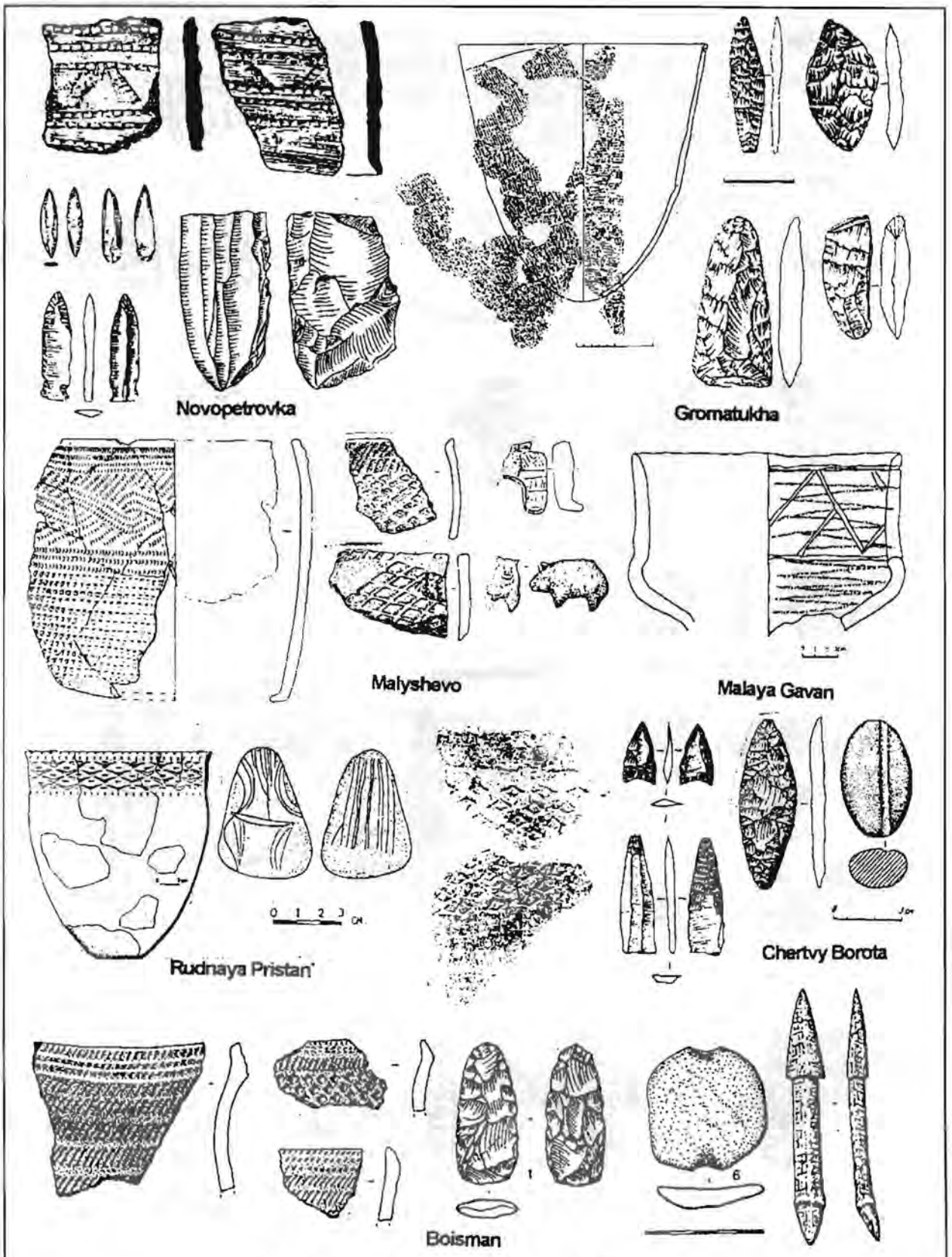

Fig.4 Early Neolithic sites in the Russia Far East

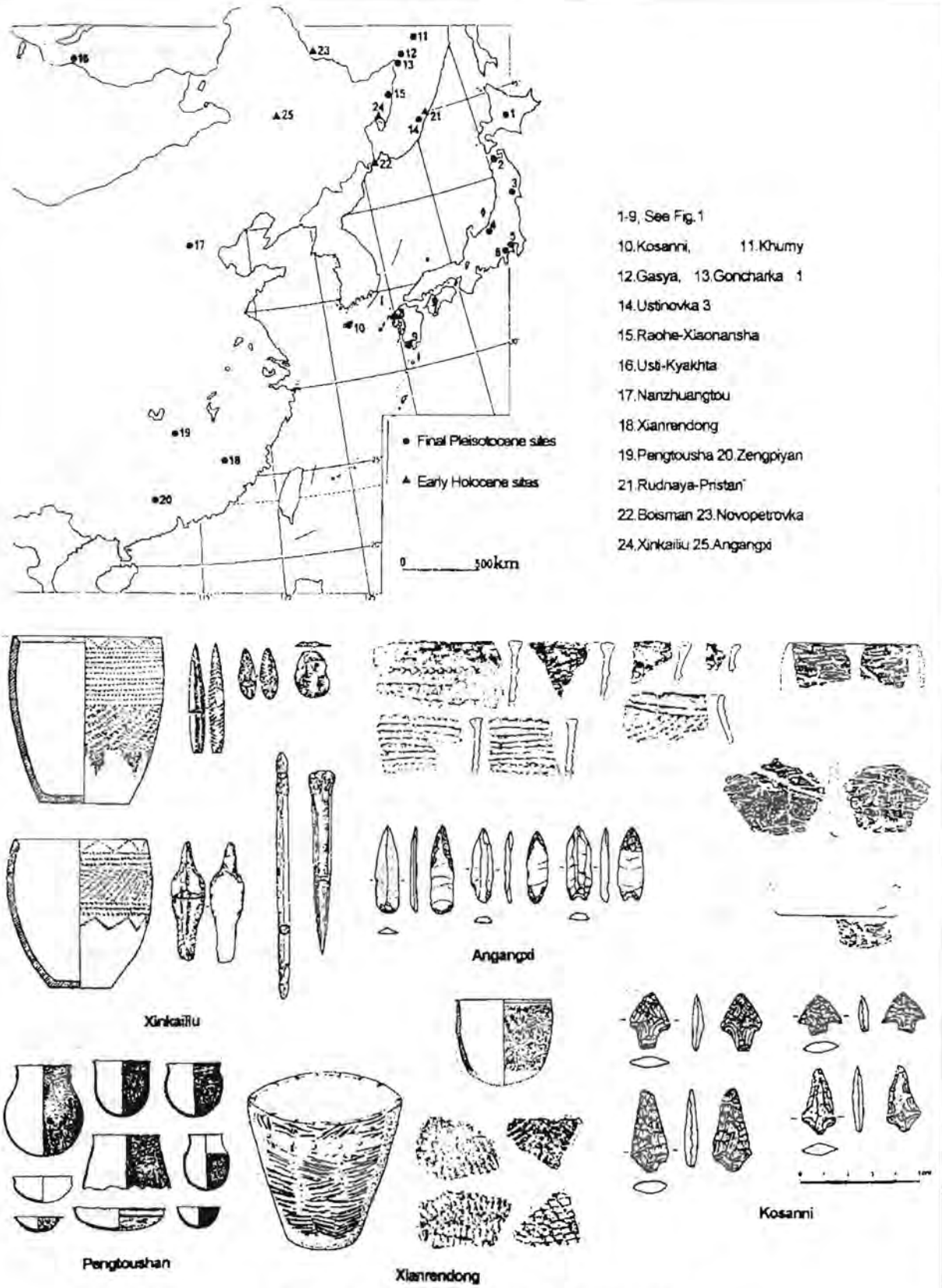

Fig.5 Representative sites with ancient pottery in China and Korea

4th Phase 10,000-8,000B.P. (Leaf-shaped point, arrowhead, blade arrowhead)	Aryn-Jarga?	Novopetrovka?	Blade arrowhead industry	Chernigovka?
5th phase 8,000-6,000 B.P. (Blade arrowhead, arrowhead, bifacially retouched insert blades)	Mukhin period, Chindand period	Osinovoe Lake	Malyshevo (Malyshevo culture) Malaya Gaban'	Boisman site complex (Boisman culture), Rudnaya Pristan' (Rudnaya culture)

Table 1 Sequences of Ancient pottery in the Russian Far East

Table is mainly based on the radio carbon dating. On the middle Amur, the site older than 12,000 B.P. could be existed, however, no site has been attested for now. As compared to the minutely constructed chronological sequences of Japanese Jomon culture, among each phase, several types of pottery must be assigned. Considering the so far discovered sites and archaeological "culture" in this region, we should conclude that many sites are still unexplored. Especially the early Holocene sites have been rarely researched to date, other than Boisman culture or Rudnaya culture (6,000-8,000B.P.). In order to develop the more detailed research of Pleistocene-Holocene transition, one of the most important agenda of archaeology in the Russian Far East should be to establish sophisticated chronological sequences of pottery types to identify coincidentally exiting features or sites. In Aryn-Jarga of Zabaikal'e, the Khin type blade arrowheads were discovered from burials with early cord marked pottery. At Chernigovka of Primorye, pottery fragments, assumed to follow the Ustinovka type, were collected from the destroyed site.

	Trans Baikal Region	Middle Amur	Lower Amur	Ussuri Basin and Primorye
1st Phase 13,000-12,000 (wedgeshaped microcore, Tanged Point, Anaya type burin)		?	Gasya, lower horizon Khummy (Gasya 1st type pottery)	Raohe-Xiaonanshan?
2nd Phase 12,000-11,000BP (wedgeshaped microcore, conical microcore, Anaya type burin, leaf-shaped point, edgeground axe or adze)	Usti-Kyakhta, Usti-Karanga (Usti- Karenga type)	Usti-Ulima (Unidentified type)	Gasya, upper horizon (Gasya 2nd type) Goncharka 1 (Ustinovka type)	?
3rd Phase 11,000-10,000B.P. (willow-leaf-shaped point, leaf-shaped point, arrowhead, blade arrowhead, some type of microcore)	?	Busse? Gromatukha? (Gromatukha type)	Goncharka 1 upper horizon (Usti-Karenga type)	Ustinovka 3 (Ustinovka type)