

ARCHAEOLOGY
IN
NORTHEAST ASIA

**ON THE PATHWAY TO
BERING STRAIT**

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SHARED BERINGIAN HERITAGE PROGRAM

Twelve to fifteen thousand years ago, Asia and North America were joined by a massive "land bridge" in the region now popularly called "Beringia." In order to promote the conservation of the unique natural history and cultural heritage of this region, the presidents of the United States and the Soviet Union (now Russia) endorsed in 1990 a proposal to establish an international park in the Bering Strait area. The Shared Beringian Heritage Program of the National Park Service, established in 1991, thus recognizes and celebrates the contemporary and historic exchange of biological resources and cultural heritage in this region. The program seeks local resident and international participation in the preservation and understanding of natural resources and protected lands, and works to sustain the cultural vitality of Native peoples in the region. To these ends, the Beringia Program promotes the free communication and active cooperation between the people and governments of the United States and Russia with regard to Central Beringia.



ПРОГРАММА «ОБЪЕДИНЕННОЕ НАСЛЕДИЕ БЕРИНГИИ»

12 – 15 тысяч лет назад Азия и Северная Америка были связаны «сухопутным мостом» в районе, который теперь называют Берингия. В 1990 г. Президенты Советского Союза (ныне Россия) и Соединенных Штатов подписали соглашение о намерении создать международный парк в районе Берингова пролива с целью сохранения уникальной истории, природы и культурного наследия этого района. Программа «Объединенное наследие Берингии» Службы национальных парков США, организованная в 1991 г. отмечает и признает современный обмен биологическими ресурсами и культурным наследием этого региона. Цель программы – вовлечь местных жителей и международных участников в дело сохранения природных ресурсов и охраняемых территорий, а также в работу по поддержанию жизнеспособности культуры коренных народов этого района. Помимо этого, названная программа содействует свободному общению и активному сотрудничеству между народами и правительствами России и США по вопросам, касающимся Берингии.

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Editors' Preface

The present volume represents a logical sequel to our earlier effort in a similar direction, which was published in 2002 as “Archaeology in the Bering Strait Region: Research on Two Continents” (*University of Oregon Anthropological Papers* 59). Again, this one is the brainchild of the one of us (Bland) who was particularly interested in the translations of non-English material, and who then obtained the support of the National Park Service Beringian Heritage Program for the project. As before, the other of us (Dumond) shouldered a substantial part of the editorial chores following translation. In this case, Chapters 1, 2, 6, 7, and 10 were received in Russian and translated by Richard L. Bland; Chapters 3, 4, 5, 8, and 9 were received in English.

As is not unusual, the romanization of Russian words has presented a problem in consistency. In this case, we have departed somewhat from our practice with the previous collection, in which we relied on a very slight modification of the Library of Congress system of transliteration, by introducing some slightly more drastic modifications — although in mild opposition to the opinions of some of our contributors. Specifically, we here adopt the Geographic Names use of *ya* and *yu* for the two appropriate Russian letters, retain the apostrophe for the Russian soft sign (or *myagkii znak*) as well as the unmodified *e* (as opposed to *ye*) for the Russian letter so written. For spelling personal names, we have tried insofar as we were able to follow the preference of the individuals involved. In the matter of references, the job of editing from a substantial distance, and often without full Russian bibliographic resources at our disposal, has resulted in a few inevitable variations between sources as listed in the various chapters. This inconsistency is even more true of labels on contributed illustrations, especially on maps. In spite of this, we hope the result will be at least minimally satisfactory.

Finally, we offer our thanks to the contributors, who have borne with us without evident signs of rebellion during a period in which the translating and editing has dragged on. We are grateful to Yvon Csonka, who initiated our receipt of the paper by Agnès Gelbert Miermon (Chapter 8) and provided the introduction for it, and to Nan Coppock-Bland who valiantly read the text when it was in somewhat less than presentable form. We especially acknowledge the Beringian Heritage Program of the National Park Service in Alaska, which has blessed the project in the best of all ways by making it financially possible.

Glossary of Geographic Terms

It also seems not unreasonable to provide here a list of some of the geographic terms that appear in the papers and illustrations, in the off-chance that some readers may not be familiar with all the usages.

Primor'e (alternatively Primorye), literally “against the sea,” referring to the region immediately west of the Sea of Japan, with the word also designating the Russian Maritime Province.

Priamur'e (or Priamorye), literally “against the Amur,” the region to the west of the lower Amur River.

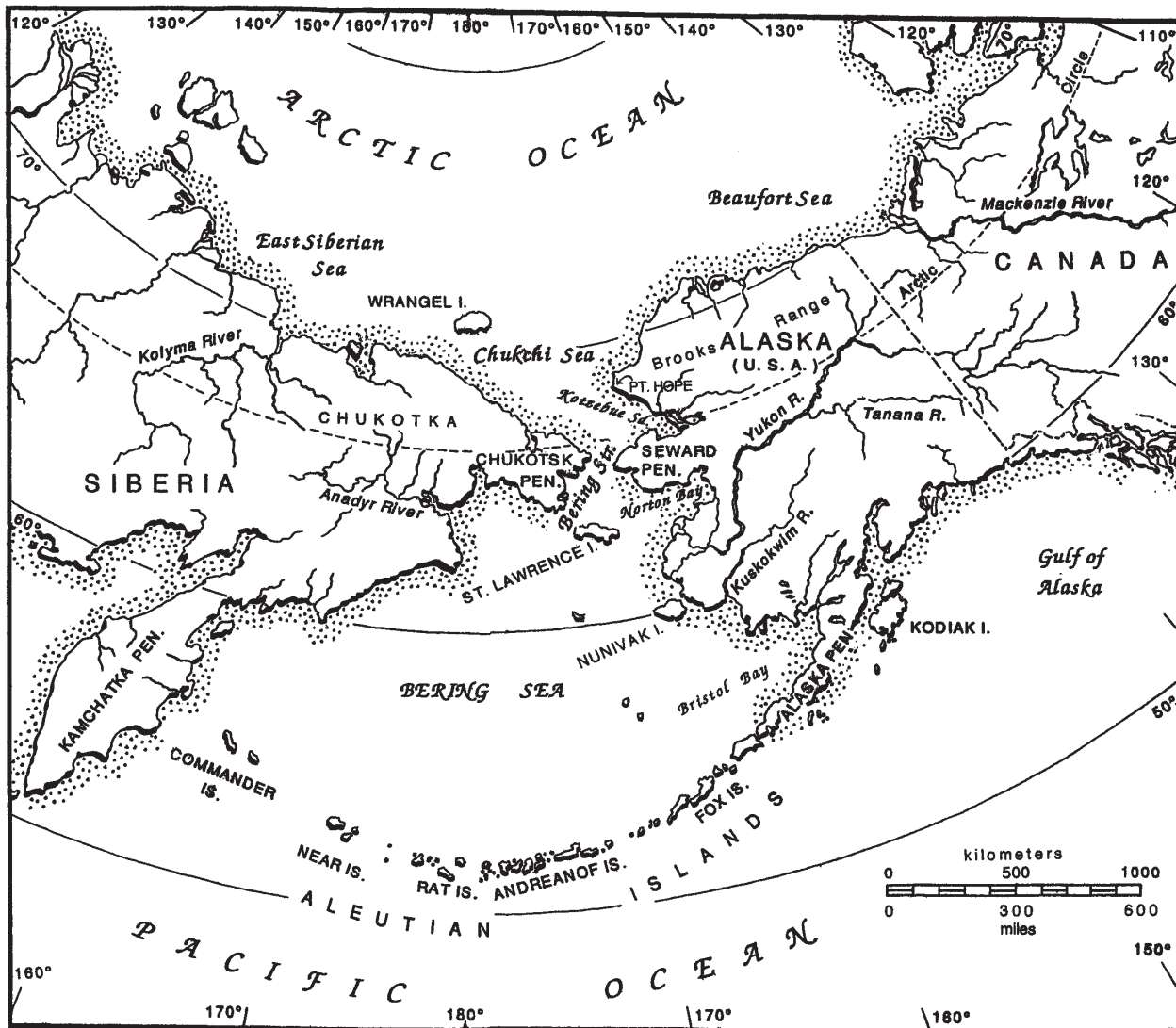
Priokhot'e (or Priokhotye), “against the Okhotsk,” the region to the west and northwest of the Okhotsk Sea.

Pribaikal'e, “against Baikal,” the region to the west of Lake Baikal, including the Angara River area.

Zabaikal'e, “beyond Baikal,” the region east of the same lake.

Yakutia, now officially Sakha or the Sakha Republic, the major territory to the west of Kamchatka and Chukotka, including much of the drainage of the Lena River.

Chukotka, the province including, and immediately to the west of, the Chukchi Peninsula and the Asian coast of the Bering Strait.



Bering Strait in the North Pacific region.

Introduction

Don E. Dumond and Richard L. Bland

BERINGIA, AMERICA, AND NORTHEAST ASIA

In the later 1500s, almost a century and a half before Vitus Bering would verify the existence of the strait that bears his name, a Spanish priest suggested on the basis of physique and culture that the ultimate origin of American Natives was in Asia. He also speculated that the ancestral Americans had entered the New World at a point where it abutted the Old World, possibly even over a land connection, and that this point must have lain somewhere in the north Pacific. Since that time a supportive current of belief has been steadily strengthened by research of various kinds (e.g., Dixon 1993:2-3, with references).

In the 1930s, a botanist applied the term *Beringia* to this still-hypothetical land bridge of the past, and within another three decades the former existence of the bridge was demonstrated fact. Uniting Asia and America across Bering Strait through exposure of the shallow continental shelf when major declines of sea levels accompanied periods of heavy terrestrial glaciation, the most spectacular drop was during the Last Glacial Maximum of the Wisconsin period, when sea level fell 125 m below that of the present day, and the land “bridge” was more than 100 km in north-south width. Since its first use, however, the term Beringia has come to designate not only an exposed Bering Strait, or the Bering Land Bridge proper — with adjacent expanses of the Bering- and Chukchi-Sea floors — but also to include substantial modern terrestrial regions both to east and west of the Strait (see Hopkins 1996 for a summary of early thought).

Nevertheless, the territory of this larger Beringia has been defined differently by different investigators. Its conceptual center is always the Bering Strait region, without which there could be no Beringia. To the east, commonly enough, Beringia is taken to include essentially all of mainland Alaska and usually that uppermost corner of Canada lying west of the Mackenzie River. In northeast Asia it is thought to extend at least as far west as the Kolyma River basin, but some researchers push it farther — west to the Lena River, or to the Verkhoyansk Mountains between the Lena and the Yana. To the southwest it may be extended to the Okhotsk Sea and Kamchatka Peninsula, and even in some opinions is pushed as far as Sakhalin and a portion of the nearby Asian coast (see West [1996] for a particularly extensive geographical definition). In present usage, in any event, “Eastern Beringia” refers to Alaska and a corner of Canada, “Western Beringia” to portions of the northeastern Asian mainland, with “Central Beringia” incorporating the present Bering Strait region itself.

Whatever the outside boundaries given it, the reality of Beringia lies in its former connection between Asia and America, which is presumed among other things to have formed the pathway for

the initial peopling of the New World from the Old. As glaciers melted and seas rose 14,000 to 10,000 years ago the reconstituted strait and its neighboring seas became the maritime home of historically known peoples, related across the water. The history of Northeast Asia, then, must be both parent and sibling to the history of America, and as such it will be addressed here.

THEMES

From works devoted to understanding the prehistory of this northeasternmost Asia, several major and consistently addressed themes, related but different, can be extracted. The first of these, of course, is simply the outline of the apparent pathway of cultural developments through time. That is, many reports focus almost exclusively on the chronicle of events as they can be reconstructed archaeologically, sometimes looking only at material culture, sometimes with reference also to the ethnographies of historically known peoples, an approach often called ethnogenesis. Not surprisingly, the attempt at chronicle is manifest in the papers that follow, with ethnic identifications attempted in a relatively few cases. With regard to the Paleolithic, in particular, there is still a great need to improve understanding of what came first, what followed, and so on.

At the same time, one must recognize that there have also been attempts to place this chronicle in an evolutionary or adaptational setting. In English, to the readers of which the present collection is directed, such attempts include — but certainly are not limited to — works by Goebel (e.g., 1999), Goebel and Slobodin (1999), and Hoffecker (2005). In the present collection this emphasis is strongest in the first two of the papers that deal with pottery (Chapters 6 and 7), both of which involve a strong focus on the evolution of ceramic technology.

A second element, related but conceptually distinct from the first, is the matter of territorial expansion. Specifically, the history of northeast Asia through the Paleolithic is also the chronicle of the human expansion northward, with regard to which cogent arguments have been made to the effect that before the full development of the Late Glacial Maximum (25,000 years BP, or so), humans had not penetrated north of 55 or 60 degrees north latitude, and during the height of the cold period (25,000 to 20,000 BP) they actually abandoned much of the path toward the northeast through the East European Plain and southern Siberia (e.g., Goebel 1999; Hoffecker 2005). Only after this time was there a further thrust northward into Beringia, leading to a presence on or at least along the coast of the exposed Bering Land Bridge. One date suggested for this is a time not earlier than 16,000 BP (Hoffecker 2005:115).

As a third element often embedded in the discussions, the approach is actually colored by notions of the early peopling of the Americas. With the recognition that humans had been in the New World since the late Pleistocene, the American focus on Northeast Asia has been pervaded by a desire to find ancestral traces of the *First* Americans, and hence it has been colored by the various conceptions of those early people that developed through studies of American, especially North American, prehistory.

In parallel with their American colleagues, Russian researchers also have shaped some of their expectations of the early Northeast Asian reality through the lens of opinion regarding the earliest Americans. For the truth of the problem has been that the development of conceptions of the earliest migrants to the New World has proceeded much faster in the territorial heartland of North

America than it has in regions farther to the north and west. This tardiness is the case in studies devoted to finding traces of the earliest people in the relatively huge landmass of Alaska and the far Northwest Coast — that is, northwesternmost America. It is especially true of the work of uncovering the earliest inhabitants of the still more huge landmass that is Northeast Asia, where active researchers into prehistory can still be counted by little more than a single person's digits, with even fewer to be found as one moves still farther toward the present Bering Strait and the site of the Bering Land Bridge.

This attitude on both sides of the Pacific is especially notable as a spin-off of the recognition of the now-well-known Clovis horizon (or culture, according to some) of fluted point makers, presently dated after about 11,600 BP, and held by many researchers to represent the earliest, or at least nearly the earliest, invasion of humans from Asia (see various contributions in Barton et al. [2004] for recent opinions). With this Clovis recognition, eyes in search of ancestral assemblages were shifted north- and westward. Surface finds of fluted projectile blades in Alaska whetted this appetite in North America, which at one time seemed on the verge of fulfillment through buried context and putatively associated radiocarbon evidence from the north Alaskan Putu site (Alexander 1987) suggesting antiquity in excess of 11,000 years, only to be dashed when additional analysis cast strong doubt on the crucial dating association (Reanier 1995). The age of fluted points in Alaska remains uncertain, and may well be no more than 10,000 years, although that age would also seem to apply to other Alaskan finds of lanceolate projectile points strongly reminiscent of an early but post-Clovis period in interior North America to the south (e.g., contributions to Bever and Kunz 2001).

In Asia, any quest for fluted points is apparently stalled. The fact of the matter is that the earliest apparent artifactual relationships recognized between Alaska and Asia are based on assemblages that in both areas are dominated by microblades derived from microcores, especially cores of a rather specific wedge-like shape. In Alaska the assemblages include those early defined as the Denali tradition (West 1967), in northeast Asia they were reported from central Kamchatka (e.g., Dikov 1965), while examples to the west in Yakutia were incorporated into a Dyuktai tradition (Mochanov 1977). In age these in America have long been dated as earlier than 10,000 BP (e.g., Dumond 2001, with references), and in Asia to nearly double that, although not so far north as Chukotka and the present Bering Strait region, as will be indicated in one of the contributions to the present collection. This apparent artifactual relationship, which appears to be generally recognized as valid, seemed in at least superficial contrast to what was known of the earliest artifactual horizons of continental North America to the south.

It was the somewhat later definition of the Nenana complex of interior Alaska, dated earlier than 11,000 years and interpreted as being without microblades, although with larger blades and relatively few bifaces, that brought a putative resolution. Held by some investigators to represent people ancestral to those of the more southerly Clovis horizon despite the absence of fluted points (Goebel et al. 1991; Hoffecker et al. 1993), the recognition of the Nenana complex as an entity separable from, and earlier than, the Denali-related complexes of Alaska spurred again the quest for an Asian ancestor of both this cultural horizon of far north America, and the Clovis assemblages farther south. Continued searches through the northeast Asian evidence for solid traces of such a presumed Clovis ancestor (e.g., Goebel 1999, 2004) are thus far without clear results, but represent a continuation of attempts to construe the prehistory of Northeast Asia in a mold shaped by North American opinion.

THE PRESENT COLLECTION

With this as background, the text to follow will be touched on more specifically.

Part I includes three papers dealing with the Paleolithic (a term that in Northeast Asia incorporates what some researchers have been inclined to call Mesolithic). Chapter 1, an overview of the regional sequence, is followed by two papers on specific sites. Of these, Chapter 2 describes a site with a comparatively standard Siberian assemblage of the terminal Paleolithic (or “Mesolithic,” to a few researchers), departing from similar sites only in its location, which is in northern Chukotka, and hence the northeasternmost of excavated sites of its character. Chapter 3 presents a potentially important site, although thus far undated, that is interpreted as marking a shift from an assemblage featuring larger blades into one with more standard microblades and microcores.

Part II, touching on both the Paleolithic and later time, is divided between two chapters on obsidian fingerprinting in the region. Of these, Chapter 4 is, again, an overview, this time summarizing previously published Paleolithic-period information on a region extending from northern Japan through the Russian Maritime Province to Sakhalin Island. Chapter 5 then reports previously unpublished results of obsidian tracking from sources still farther north, on the Kamchatka Peninsula in the Neolithic and Paleometal periods. Both of these chapters document the apparent expansion of obsidian trade networks through time. Unfortunately, there appear to be no comparable obsidian sources north of Kamchatka in Chukotka and the approach to Bering Strait, so that one cannot well expect these efforts to be expanded farther to the north.

Part III is devoted almost entirely to Neolithic time, specifically to pottery of the region, a subject that has hitherto been little covered, certainly not in English, with emphasis on the evolution of the technology. Chapter 6 reports specifically on the ceramic industries of Sakhalin Island, while Chapter 7 focuses on the pottery of Chukotka. Unfortunately, the sample available to the author of the latter, of pottery remains from the coast and specifically the period of the known Eskimoan peoples (Old Bering Sea and onward), is deficient save for the latest (historic?) period. To some extent this gap is filled, however, by chapter 8, which details the ceramic remains from the large erosion cut at the Ekven site, apparently dating to the immediate post-Old Bering Sea period.

Part IV, then, provides two short chapters that attempt to plug holes in certain categories of knowledge regarding the northeastern coast of Chukotka. Chapter 9 provides an analysis of the marine reservoir effect on radiocarbon determinations on the northwest coast of the Bering Sea and of Bering Strait. Chapter 10 adds what in effect is a footnote to knowledge regarding the so-called Devil’s Gorge site on Wrangel Island off the north coast of Chukotka, in which an analysis of faunal remains adds new information, while additional radiocarbon determinations appear to confirm previous information.

Finally, a wrap-up to the volume in Chapter 11 attempts to bring together much of what has gone before, adding some mild critical comments, and essaying some complementary statements derived from work in Alaska.

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Part I

The Paleolithic

The introductory remarks regarding the themes that can be extracted from works dealing with the early prehistory of Northeast Asia are relevant to the present section, much of which is slanted toward an archaeology that would provide evidence related to what is perceived as the earliest evidence from North America. Here, for instance, Slobodin in his summary paper (Chapter 1) considers not only a microblade horizon rather clearly related to the bulk of early finds from Alaska, and a presumed pre-microblade horizon that may relate to Alaskan materials such as those of the Nenena complex, but also the possibility of the presence of a still earlier “Pebble Tool” tradition such as has been claimed by some for the terminal Pleistocene period on the American Northwest Coast (see Carlson 1996:8-9, with references).

This is followed, here, by more specific descriptions of two potentially important sites. Tytyl’vaam IV (Chapter 2), which is the first site of eastern Chukotka that approaches the fairly typical microblade and wedge-shaped core assemblages of the Late Paleolithic collections that are common farther south. An exception is that the small cores were not made by the so-called “Yubetsu” technique, as it has been defined in northern Japan. A technique that seems to have become a hallmark of most terminal Paleolithic industries in Northeast Asia, this involved the chipping of a small biface of roughly leaf shape, which was then split longitudinally by a blow producing a facet that could be used, when positioned horizontally, as a striking or pressure platform, from which bladelets would be pressed off of one end of the core. With use, the platform could be rejuvenated by removing other, thinner longitudinal slices producing characteristic “ski spalls.” Although not the only technique for producing either microblades or cores of general wedge shape, the particular technique has come to seem the hallmark of terminal Pleistocene industries of northeasternmost Asia, as the papers in this section will serve to indicate. Both the Yubetsu technique and a variant “Horoka” method of core formation (mentioned in the present Chapter 1) are discussed and explained graphically with reference to Hokkaido by Morlan (1967:173-177).

Chapter 3 provides a fairly detailed description of the first seasons’ work at the site of Khaya IV, with Yubetsu cores but also with a larger (i.e., non-microblade) blade industry. Not so far north as Tytyl’, it is still well north of the Okhotsk Sea. If dating works out as the author expects, this site will provide northeast Asian evidence of a transition into a microblade-producing culture — again, a first for a site this far north.

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Northeast Asia, the western approach to Bering Strait.

Chapter 1

The Paleolithic of Western Beringia: A Summary of Research

Sergei B. Slobodin

In recent years a large volume of materials on the Paleolithic of western Beringia, which elucidated many previously poorly studied problems, has been introduced into scientific circulation. Along with newly discovered sites, which expand the age of the Paleolithic of western Beringia and understanding of diversity of the methods of working stone, the relative positions of formerly known complexes have been made substantially more precise. This significantly expands our knowledge of the Paleolithic of this region, requires the correction of ideas (Slobodin 1999b, 2000, 2001b), and permits the planning of new directions for long-term research in the Beringian Paleolithic.

Western Beringia occupies the territory east of the Verkhoyansk Range and includes such regions varied in landscape and natural environment as Indigirka, Kolyma, Chukotka, Kamchatka, and continental Priokhot'e. The importance of research in this territory has been repeatedly observed by scholars. "It is now precisely established that whoever were the first people to settle America, wherever they came from, they arrived along the edge or through this region" (Powers 1973). In the Paleolithic of western Beringia, proceeding from the character of the stone-working industry, it is possible to distinguish several technological traditions: 1) cobble tool, 2) microbladeless (with bifaces), and 3) microblade (with wedge-shaped microcores and bifaces). The last two are spread over all of Beringia, whereas the first is evident only in the western part.

PEBBLE TOOL TRADITION

The earliest is thought to be a pebble tool tradition that preceded traditions with bifacially worked tools and blade industries. To such an early tradition can be assigned materials from the Orlovka II site in western Chukotka, Lopatka IV in Kamchatka, and finds from eastern Chukotka and from the Omolon River.

Beginning in the mid-1960s, after A. P. Okladnikov's discovery of pebble tool cultures on the Amur (Derevyanko 1983; Okladnikov 1970) and the characterization in North America of a pre-projectile point stage (Krieger 1964), hypotheses regarding the spread of pebble or cobble tool cultures from Asia into America became very popular (Dikov 1979; Laricheva 1976:45-76; Medvedev 1983). Pebble tool cultures of the Far East were rather logically fit into this schema.

In 1968, Charles Borden presented a report on the archaeology of British Columbia at the international congress in Japan. In particular, he reported on the Pasika pebble tool complex of the

Fraser River, which he had dated by its stratigraphic deposit to an age of 11,500 to 12,000 years ago. Borden connected its origin with Asia. In Tokyo he met with A. P. Okladnikov, who was reporting there on cobble materials from the Amur. After becoming acquainted with these materials, Borden wrote that “pebble tools, including specialized types identical to some in the Pasika complex of British Columbia . . . [Borden showed exactly which ones in his illustrations — S. S.] have recently been discovered on ancient stream terraces along the lower Amur River” (Borden 1969:10). In spite of his doubts about the relative age of the Amur materials, Borden, with a citation to personal communication with Okladnikov, dated them to the middle Paleolithic. “If this very tentative estimate should prove correct,” he wrote, “this East Asiatic industry would probably have been available for export to the New World during the stadial which preceded the warm interval prior to the last glacial maximum” (Borden 1969:10).

For corroboration of this hypothesis it was necessary to find pebble complexes in the area between British Columbia and the Amur region — the Kolyma, Chukotka, Kamchatka, and Alaska.

N. N. Dikov participated in this same conference in Tokyo with a report on the Paleolithic of Kamchatka. Several years after the conference, between 1971 and 1973, he identified a cobble tool culture in Northeast Asia in materials from his Siberdik and Kongo sites, which were dated by C-14 from 8,000 to 9,500 years ago, and contained cobble tools with microblades and bifaces. Disengaging himself from the microblades and bifaces, Dikov proposed the existence along the Kolyma River of a “Kolyma industry of uniface choppers” 20,000 to 23,000 years old, a relict of which, in his opinion, were those cobble tools on the Kolyma — uniface and biface choppers.

Dikov thought they resembled most of all the cobble tools of Priamur’e, “where they were used for a long time, from the earliest stages of the Paleolithic known there” (Dikov 1979:98). In his cultural construction he relied as well on Borden’s American Pasika complex, viewing the Kolyma uniface choppers as an intermediate link in the chain to those from the Amur, despite the Holocene dates for the Kolyma sites.

Meanwhile, further investigations on the Kolyma did not provide indisputable arguments corroborating the existence there of a Pleistocene “Kolyma industry of uniface choppers.” In addition, the homogeneity of the Siberdik complex is doubtful (Slobodin 1999a). A basis for doubt is the discovery of a late cobble tool industry on the upper Kolyma with an age of 400 to 600 years. Okladnikov (1947) first noted sites with materials of this “late cobble tool industry” in the early cobble bars in the valley of the Kolyma’s middle course during his Kolyma Expedition in 1946. No less complicated is the determination of the character of the tool kit of small siliceous tools of the Siberdik culture, which includes both a wedge-shaped core, characteristic of the Paleolithic, and conical cores, which appear in the Northeast during the early Holocene and exist there during the Mesolithic and Neolithic. Although these doubts are not a basis for reviewing the question of the existence of a Siberdik culture, this clearly illustrates the problem of the cultural interpretation and dating of surface and mixed materials on the upper Kolyma, as occurred at the Agrobaza site (60 km from the Siberdik site). Here the complex of surface materials, initially defined as belonging to the Siberdik culture — that is, according to Dikov, combining cobble tools and small siliceous tools on microblades — was separated during excavation into two stratigraphic layers containing complexes distinct from each other and separated in time by several millennia (Slobodin 2001a).

Also, isolated cobble tools found on the surface — uniface choppers on the Omolon River (a right tributary of the Kolyma) — were defined as Paleolithic (Vorobei 1999). Stipulating that it is presently impossible to determine the real age of the finds, I. E. Vorobei, proposing external connections (i.e., beyond the bounds of Northeast Asia), compares the finds with the earliest cobble tools of Siberia (on the Angara River), of Viet Nam, and of Mongolia (Vorobei 1999). Undoubtedly if such a connection actually existed, the technology of preparation and the morphology of the tools would have been subjected to the influence of Far Eastern traditions in their course from these cultural centers far from the Omolon.

In Kamchatka the cobble tool complex has been identified at the Lopatka IV site on Cape Lopatka — the southern extremity of the Kamchatka Peninsula. The surface of the cape, 8 to 10 m above sea level, is covered by sand dunes. Here a cluster of mixed-age and predominantly surface materials included some from the Neolithic (Dikova 1983). Mapping permitted the definition of Cluster 3, the materials of which were assigned to the Paleolithic, a part of which were obtained from the surface layer of sand. The artifacts were principally of andesitic basalt and siliceous cobbles and are represented as cobble cores (for acquiring flakes), uniface choppers, biface choppers, large unifacial skreblos, and knives on primary flakes and, possibly, points with edge-working on flakes found in a stratum. Analogs of this complex were traced in the cultures of Primor'e and even farther south — in those of Viet Nam, Mongolia, Japan, and the intermediate region of the Kurile Islands (Dikova 1983). The archaic nature of the complex was taken to imply a date of more than 11,000 years ago, but with the proviso that the question of its dating remains open (Dikova 1983). The excavator suggested the complex of the Lopatka IV site to represent a cobble tool tradition characteristic of the Siberian-Mongolian Paleolithic, attesting to “migrations of a Paleolithic people in the late Pleistocene from Asia to America along the islands of the Pacific Ocean” (Dikova 1983).

The materials from Shumshu Island (Kurile Islands) — the closest to Cape Lopatka — which contain cobble chopping tools from the Kozyrevsk I and Bol'shoe I sites, also remain undated (Salova 1976). Their age, based on analogs from sites in the Japanese Islands and the Ustinovka culture of Primor'e, was tentatively placed within the Pleistocene.

In Chukotka, Dikov believed that the Kym'yanonvyvaam XII and XIII sites with chopper-like tools and skreblos of jasper were the intermediate link between American sites of the “pre-projectile point” stage with tools of coarsely flaked cobbles, and their prototypes from the Far East — cobble tools from the Filimoshki, Kumary 1, and Diring-Yuriakh sites in Yakutia (Dikov 1993b). The age of the sites was placed between 20,000 and 23,000 years. All of the artifacts from these sites were surface finds and do not have a stratigraphic tie; some were even collected in a stream bed. Judging from trace analysis (conducted by N. A. Kononenko), there are tools among them with traces of working or use-wear and facets sharpened along the margin of the uneven working edge (Dikov 1993a:36). Around these finds, for a distance of 100 m or more, were Neolithic sites with knife-like blades and ceramics (Dikov 1993:36). In our view, since the sites are located in the vicinity of low-quality siliceous stone (which due to its brittleness was not favorable for making uniface choppers) and there are fresh traces of secondary working on the artifacts, the sites are most probably workshops with debitage of half-finished raw material, and thus significantly younger than the proposed age.

Dikov also proposes the same cultural parallels for the Orlovka II site as for the Kym'yanonvyvaam XII and XIII sites (*Severo-Vostok*. . . 1996). The former site is located on the

120-(160?)-meter projecting slope of a hill by the Orlovka River (western Chukotka, Bol'shoi Anyui River basin) (KiriyaK 1985). The surface of the slope is subject to solifluction slumping, which is reflected in the location of the finds. Some of them (cobble tools and microblades) were found on the surface. In the excavation the artifacts lay in two horizons to a depth of 22 cm. A complex of siliceous microblades gravitates toward the upper horizon; toward the lower, there are uniface cobble choppers, cores for obtaining blade spalls and blades, blades from them, a skreblo, scrapers, burins, and others, all on cobble spalls. In the plan, the distribution and concentration of artifacts agrees from the surface to the bottom layer (KiriyaK 1995). Raw material for cobble artifacts could have been obtained only from the river, a distance of about 2 km. In sum total, they make up a rather substantial quantity and would require definite effort to transport them to the site.

The question of cultural association and age of the Orlovka II site depends primarily on whether or not it is determined to be a one- or two-component site. Microblades limit the possible maximal age in Chukotka to the range of 12,000 years, and considering the fact that there is no direct evidence of the presence of wedge-shaped cores at the site, to no more than 9,000 years. If it is a matter of two different complexes, the cobble tools in this stratigraphic context may indicate a substantial antiquity of these tools and of the existence of a cobble tradition in Northeast Asia, as Dikov suggests.

M. A. KiriyaK proposed various geographic parallels (from Inner Mongolia to Alaska) for the cobble tool component of the site and a broad chronological framework (from early Holocene to the beginning of the Upper Paleolithic). In her opinion, "artifacts from the Kumary II site on the Amur are almost absolute analogs of the Type 1 Orlovka core (subprismatic in form with traces of subparallel longitudinal flaking)" (KiriyaK 1985). There is every reason to agree with such a comparison if one considers the Orlovka complex as not having microblades. Thus, the Orlovka materials better serve as a reliable basis for dating the Kumary site, and not the reverse.

Other comparisons of the Orlovka II site — with the Anangula, Tangle Lakes, Ezhantsy, and Verkhne Troitskaya sites — provide almost nothing for determining the age and cultural connections, inasmuch as the cobble tools there are neither dated nor the leading technological element of the complex.

Discussion

For Northeast Asia the possibility of the existence of connections with the Far East at the level of cobble tool complexes is for the present retained, though this view is based not on the available data but rather on their uncertainty. Data for precise determination of cultural and chronological association of the examined materials are meanwhile few, inasmuch as they are from the surface or were found in mixed or unclear stratigraphic context. During the course of a long discussion about Far Eastern cobble tool complexes, it was concluded that "many researchers do not perceive these finds as artifacts, and in the case with finds from the Kumary site (Amur valley), which contains biface choppers, tools with 'beaks,' and amorphous cores, one can speak only of the appearance of the inventory, and not about its antiquity" (Derevyanko et al. 1994:165).

And the materials of the American Pasika complex from British Columbia, which could have supported a working hypothesis of the spread of cobble tools from the Far East into North America

until the discovery of comparable materials in Beringia, did not retain their presumed initial chronological and cultural position. Rather, all of the cobble tool finds that have been examined up until recently through the prism of Borden's hypothesis (Borden 1969) concerning a Pleistocene appearance in British Columbia, have now acquired a different interpretation. Shawn Haley's C-14 dating of many sites that contain cobble tools showed that this tradition (to be called "late pebble tool") existed approximately 4,000 to 6,000 years ago and contains, besides cobbles, different bifacial tools, microblades, microcores, and so on (Haley 1996:52, 62). This tradition thus has no relation to the problem of the settlement of America. These conclusions have been acknowledged by Roy Carlson (1998:633) as well.

The age of the examined cobble complexes of western Beringia at present is not supported by the C-14 dates nor by the stratigraphy of the sites adequate for their age, but rather it is based on formal-typological comparisons also. By itself the cobble tool component is characteristic of sites of a substantially later time. For example, the Orlovka II site formally corresponds with the criteria "Siberdik culture," which is characterized by "a combination of small blade [microblades — S. S.] and large cobble tools," though the appearance of the cobble artifacts of the materials attracts Middle Paleolithic comparisons. The Paleolithic complex of the Lopatka IV site is extracted from materials that also contain artifacts of Neolithic (Tar'in) times. Nevertheless, the question of a "pebble industry" in Paleolithic western Beringia remains real, especially after the discovery in Yakutia of the Diring-Yuryakh site with cobble tools dated by various estimates to an age of 120,000 to 3,000,000 years.

In the future, concerning the question of the correlation of pebble or cobble complexes in the Far East and Northeast Asia, only new sites with well-determined stratigraphy and C-14 dates can clear up the situation. On the basis of materials now available, this question is impossible to resolve.

TRADITION WITHOUT MICROBLADES

A microbladeless tradition that is clearly manifested in the Paleolithic of western Beringia is represented by the early Ushki culture, the Uptar complex, and recently discovered materials at the Yana site.

Materials from the early Ushki Paleolithic culture in Kamchatka — Layer VII of the Ushki sites, studied over an area of more than 2,100 square meters — are the most fully represented in the territory examined here (Dikov 1993b). The layer was recorded at a depth of about 2.1 to 2.3 m below the present ground surface. Houses, judging by the carbonaceousness and the scorched bones, were rounded surface structures with an area of 40 to 100 square meters and hearths in the middle lacking stone enclosures. Tools were made on flakes. Here biface stemmed points, leaf-shaped bifaces, oval and end scrapers on flakes, chalcedony burins, and stone beads and pendants were found. In the layer was a burial, but the bones of the interred were not preserved. C-14 dates of the layer, on charcoal from the layer, were 14,300 and 13,600 years. New, recently obtained dates of this layer falling between 11,000 and 11,300 years (Goebel et al. 2003) can probably be assigned to the upper boundary of this culture.

Materials from the Bol'shoi El'gakhchan site (Dikov 1993b; Kiriya 1993) on the Omolon River are also assigned to the early Ushki culture. Its tool complex is represented by stemmed points, oval bifaces, and scrapers on flakes. There are no C-14 dates for the site, but the artifacts lay in a layer

with cryogenic disturbance at a depth of 12 to 60 cm. In both complexes, Ushki and El'gakhchan, microblades and wedge-shaped cores are absent. In western Chukotka at the sites of Chelkun II and Ul'khum I and in Priokhot'e at the sites of Serdyak (Slobodin 1999a) and Bol'shoi Avlondya (Vorobei 1993) stemmed points from surface materials are assigned to early Ushki, but these assumptions still require corroboration.

We view as microbladeless the complex of the Uptar site, lying under volcanic ash. The C-14 date of 8260 ± 330 (MAG-1262) obtained from the layer that covered the artifacts probably records the approximate time of the ash fall, establishing the minimal date of the Uptar complex as the early Holocene. Patina on the surface of the stone tools and other traces of aeolian abrasion permit supposing that the finds, until their burial by ash, lay unburied a substantial time on the surface of the terrace. The Uptar artifacts are represented by oval bifaces, narrow leaf-shaped arrow points, spear points with narrowing butt, scrapers, and cobble tools. One arrow point has a flute on one side along the body from the base to the point characteristic of Paleo-Indian points of North America. The complex has no clear analogs within known cultures of Northeast Asia.

The microbladeless industries of western Beringia acquired a new impulse with the discovery of the Yana site on the lower reaches of the Yana River at 72 degrees north latitude (Pitul'ko et al. 2004). Materials from the site were obtained in part from the cultural layer and, basically owing to collapse of the edge of the site during rising of the river, from collections on the river bank. The tool complex combines unifacial and bifacial technology of working stone without the features of a blade industry. The complex of artifacts is represented by cores for obtaining flakes, lateral sereblos with bifacially worked edge, end and corner scrapers, a bifacially worked point, uniface choppers, biface choppers, tools from bones of Pleistocene animals — punches and an awl. Also, a large quantity of bones of late Pleistocene animals was found in the layer of the site and cutbank. A series of C-14 dates from the cultural layer, bones from collections, and bone tools indicated the age of the site at around 27,000 years. Researchers note the similarity between Paleo-Indian bone tools and the artifacts from Yana, with a common biface technique for manufacturing stone tools and in the lack of a microblade industry.

Discussion

It is supposed that all three complexes have a connection with Paleo-Indian cultures, with the lack of a microblade industry a common basis for all. In addition, there are individual features, such as stemmed points for the Ushki culture, a fluted point for the Uptar site, and bone tools for the Yana site. Each variant has its pros and cons.

Sites with stemmed points in America, for example, are now dated to an age of 10,000 to 11,000 years ago (Davis and Sisson 1998). In spite of the fact that their age places them as later in comparison with sites with fluted points, they are still assigned to the Paleo-Indian tradition. Thus, they can be fully viewed as a continuation of development of the early Paleolithic Ushki culture. This scenario, though, does not find support among the majority of American archaeologists. Dikov even proposed that in Kamchatka we have a case of return migration from America into Asia along the Beringian Land Bridge during maximal cold. However, the lack of similar complexes of adequate age

in the intervening area between Kamchatkan and American stemmed points — for example, in Alaska — makes difficult the argument in favor of such a development.

The fluted Uptar point in a complex with leaf-shaped points likewise requires confirmation by new finds, so that we do not have a case of an accidental removal of a spall from an energetic blow, but rather one of an intentionally applied flute. Also, the true age of the Uptar complex is not known since the wood charcoal for C-14 analysis was collected in the ash that covers the finds.

The finds from the Yana site, on the other hand, substantially exceed the chronological maximum that exists for Paleo-Indian cultures, and even for pre-Paleo-Indian complexes, the age of which, such as Meadowcroft, is proposed at 16,000 to 17,000 years (Adovasio et al. 1999). The similarity between bone artifacts of the Yana site and the Paleo-Indian tradition raises and inspires hope that in the course of further study of the site there will be success in tracing similarities between them in the typology of stone tools as well.

Meanwhile, all these correlative schemes exist on the level of hypothesis, though at the moment it is the best we know concerning this question.

MICROBLADE INDUSTRY

In the concluding period of the Pleistocene in western Beringia a microblade industry spread. Its appearance in Siberia is assigned to the boundary of the Karginisk and Sartan epochs (Derevyanko et al. 1998), and the majority of researchers define its age as not earlier than 22,000 to 23,000 years. These dates establish a possible lower temporal boundary for the appearance and spread of the microblade industry in western Beringia.

Materials from the recently studied Khaya IV site [see Chapter 2] attest to the evolution in the technology of working stone that determined the transition from removal of blade flakes and blades from the broad surfaces of flattened cores to end flaking, and then to obtaining microblades from end cores. The site is located on the Okhotsk-Kolyma plateau and, according to geologists, this region was free of ice cover during the Karginisk and Sartan periods (*Pozdnechetvertichnye . . .* 2002).

Artifacts at the site rested in unconsolidated deposits overlying a rocky base at a depth to 25 or 30 cm, both deposits and cultural materials bearing traces of cryogenic disturbance and displacement. There is a film of oxides on the artifacts from the lower lithological layer. The complex of tools, based on raw material, typology, and characteristics of manufacture, is homogeneous. Siliceous platy cleavages and chalcedony cobbles served as raw material. Among the artifacts were cores, blades, burins, a graver, points, bifaces, scrapers, pendants, a biface chopper, technical spalls, and flakes. The cores are of several types: large and flat cores with wide front for obtaining blade flakes; narrow cores, steeply beveled toward the frontal pressure-retouched platform; end cores on slabs; a flattened subprismatic one; flattened two-platform ones with retouched beveled pressure platforms; and a fragment of a core front with microblade removals. Some of the blades correspond by their dimensions to microblades. Bifaces have a flattened-lenticular cross section and are asymmetrically oval, semi-lunar, and asymmetrically triangular in shape. Points are represented by bifacial artifacts of leaf shape (with rounded and pointed bases) and subtriangular form (with straight base). Side scrapers are on flakes and end scrapers (including double-ended scrapers) on blades. Burins of

middle, angle and transverse types were made on blade spalls. Ornaments are represented by a flat pendant with a hole, and beads.

The cultural association and age of these materials have not been precisely determined at present, though it is clear that in general the tool complex of the Khaya IV site is characteristic of Paleolithic complexes of northern Asia. This is corroborated by artifacts that reflect a transition from a subprismatic technique of obtaining blade blanks from the broad surfaces of cores to end cores. Such a transition is recorded in early stages of the late Paleolithic of the Altai at the Kara Bom site (Derevyanko et al. 2002) and in the middle period of the late Paleolithic (25,000 to 18,000 years ago) in Zabaikal'e (Konstantinov 1994). In the technique of primary flaking at the Bol'shaya Khaya IV site can be traced parallels with materials of the fourth cultural complex of the Abakan site on the Amur with an age of 21,000 to 25,000 years (Derevyanko et al. 1996), and with materials of the lower layer of the Ustinovka I site in Primor'e with an age of 22,000 to 14,000 years (Vasil'evskii and Gladyshev 1989), or even 33,000 to 30,000 years (Kononenko 2001). Considering C-14 ages for the Ustinovka tradition Suvorovo IV site of 15,000 to 16,000 years, the Early Ustinovka complex dates at more than 16,000 years BP. The existence of a pre-Ustinovka, "though tentative," complex of middle Sartan time, with cores exhibiting parallel flaking, blades, tools on them, bifaces, but without a microlithic technique — which does not yet exist or is in the initial stage of its formation (D'yakov 2000) — is supposed for the Far East. This fully corresponds to the characteristics of the complex at the Bol'shaya Khaya IV site.

Sites with a microblade industry and wedge-shaped cores are represented in Beringia substantially better than are those with microbladeless and cobble or pebble complexes. Many have assigned the former to the Dyuktai culture. Dikov (1993b), in general recognizing the distribution of the Dyuktai culture in Beringia, separates from it the late Paleolithic Ushki culture, represented by Layers VI and V of the Ushki sites. He considered that only a small population of the Dyuktai culture penetrated along the north into Chukotka and farther into Alaska at the end of the Pleistocene, as corroboration of which is the site of Kurupka I in Chukotka (Dikov 1993b). Microblade complexes with wedge-shaped cores are identified in western Beringia in the sites of Uskhi I-VI, Kheta, Berelekh, Druchak-Vetrennyi, and several Chukotkan sites. The sites of Maiorych and Kukhtui III are not viewed as Paleolithic.

It is possible that the earliest microblade complex in western Beringia is the Berelekh site on the lower reaches of the Indigirka River, dated by C-14 to between 10,600 and 13,400 years BP (Mochanov 1977). The stratigraphy of the site is disturbed by cryogenic processes, land slipping, with the possibility of redeposition of the artifacts, which is also suggested by the broad range of C-14 dates. Flakes, blades, fragments of biface knives and points, a chisel-like tool, were found in the excavation. Knives and a leaf-shaped point of mammoth tusk and bone, retouched along the edge like stone, are described. Part of the materials were found on the surface. Microblades are poorly represented, and two atypical artifacts were interpreted as wedge-shaped cores, but later have ceased being viewed as such. This provided a basis for including the Berelekh site among those complexes of Beringia without microblades (Goebel et al. 1991). Later, new finds were assigned to the tool complex of the Berelekh site (Mochanov and Fedoseeva 1996), including a wedge-shaped core and biface of tear-drop form collected on the river bank at the site. A fragment of tusk with an image of a mammoth engraved on it was found 48 kilometers from the site (Mochanov and Fedoseeva 1996).

The most clearly dated and stratified materials are from Layer VI at the Ushki site in Kamchatka (Dikov 1979). They are dated by C-14 to 10,300 to 10,800 years and include wedge-shaped cores (including bifacial ones), knife-like blades, ski-shaped spalls, corner and transverse burins (Slobodin 2001), leaf-shaped and oval knives or bifaces, end scrapers, gauged slabs, labrets, and pendants. Cores were made by the Yubetsu technique. Horoka-type cores are also reported, but they are not represented in the illustrations and preserved collections. Dikov (1979) proposed the existence of technological succession between cultures of Layers VI and VII, which is considered unlikely by reason of the typological differences between them.

Finds in the site are concentrated around the hearths of round surface dwellings and pit houses (to 0.5 m from the surface) with a corridor. They reach 48 square meters in area. Several caches of tools and tool blanks were found in the houses, as well as a buried dog and two buried children, judging by the teeth found there. In addition to numerous pendants and tools well saturated with ochre, among the finds were teeth with ground roots and narrow, bored holes (Dikov 1993b). Until 1993 Dikov viewed the materials from Level VI of the Ushki sites as evidence of the formation in western Beringia of a proto-Eskimo-Aleut culture, but then assigned them to the ancestors of the Athapaskans (Na-Dene) (Dikov 1993b). The end of development of this culture is traced in Layer V of the Ushki sites, which have a date of 8,800 years ago. The tool complex, in general, is preserved. Among the wedge-shaped cores, a variety with a rib on the side of the pressure platform predominated (Dikov 1979).

In western Chukotka the Tytyl'vaam IV site, recently discovered along with several other Paleolithic sites on Lake Tytyl' (Kiriyaik et al. 2003), should be viewed as a type site for the microblade industry of the Paleolithic of this region of Beringia [see Chapter 2]. The complex of tools at this site, lying at a depth to 40 cm in a humic stratum with traces of frost cracks, contains a representative series of wedge-shaped cores, oval bifaces, leaf-shaped arrow points, end scrapers, and burins on flakes. On the blanks of cores are clearly recorded such technical features as the formation and trimming of the pressure platform by short frontal or lateral flake removals, with preservation of the rib on the side of the pressure platform, and not with the aid of ski-shaped spalls. That is, in working the cores the Yubetsu technique was not used, but rather the methods noted, for example, were those of Layer V of the Ushki sites (Dikov 1979). The age obtained by C-14 for the complex fully corresponds with its appearance — 9,700 to 9,800 years.

Several other sites in Chukotka are assigned to the Paleolithic (Dikov 1993a). Not one of them is dated by C-14 and not one is in stratigraphic context. These are the sites of Inas'kvaam II and Talain in southern Chukotka. In the first site were blade spalls, a retouched blade, a wedge-shaped core, and a fragment of a biface projectile point. The wedge-shaped core, as follows from the description (Dikov 1993b), is not very reminiscent of typical wedge-shaped cores and attests to the degrading of this technique. At the Talain site there was a wedge-shaped core. At the source of the Anadyr' River, on Lake El'gygytgyn, geologists of SVKNII DVO collected diachronic materials, among which there are two wedge-shaped cores.

At Mount Kimeneki, in the western part of the Chukchi Peninsula, materials described as a wedge-shaped core and flakes were obtained from a geological core at a depth of 30 m with the drilling of a moraine (Laukhin and Drozdov 1989). The finds and the stratum from which they were

obtained are dated to 30,000 years ago by analogy with materials of the Ikhine and Ust'-Mil' sites in Yakutia. The general appearance of the finds summons doubt regarding such an interpretation.

On the Chukchi Peninsula itself, at Bering Strait, the sites of Kurupka I, Ul'khum, Chaatam'e and Kym'ynanonvyvaam VII, VIII, XIV, Ioniveem, and Igel'khveem were found, located on river terraces. At the Kurupka I site numerous flakes, microblades, fragments of bifaces, end and side scrapers, conical, wedge-shaped, and prismatic cores, and artifacts on flakes with transverse spalls removed were found on the surface (Dikov 1993a; 1993b). The last were also characterized as wedge-shaped cores, with the specification that they have an archaic appearance. They are compared with the Ushki and Ezhantsi cores. At the Ul'khum site were conical and prismatic cores, fragments of bifaces, end scrapers on blades, and two cores characterized as wedge-shaped, but excavations conducted at the site did not provide diagnostic material (Dikov 1993b). From the Chaatam'e I site, among the flakes, blades, and fragments of indefinite tools, is recorded a core on a quartz slab (Dikov 1993b). At the Kym'ynanonvyvaam VII, VIII, and XIV sites several not very diagnostic cores are recorded, and assigned to the Paleolithic (Dikov 1993b).

Meanwhile, there is Dikov's supposition (*Istoriya Chukotki* 1974) of the presence on Aion Island in Chaunsk Bay of Paleolithic materials, treated critically by Yu. A. Mochanov (1977). This was corroborated with additional study of collections from Aion Island, during the course of which were found a ski-shaped spall and a spall from the trimming of the pressure platform of a wedge-shaped core reformed into a scraper (Slobodin 2001b).

Exceptionally important in the reconstruction of cultural and technological connections of western Beringia are materials from the Druchak V site in continental Priokhot'e (Vorobei 1996). The complex of the site includes Yubetsu-like wedge-shaped cores, ski-shaped spalls, bifacial points, end macroscrapers, transverse, angle, and middle burins, bifacially worked axes of oval form, adzes, and others. The culture-containing deposits of the site were disturbed by cryoturbation and solifluction evidently reflected in the results of spore-pollen and radiocarbon analyses, which give an early Holocene age for the deposits. However, the technological characteristics of the complex suggest a genetic connection of the Druchak complex with the final Paleolithic industries of Pribaikal'e, with an age of 13,000 to 14,000 years (Vorobei 2003). Here the Lenchik site was investigated, the wedge-shaped cores from which have a rib on the side of the pressure platform and are distinct in their special variety — "Lenchik microcore type" (Vorobei, unpublished conference report, 2004).

A diagnostic tool complex was obtained from the Kheta site in the Okhotsk-Kolyma uplands. The finds lay in mechanically disturbed late Pleistocene deposits (at their base), covered by early Holocene tephra. Here, executed by the Yubetsu technique, were wedge-shaped cores, ski-shaped spalls (refitted), microblades, leaf-shaped and oval bifaces, end scrapers, transverse burins, and pendants. Transverse burins are poorly represented in Chukotka, Kamchatka, and in Yakutia, which brings the Kheta complex together with cultures of the Russian Far East — the Ustinovka and Seledmzhinsk. The Kheta peoples used raw material very economically, the tools at the site being small in size, the cores miniature. One such wedge-shaped microcore was found by I. E. Vorobei on the Arman' River, and several more by us at the Omchik II and Gipoteticheskii Istok sites on the Upper Kolyma. One of them, a bifrontal wedge-shaped core, is similar to artifacts from the Ushki sites (Layer VI) in Kamchatka, Barkasnaya Sopka (Seledmzha River), Khummi (Amur River), Molodezhnaya (Primor'e), and others, which permits viewing it as one of the "markers" of the later Paleolithic of Beringia.

Discussion

If not only the technological but the absolute (by C-14 or other natural methods) antiquity of the materials from the complex at Khaya IV is corroborated, then we have regional evidence of the formation of microblade technologies on the base of a blade industry from the beginning of the Upper Paleolithic in western Beringia.

The earliest evidence of settlement of western Beringia east of the Verkhoyansk Range by cultures with microblade industries, supported by C-14 dates, occurs from the valley of the Indigirka River and belongs to a time of approximately 13,000 to 14,000 years ago. On the Kolyma and in Priokhot'e all the complexes of this tradition are dated on the basis of typological comparisons with materials of Yakutia, Priamur'e, Primor'e, and Pribaikal'e. Their age is determined as being between 11,000 and 14,000 years. In Kamchatka the appearance of a microblade industry based on C-14 data is assigned to a time of approximately 11,000 years ago, and in Chukotka approximately 10,000 years ago. Guided by the earliest microblade complexes of Alaska with an age of about 11,600 years,¹ there is every reason to suppose that they appeared 500 to 1,000 years earlier in Chukotka. In the majority of cases, sites of this tradition are represented by short-term hunting camps or workshops. The only exception is the Ushki site, where were preserved long-term and repeatedly reconstructed houses, a burial complex, and a large quantity of evidence for a rich spiritual life of the Paleolithic inhabitants of Beringia.

The tool kit of these cultures is sufficiently unified and includes wedge-shaped microcores, ski-shaped spalls, microblades, oval bifaces, end scrapers on blades, burins (angle and transverse), and leaf-shaped points.

In spite of the generally common appearance, the tool kits of the different cultures differ. For sites of the Dyuktai culture of Yakutia an exceptionally small quantity of leaf-shaped arrow points and transverse burins can be noted, for example. In Kamchatka, at the Ushki site, leaf-shaped points make up a noticeable part of the tool complex, but transverse burins are poorly represented. At the Kheta and Druchak-Vetrennyi sites transverse burins were used rather widely. Besides this, the Druchak-Vetrennyi site is rendered distinct by the diverse end-macroscrapers on blades. All of this probably points to the fact that in Beringia at the end of the Pleistocene, within the framework of a tradition that was fundamentally large and identifiably unique, there existed various individual complexes or cultures possessing their own history.

Significant from these positions is the existence in Beringia of bifrontal wedge-shaped cores. The separation of bifrontal wedge-shaped cores permits us to carry out a definite division into regions of the whole zone of the spread of wedge-shaped cores in Beringia, and to trace the succession in the spread of this variety of core within the territory. Bifrontal wedge-shaped cores evidently spread from the Amur region through continental Priokhot'e to the upper Kolyma and Kamchatka. In Kamchatka, at the Ushki I site four specimens, at a minimum, of wedge-shaped cores of such type are now known. Judging by the publications, this type of wedge-shaped core did not spread into Yakutia. Nor is there a single specimen of bifrontal wedge-shaped cores known at sites of the Dyuktai culture (Mochanov 1977). This, in particular, may be evidence of more substantial influence or

¹ Recently dated somewhat earlier than this, as commented on in Chapter 11, below [eds.].

spread onto the upper Kolyma and Kamchatka of traditions from the Far Eastern and Priamur'e Paleolithic, and not from the Dyuktai culture to the west. From the upper Kolyma, Kamchatka, and possibly Chukotka the technological traditions of bifrontal wedge-shaped cores were spread farther into Beringia, into Alaska, where they are known at the sites of Red Dog (Gerlach and Hall 1996), Broken Mammoth (Holmes 1996), and Little Panguingue Creek (Hoffecker and Powers 1996).

In Alaska, the late Sartan western Beringian microblade complexes are viewed as the basis of the formation and appearance there of the Paleo-Arctic tradition (including the Denali Complex).

CONCLUSION

Thus, over the last five years, a large volume of materials on the Paleolithic of western Beringia has been introduced into scientific circulation, which elucidate many problems weakly studied earlier, and which permit planning new long-term directions in the investigations of Paleolithic sites in this region of Beringia.

And in first order, using the example of the Yana site, is the more than doubling of the chronological framework (to 27,000 years) of the possible existence of Paleolithic sites with bifacially worked tools, and without a blade industry, in western Beringia. To reinforce this "boundary" and to fill the chronological lacunae with other cultures (in the first instance with Dyuktai) are aims of further investigations. Also significant is the discovery of the first type site of Paleolithic Chukotka at Lake Tytyl', with a clearly pronounced tool complex and dates. Cores of this complex demonstrate a pronounced non-Yubetsu-like technology in their preparation, with trimming of the pressure platform by short frontal or lateral spalls, not ski-shaped. Such specifics are well represented among wedge-shaped cores in Layer V of the Ushki sites.

The study of materials from the site of Bol'shaya Khaya IV on the Okhotsk-Kolyma plateau is promising. These materials demonstrate the evolution of the late Paleolithic technology of obtaining blade forms, from the flaking of crude blades from broad surfaces of flat subprismatic cores to obtaining blades from end cores. Specific varieties of wedge-shaped cores are distinguished in Beringia (Lenchik type, and bifrontal), and their possible regions of spread and chronological framework of existence are preliminarily defined, but they still await being made more precise.

Also, new data have been obtained on several previously known sites (Kheta, Ushki, Druchak, Bol'shaya Khaya IV, Aion Island). This results in the review of the initially proposed cultural connections and dates of these sites. The recently published younger dates, in comparison with those earlier known, from Layer VII of the Ushki site (coinciding with dates for Layer VI) did not at all diminish its significance for the Paleolithic of Beringia. They probably define the upper chronological boundary of the early Ushki culture, and only emphasize the urgency of further investigations in the solution of this problem.

The accumulation of data on cobble complexes of western Beringia has continued, to which several more sites in the Omolon valley have been assigned in recent years. Meanwhile, these complexes are arguably the least represented both in time and in technological aspects. Only the discovery of a stratified site of this tradition, with determination of the age of the site by C-14 (or other

natural-science method), will provide a real basis for the determination of their place among the archaeological cultures of western Beringia.

The “recognition” of the Paleolithic age of such sites as Maiorych, Kukhtui III, several Chukotkan sites, and others, which filled the role of Paleolithic “outpost” in the history of the study of the Paleolithic in western Beringia, is not compelling now because their complexes are not representative, they lack dates, and other clearly Paleolithic sites are present in these regions.

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Chapter 2

Archaeological Complexes of the Pleistocene-Holocene Boundary in Western Chukotka (Tytyl'vaam River Valley)

Margarita A. Kiriya (Dikova)

INTRODUCTION

Investigators of the prehistory of northern Eurasia and North America have always taken into account the territory of Chukotka, located so close to Alaska. Transit routes ran through here for many millennia, and here early populations came together as they penetrated into extreme Northeast Asia and America. The only data that document these prehistorical events are archaeological sites, the interdisciplinary investigation of which helps to resolve problems of the origin of early cultural traditions and ethnic connections on both sides of Bering Strait.

Of special interest in this regard are archaeological complexes discovered relatively recently — at the end of the 1970s and in the 1980s — in eastern Chukotka. Researchers have assigned the time of their formation to the end of the Pleistocene and beginning of the Holocene (Dikov 1993a, 1993b). In the opinion of specialists the earliest artifacts are those found during geological drilling in cobble-gravel deposits from the beginning of the Sartan glaciation at a depth of 32 to 33 m on Mt. Kymyneikei, in the continental region of eastern Chukotka (Laukhin and Drozdov 1989). The geological core sample extracted contained a small number of objects (a prismatic core made on a pebble, skreblo-like artifacts, and blades), which, on the basis of typology and geological age, were tentatively dated to a time 30,000 years ago and possibly earlier (Laukhin and Drozdov 1989:38).

In all probability a small complex of artifacts made from river cobbles, which I found in 1980 in excavations at the Orlovka II site (in west-central Chukotka), is also of approximately the same age: a “Levallois core for blades” (in the terminology of F. Bordes), a core in form and technique similar to “tortoise-shell” specimens, a uniface chopper, skreblos on cobble spalls, and crude end-scrapers. The site is located on a high terrace, 120 m above the level of the Orlovka River. Because of the small quantity and the few specifics known regarding the deposition of the artifacts, and the absence of radiocarbon and palynological data, a more precise age for the Orlovka complex is impossible to establish (Kiriya 1985, 1995). It can possibly be assigned to the end of the Karginsk interglacial or the beginning of the last, Sartan glacial. Cobble cores of the Orlovka complex are similar morphologically to such artifacts found at the sites of Kumary II, near the Amur River, and Ezhantsy, near the Aldan (Kiriya 1985, 1995).



Figure 1. Location of Lake Tytyl' (scale in kilometers).

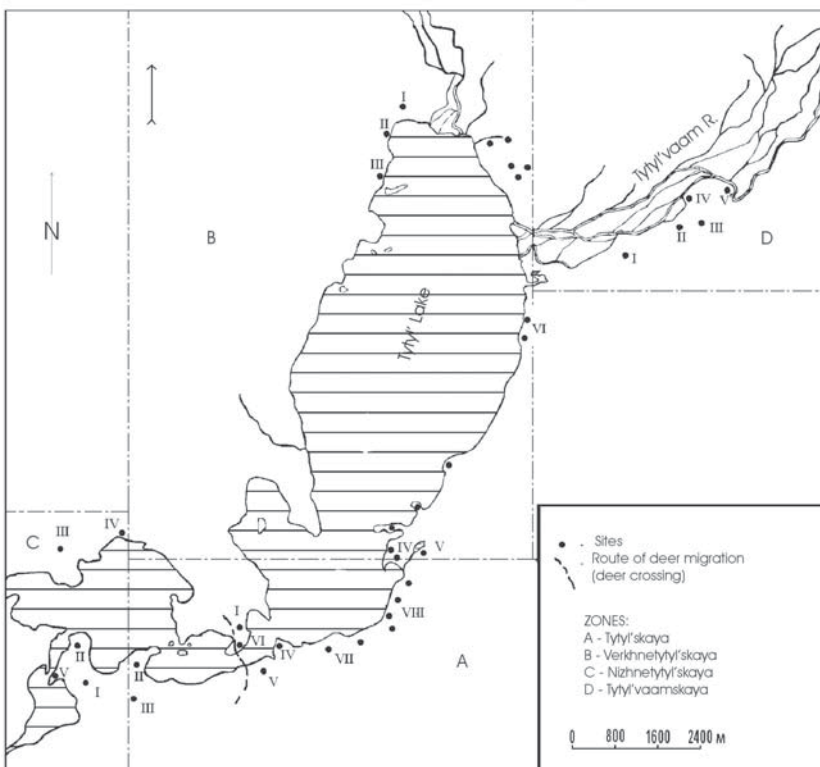


Figure 2. Location of sites in the coastal zone of Lake Tytyl' and the Tytyl'vaam River valley (scale in meters).

Taken together, the cultural remains from Mt. Kymyneikei and those excavated at Orlovka II can today be considered as probably the earliest in Chukotka.

The representative group of Upper Paleolithic artifacts collected by Nikolai N. Dikov from the surface and during excavations at the sites of Ul'khum I and Kurupka I, in eastern Chukotka, can be more confidently identified. Correlating some components from mixed, diachronic complexes, Dikov has pointed out typological parallels with the Early Ushki and Late Ushki cultures in Kamchatka of the early Holocene (Dikov 1993a:148, 1997:92-93).

In eastern Chukotka, Dikov (1993a:148) reported a series of sites with artifacts of Paleolithic appearance (Marich I - III; Chel'kun II; Kus'yuveem IV, VI, X; Chaatam'e I; and others), but the absence of stratigraphic or any other basis for validating their age creates problems for chronological interpretation.

In light of these problems we feel the discovery of several Upper Paleolithic sites in the Tytyl'vaam River valley of western Chukotka is important. These are located beyond the 67th parallel of north latitude, 4 to 6 km northeast of Lake Tytyl' (Figs. 1, 2). These sites

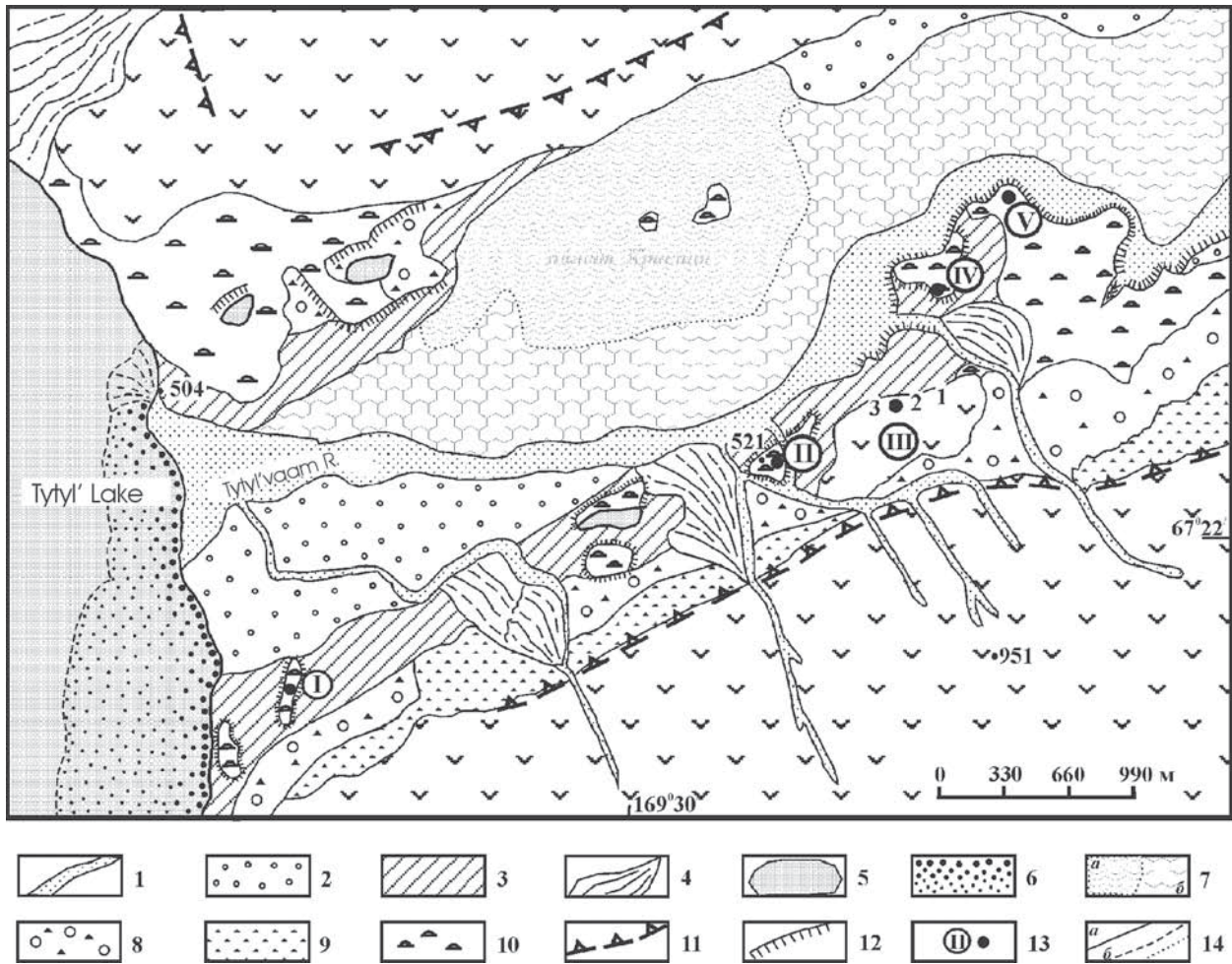


Figure 3. Geomorphologic map of the Tytyl'vaam River valley: 1. Channel. 2. Flood plain at an elevation of 1.5-2.0 m. 3. First terrace above flood plain at an elevation of 3-4 m. 4. Alluvial-colluvial cones of debris. 5. Lake. 6. Shoreline sandbanks. 7. Ice: a) multi-year, b) areas of seasonal thawing. 8. Moraine of the latest Pleistocene glaciation. 9. The same, covered with talus along the foot of the slopes. 10. Fragments of fluvio-glacial terraces at an elevation of 8-10 m. 11. Shoulders of a trough. 12. Erosional bench. 13. Archaeological sites and their sequential numbers. 14. Geomorphological boundaries: a) established, b) supposed. Scale is in meters.

have informational value not only because they are the northernmost in the Chukotka region, but also because of their stratigraphic context and radiocarbon dates. The latter elements place the sites in a more favorable position than the presumed late Pleistocene Ul'khum I and Kurupka I sites discovered in eastern Chukotka, which were not studied stratigraphically and dated by radiocarbon (Dikov 1993a).

In 1996 I examined the area in the valley around the mouth of the Tytyl'vaam River, which flows from the northeast into Lake Tytyl' (Figs. 2, 3). A washed-out surface in the vicinity of one of the sites revealed a denuded fragment of a cultural layer where we found a wedge-shaped core (Fig. 4:9) and a ski-shaped spall. In 1998 more detailed surveys in the Tytyl'vaam River valley were carried out, and in 2000 and 2002 excavations were conducted in which five Upper Paleolithic locations were opened — the sites of Tytyl'vaam II to V and Podgornaya, Locus 1.

The archaeological sites discovered in the Tytyl'vaam River valley are, as might be expected, in the immediate vicinity of Lake Tytyl'. The selection of this place in the polar zone of western

Chukotka for numerous and possibly long-term sites is not by chance, but was because of particularly favorable geographic and micro-climatic conditions.

GEOGRAPHIC POSITION, GEOMORPHOLOGICAL SITUATION, CLIMATE¹

The region of investigation is on the south slope of the Ilirnei Range in the southeastern part of the Anyui Plateau and on the left bank of the Tytyl'vaam River, where it embraces a section of the valley and the slopes surrounding it for an extent of 4.5 km from the eastern shore of Lake Tytyl' to the mouth of an unnamed left-bank tributary (Fig. 2). In the stratigraphy of the Ilirnei Range are sedimentary, sedimentary-volcanic, and volcanic strata of the upper Triassic; the lower, middle, and upper Jurassic; the lower and upper Cretaceous; and the Cenozoic.

The slopes of the mountain massifs on the lower course of the Tytyl'vaam River are composed of volcanic formations, predominantly lava. Also, outflows of andesites, andesitic basalts, tuffs, tuff-lavas, and dacites with thicknesses of 100 to 1,000 m can be observed. In the basin of the middle course of the Tytyl'vaam River is a massif with Pobeda Peak as the summit (1,521 m). Volcanic formations of acidic composition, predominantly of tuff, are spread here.

Friable deposits in the bottom of the valley are represented by thin-layered glacial and fluvio-glacial deposits of the last glaciation epoch — blocks, boulders, cobbles, sandy loams, and loams. The low terraces, bottom lands of the rivers and creeks, and alluvial-colluvial cones of debris have an early Late Holocene age and are represented by gravels, sands, sandy-loams, loams, blocks, boulders, and rubble. On the slopes and the areas between streams, collapsing scree, talus, and solifluction deposits predominate.

The chief element of relief in the territory being studied is Lake Tytyl' itself, of a subpond-glacial origin. Filling the valley of the Tytyutin River, which drains from north of the axial part of the Ilirnei Range (the northern Anyui Range), the absolute elevation of the lake is 504 m. The lake flow consists of five reservoirs conjoined by short channels of different sizes and has a total extent of 18.8 km, with a depth in its central part of about 70 m. The northern segment of the lake, 10.3 km in length, is an oval stretching from north to south. Its maximum width in the central part is 4.5 km, with narrows elsewhere formed by protruding capes — fragments of stadial end moraines. The width of these protrusions reaches 0.8 km, their length 3.0 - 3.5 km. Along the shores fragments of low lake terraces can be seen — witnesses to gradual lowering of the lake level.

Characteristic for the region of investigation is the presence of numerous traces of glacial activity. Glacial cirques developed in the high mountains, and the overwhelming majority of the valleys in the northern and southern slopes of the range are united by deep valley passes with traces of glacial modification. The valleys are straight, having the transverse profile of typical glacial troughs, their bottoms filled with moraines and deposits of fluvio-glacial flows, and in some areas they are partitioned by end moraines. Lake Tytyl' itself emerged as a result of ponding of the Tytyutin River valley by a large end moraine, which apparently marks the boundary of the maximum expanse of the

¹ The geomorphological survey was by O. Yu. Glushkova, Senior Research Associate at the Northeast Interdisciplinary Scientific Research Institute, Far East Division, Russian Academy of Sciences.

Sartan glacier. In the valleys, such forms of glacial relief as fragments of fluvio-glacial terraces and outwash plains predominate. The moraines, which usually cover the bottoms of the valleys, are preserved only in the form of narrow bands near the bottoms of slopes at an elevation of 20 to 35 m above river level. They are usually covered with talus at the bottoms of steep slopes and are deformed by modern cones of debris in the stream valleys. One of the large elements of the landscape in the valley of the Tytyl'vaam River is an ice body 3.6 km long.

In the area of the fall into Lake Tytyl', the Tytyl'vaam River channel is forced to the left side of its valley. Fragments of the 1.5- to 2.0-m high flood plain can be traced there, as well as the 3- to 4-m high first terrace above the flood plain, and remnants of a fluvio-glacial terrace 8 to 10 m high. The Sartan moraine, partially covered by talus, is preserved below the slope.

The gradual and very substantial warming of the climate at the end of the late Pleistocene and beginning of the Holocene about 10,000 years ago led to the melting of the large glaciers in the valleys of the region. Observations in other regions show that early hunters of the north often followed the retreating glaciers. Large numbers of wild animals congregated in these regions. Toward the beginning of the Holocene, passage by way of the Tytyl'vaam River on the south slope of the Ilirnei Range was possibly free, along which in summer migrated not only herds of reindeer, but also possibly the last populations of mammoths. The animals that migrated for winter into the relatively warm valley of the Malyy Anyui River, at the beginning of the spring snow melt returned through the valleys to the north into the Chaun lowlands, and farther into the region of the Arctic coast. The migrations of early people took place not only along the valley of the Tytyl'vaam River, but also along the Tytylutin valley. The second factor that was favorable for the arrangement of sites in that place is undoubtedly the presence of the big lake with its large number of fish, providing year-round food. The third factor is the extensive ice body, which additionally attracted animals in summer, saving them from insects as well as creating natural salt licks with its thawing. Thus, it was a place visited by large numbers of animals. The fourth factor is that the occasionally very steep precipitous southeastern slope of Mt. Krasnaya was a favorite place for snow sheep, an additional food source for the early hunters. Fifth, early people selected the relatively level, dry, and well-drained surface of the fluvio-glacial terrace for settlement. At the present time, owing to a deep freezing of component material, only isolated remains of the terrace are preserved, its primary part eroded by the river and a low alluvial terrace formed at the 3- to 4-m level.

Traces of human activity throughout the Holocene are noted along both sides of the Tytyl'vaam River valley. The earliest sites are concentrated on the left bank in the area around the mouth. These are campsites Tytyl'vaam II to V, located on fragments of fluvio-glacial terrace (8 to 10 m) and the terrace above the flood plain (4 to 6 m), and the Podgornaya site, located on a lateral moraine (more than 20 m high).

A detailed description and analysis of material complexes of the named sites was carried out by the author on the results of investigations in 1998 - 2000 (Kiriya et al. 2003). During excavations of the Tytyl'vaam IV site (Locus 2) in 2002, new representative material was obtained, more clearly illustrating the stone industry of the early occupants.

Archaeological Complex of the Tytyl'vaam IV Site

Topographically the Tytyl'vaam IV site is divided into two areas: Locus 1 is positioned on a fluvio-glacial terrace 7 to 8 m high, cut by the Tytyl'vaam River; Locus 2 is situated on the terrace adjoining it on the southwest, which is 4 to 5 m above the flood plain.

During visual examination of Locus 1 about 1,000 artifacts were collected, among which fewer than 2% are morphologically definite forms, the remaining part debitage — fragments of blanks, angular spalls, nodules, and flakes (among the last only 28 were micro-specimens). At Locus 1, an area of 20 m² was opened. The cultural remains lay immediately under the thin sod layer on the stony ancient surface of the fluvio-glacial terrace. The complex was not large: two blanks of wedge-shaped cores (Fig. 4, 1, 4), one wedge-shaped core (Fig. 4, 5), a biface (Fig. 4, 11), a scraper (Fig. 4, 13), a large fragment of a bifacially worked spear point or knife blade, and two bifacially worked discoidal artifacts. The raw material used was tuffite and siliceous slate. The material complex at the Tytyl'vaam IV site, Locus 1, considering its assemblage — to which the surface collection was added — permits a tentative conclusion that the site was functionally a workshop, in the vicinity of which the reduction of raw material occurred. This is supported by the large quantity of debitage with the numerically small kit of finished tools.

Upon examination of blowouts in 1996 on the 4- to 5-m terrace at Locus 2 of the Tytyl'vaam IV site, a wedge-shaped core (Fig. 4, 9), a ski-shaped spall, and several microblades were found, and small clusters of tiny microflakes were noted. A test pit (2 x 2 m) was placed in one such cluster, yielding wedge-shaped cores (Fig. 4, 2, 3, 6-8, 12) and two fragments of thin bifacially worked points, apparently originally leaf-shaped (Fig. 4:10).

In 2002 the test pit was expanded to an excavation of 27 m², its stratigraphy as follows: 1) sod, 2-14 cm; 2) ash-colored fine-grained sandy loam, 1-5 cm; 3) a brown loam/sandy loam layer with pockets of black-brown humus, 13-37 cm; 4) yellowish-brown sterile sand, 5-18 cm; 5) lenses of compressed sterile, clear-yellow sandy loam. In the walls of the excavation, disturbances of the horizontal bedding could be clearly seen. These were probably connected with fluvio-glacial flows and cryogenic and solifluction processes that occurred in the early Holocene during various stages of the retreat and melting of the glacier.

In the profile and the floor of the northern part of the excavation, traces of a frost crack and pocket of sub-sod ashy, sandy loam were revealed, penetrating to a depth of 20-23 cm. A cluster of artifacts was found along the trough of the pocket throughout its whole extent. In the southern part of the excavation the contours of a depression (pit?) were revealed with a fill of blackish-brown humus. In this same place occurred the bulk of finds from 2002, the artifacts in a brown humic layer. The remaining objects were found in vertical or slanting positions, suggesting they had suffered some displacement. The thickness of the whole culture-bearing fragment was from 15 to 37 cm.

The collection consisted of 649 artifacts (including finds from the first test pit). These were 28 wedge-shaped cores, 2 bifacial core blanks, 3 rejuvenation spalls of crest-like platforms of cores, 56 microblades, 2 ribbed blades, 2 blades, 3 end scrapers on blades, 10 burins on flakes, 2 fragments of arrow points, 1 punch, 2 uniface choppers, 2 edge spalls of cobbles, 2 pieces of raw material, 3 nodules, 196 flakes, and 337 microflakes. The raw material was tuffite, gray siliceous slate that on rare occasions was greenish, and isolated spalls from basalt cobbles.

Cores. Bifaces served as the basis for primary flaking (Figs. 5, 6, 7, 1-2, 4, 6, 7, 9), though on some occasions massive flakes were used (Fig. 7, 5, 8). Some wedge-shaped cores had a peculiar characteristic — a crest, either distinct or slight, running longitudinally along the center of the striking platform (called here, the pressure platform) (Figs. 5, 3-5; 6, 3), which was removed in the course of trimming for blade removal. Trimming was carried out at a sharp angle to the flaking front (Figs. 5, 3-6; 6, 3, 4, 7, 10). Sometimes a spall was struck off along the whole striking platform with displacement toward one of the sides (Fig. 5, 7, 9). In some cases, part of the rib of the keel was flaked off (Fig. 6, 7-9, 10). The process of rejuvenating the striking platform is illustrated by three artifacts (Fig. 8, 23-25).

In the material complex from Locus 2, the whole process of deriving microblades (Fig. 8, 5-17) from wedge-shaped cores can be seen: thin bifaces of oval (and possibly subdiscoidal) form were widely used, which were flaked or split along the transverse axis. This formed the future striking platform, which initially — as primary blanks, preforms, and rejuvenation spalls from the striking platform illustrate — could be straight (Fig. 7, 1), concave (Fig. 7, 3), or convex (or “bent”) (Fig. 7, 2), the latter being caused by a break from a projection on the flaked biface, which was retouched rather than removed.

Among the cores is also a subprismatic specimen from which large blades were flaked.

Scrapers. Large blades served as blanks for end-scrapers (Fig. 8, 1-3). Flakes were used as microscrapers (Fig. 8, 19).

Burins. Angle and lateral burins were made on amorphous flakes by the removal of one or two burin spalls (Fig. 8, 18, 20, 22). The part around the haft was not modified by retouch.

Other specimens. Flakes (Fig. 8, 21), blades (Fig. 8, 4), and lamellar spalls were used opportunistically. In the collection of artifacts from Locus 1, there are also two crude uniface choppers (Fig. 9).

Discussion

Functionally the site can probably be interpreted as a workshop with specialization oriented toward the production of microcores.

The stone assemblage from the two loci of the Tytyl’vaam IV site represents the Tytyl’vaam cultural tradition in such a way that the coexistence of three technological components is revealed — the blade, microblade, and biface components. The blade component is based on the flaking of large subprismatic cores of parallel cleavage. Wedge-shaped microcores lie at the base of the microblade technique. And a highly developed bifacial technique is also represented.

The distinctive nature of the microblade technology at the Tytyl’vaam IV site can be seen in the formation of the striking platform of wedge-shaped cores by retouch that created a rib or “crest.” The removal of microblades was carried out through short direct shearing on the cleavage front at an acute or (more rarely) right angle to its long axis. At the same time, Tytyl’vaam people formed wedge-shaped cores not only on bifaces, but also on blanks of a different character (Fig. 4, 4) — large, percussion-flaked nodules of similar overall form that might better be termed “end-cores.” Bladelets were derived from both types — wedge-shaped microcores and end-cores — in a similar way.

Comparisons

For determining the place of the Tytyl'vaam complex within the context of Upper Paleolithic cultures in adjoining territories, it is necessary to make a comparison using multi-component and reliably stratified sites.

The closest parallels in a number of ways can be found in the Dyuktai culture of Yakutia. Analogies appear in the technique of primary flaking. In the Dyuktai materials subprismatic and prismatic cores, along with wedge-shaped ones, are rather widely represented (especially in the early complexes of the Ezhantsy site), for the preparation of which large river cobbles were used, a trait characteristic also for the Tytyl'vaam complexes. On several wedge-shaped cores not made from the standard biface blanks, a projection appears on one lateral face, presumably an adaptation to a particular manner of clamping during blade removal (Fig. 4, 4) (see also Mochanov 1977:Pls. 1, 10; 4, 2, 8; 8, 7; 21a, 1).

Also analogous is the Dyuktai peculiarity of a crested platform on the blanks of wedge-shaped cores (see Mochanov 1977:Pls. 15, 12, 16; 23, 2-7; 24, 37; p. 70), although these were not specifically noted by the investigators. Along with the similarities in individual types of wedge-shaped cores, however, differences can also be seen. All of the Tytyl'vaam wedge-shaped cores have a tall or vertical profile. In addition to such specimens, in the Dyuktai culture horizontal "Gobi" cores make up a substantial portion (Mochanov 1977:Pls. 8; 21a; 23).

There are also similarities in the primary categories of tools. For the Dyuktai sites the use of burins of various types (angle, lateral, dihedral, transverse) on flakes and slab fragments is typical. Working edges were formed by the removal of one or two burin spalls. The body of the burin was partially modified by retouch or else preserved the surface of the primary blank. In the Tytyl'vaam complex, angle and dihedral burins were identical in technical characteristics to some Dyuktai specimens.

In both complexes the bifaces also provide analogs (Fig. 4, 11) (Mochanov 1977:Pls. 3, 2; 13, 20; 22, 11).

In the Dyuktai culture, projectile points of willow-leaf form are noted (Mochanov 1977: Pls. 3, 1; 7,7). Fragments of two willow-leaf arrow points were also found at the Tytyl'vaam IV site, Locus 2 (Fig. 4, 10).

In the opinion of researchers, the Dyuktai culture disappeared about 11,000-10,500 years ago in northeast Asia (Mochanov 1977:239). However, as the analogs cited above indicate, the Dyuktai tradition continued its existence in the adjoining territory of western Chukotka in the earliest stages of the Holocene.

Yu. A. Mochanov assumed the probable association with the Dyuktai culture of some artifacts from Layer VI (Late Pleistocene) of the Ushki I site in Kamchatka (Mochanov 1977:224). A connection (in part, genetic) of the Ushki Late Paleolithic culture with the Dyuktai is also suggested by N. N. Dikov (1979:72). Indeed, the fundamental basis of the culture in Layer VI of the Ushki I, V, and VI sites appears to me to be close to Dyuktai. In the Ushki sites two technological traditions also coexisted — the blade and the microblade — and along with crude subprismatic cores the Ushki

people used microcores, predominating in all the Ushki complexes. The microcore types are absolutely identical to those of Dyuktai (Dikov 1979:Fig. 16), and the burins, bifaces, and arrow points are analogous (Dikov 1979:Figs. 18-20). The Ushki component is also rather well represented with crude tools (of percussion and skreblo-like character) made from cobbles and slabs (Dikov 1979:Figs. 17, 18). At the same time, the Ushki complexes include such stone specimens as labret-like objects, a large number of sculptural and graphical images, and pendants, which are not found in the Dyuktai complexes.

The house-building technique is very clearly and vividly represented among the Ushki peoples — semisubterranean dwellings with a corridor-like entry and stone hearths. These have no analogs in the Dyuktai culture nor in other Upper Paleolithic cultures of Siberia.

Comparison of the Tytyl'vaam artifacts with those of Ushki, Layer VI, reveals their closeness not only in the parameters traced above, but also with consideration of the peculiarities of the primary flaking, represented by microcores. These are united by such a distinctive detail as the presence (on some of the Ushki specimens) of the crest-like retouched ribs on the striking platforms, as clearly shown in Figure 10, in which not only the materials from the Ushki I site obtained by Dikov are reflected (that researcher did not succeed in publishing a large part of the Ushki finds), but also new materials we collected during excavations at the Ushki V site in the year 2000.

The distinctiveness of such a type or subtype of wedge-shaped core is emphasized by Dikov in the description of the small amount of materials from the final Paleolithic Layer V of the Ushki sites, in which the “usual finds for Layer VI” were also noted (Dikov 1979:78), and which probably shows the succession within the local cultural tradition.

I found an analogous type of wedge-shaped core and crest-like rejuvenation spall of the striking platform at the Bol'shoi El'gakhchan I site (in the territory adjoining western Chukotka) (Kiriya 1993, 1996). There is also such a type of wedge-shaped core with a crest-like striking platform in the material complex of the Chinese Hutouliang site, located southwest of Beijing (Chen Chun and Wang Xiang-Qian 1989:Fig. 18, 3, 6, 7). In the Hutouliang complex are artifacts analogous to those of Layer VI of the Ushki I and V sites in Kamchatka; these include, besides the cores mentioned, leaf-shaped bifaces, spear points, and end-scrapers (Chen Chun and Wang Xiang-Qian 1989:Fig. 18, 8-11). The age of this site is 11,000 years BP.

The distinctiveness in the formation of wedge-shaped cores noted above can also be traced to Alaska. In the Teklanika West complex, typologically close to Tytyl'vaam, not only are there wedge-shaped cores with retouched and ribbed (and in some cases longitudinally indented) striking platforms (West 1996:Fig. 7-3, n, o, p, q, r), but also large subprismatic cores (West 1996:Fig. 7-3, f, g), isolated specimens of end scrapers on the ends of large broken blades (West 1996:Fig. 7-4, g), and side-scrapers on large flakes (West 1996:Fig. 7-4, f).

In Component II of the Dry Creek site, the date of which is placed in the chronological framework of Layer VI of the Ushki sites, an analogous technological method can be clearly traced — a longitudinal crest-like striking platform on a core of slightly concave lateral profile, which was rejuvenated in the removal of blades (Hoffecker, Powers, and Bigelow 1996:Fig. 7-9, b, c, g). This method is also characteristic of the Campus site, the age of which is unclear (Slobodin 2001).

These technical and typological parallels cannot be accidental. In them are probably manifested the sources of that tradition embodied in the early Holocene complexes of the Tytyl'vaam River valley in western Chukotka. Of course, it must be considered that the investigation of the Tytyl'vaam Paleolithic antiquities has only begun (the total area of the excavations amounts to 54 m²) and further study of them remains an urgent task.

CONCLUSIONS

Analysis and comparison of the Upper Paleolithic materials being examined from standard archaeological sites in two adjoining territories — Yakutia and Kamchatka — lead to the conclusion that there was a unified historical and cultural community at the end of the Pleistocene, on the base of which local cultures were formed and developed: Dyuktai, which existed in the interval 35,000 to 10,500 years ago, and the Ushki culture of Layer VI with a temporal interval of 10,860 ± 400 to 10,360 ± 345 BP. At the beginning of the Holocene this continued in the geographically intermediate area of western Chukotka, where the Tytyl'vaam complex has produced radiocarbon ages of 9725 ± 45 (CAMS 80788) and 9820 ± 40 years (CAMS 80789).

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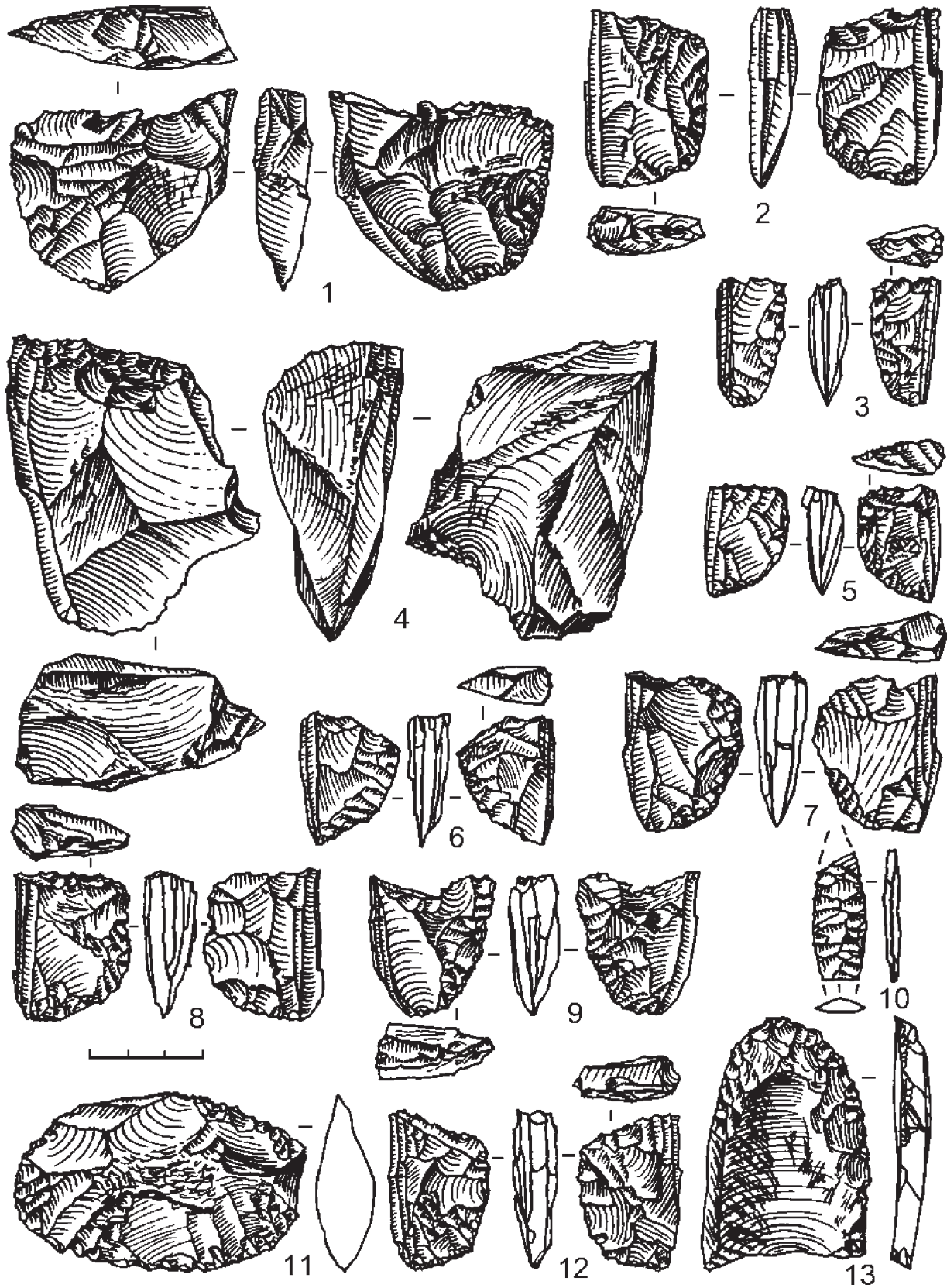


Figure 4. Stone artifacts from the Tytyl'vaam IV site: artifacts 1, 4, 5, 11, 13, from Locus 1; artifacts 2, 3, 6-10, 12, from Locus 2; artifacts 1, 4, preforms; artifacts 2, 3-9, 12, wedge-shaped cores; 10, point fragment; 11, biface; 13, scraper. Scale is in centimeters.

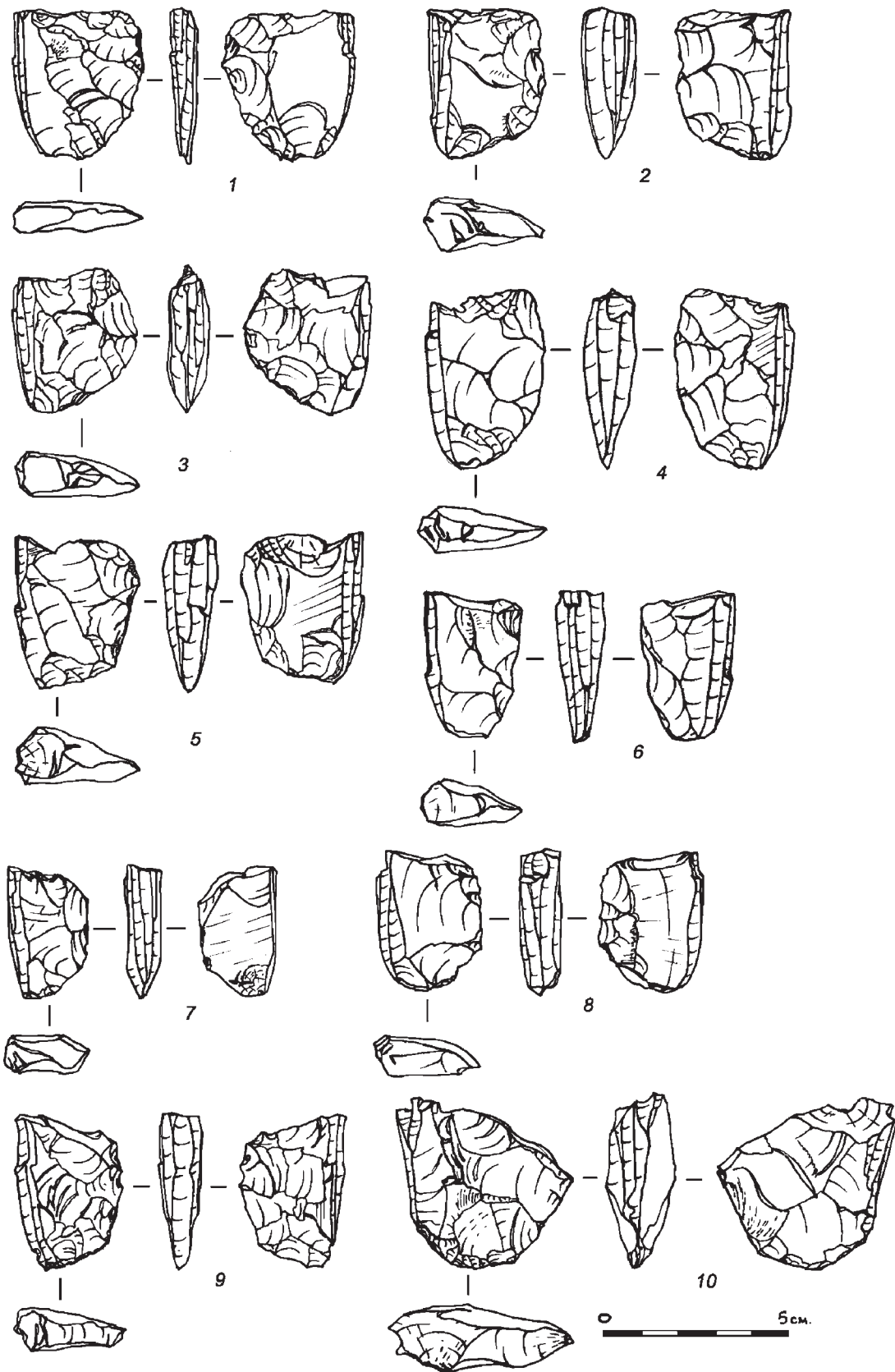


Figure 5. Wedge-shaped cores from the Tytyl'vaam IV site, Locus 2 (scale in centimeters).

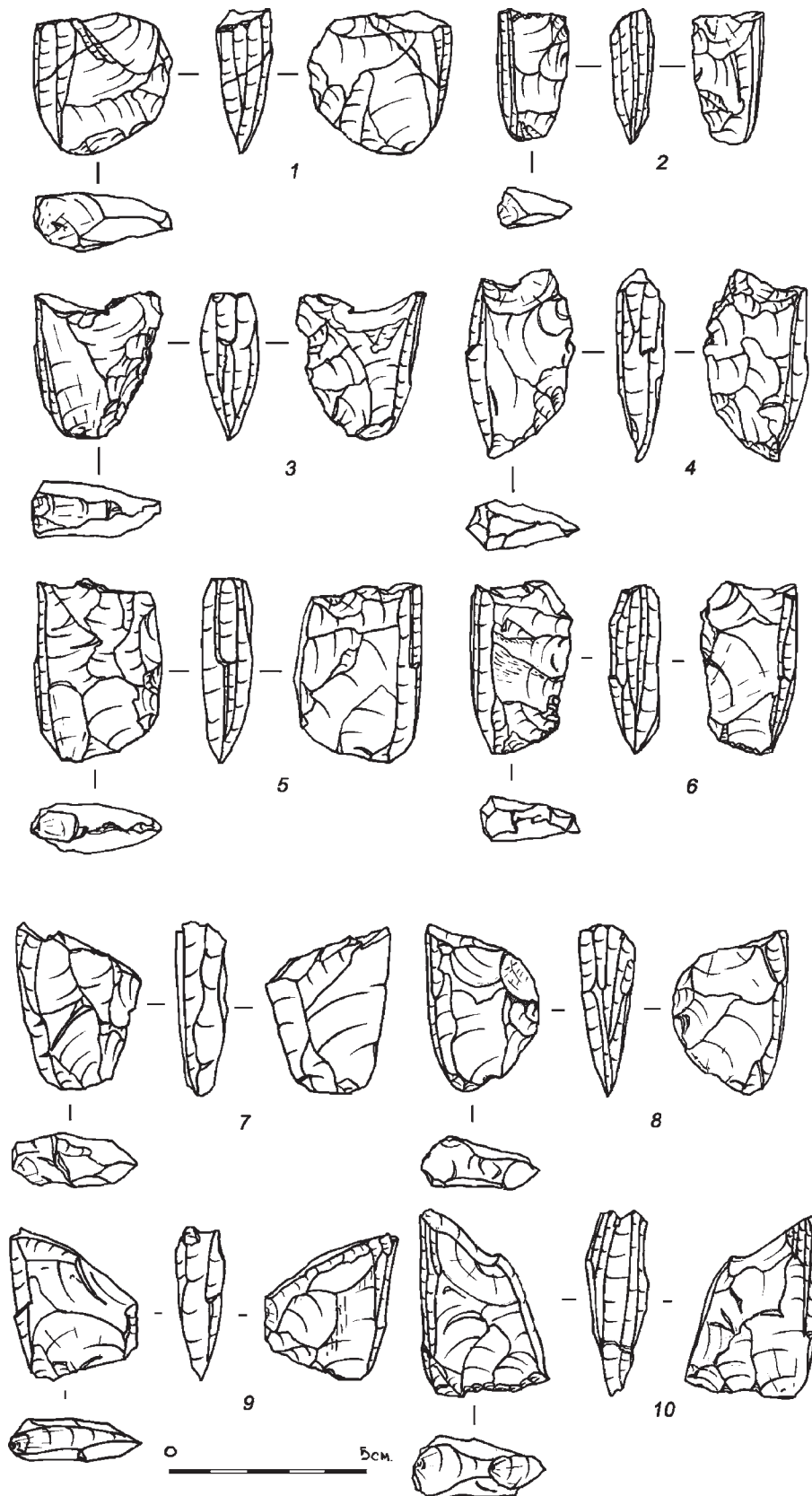


Figure 6. Wedge-shaped cores from the Tytyl'vaam IV site, Locus 2 (scale in centimeters).

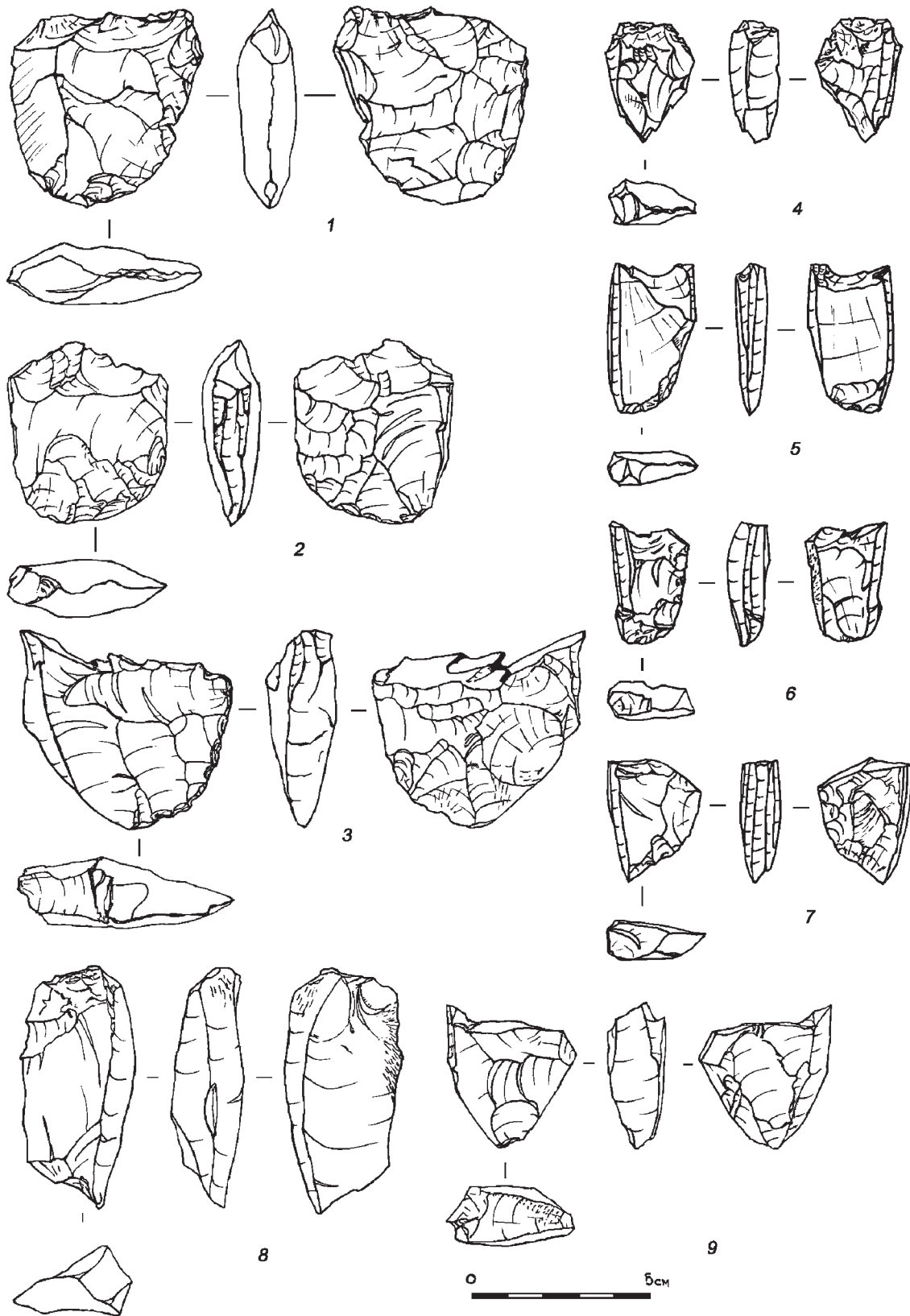


Figure 7. Biface blanks and wedge-shaped cores from the Tytyl'vaam IV site: 1, 2, 4-9, from Locus 2; 3, from Locus 1). Scale is in centimeters.

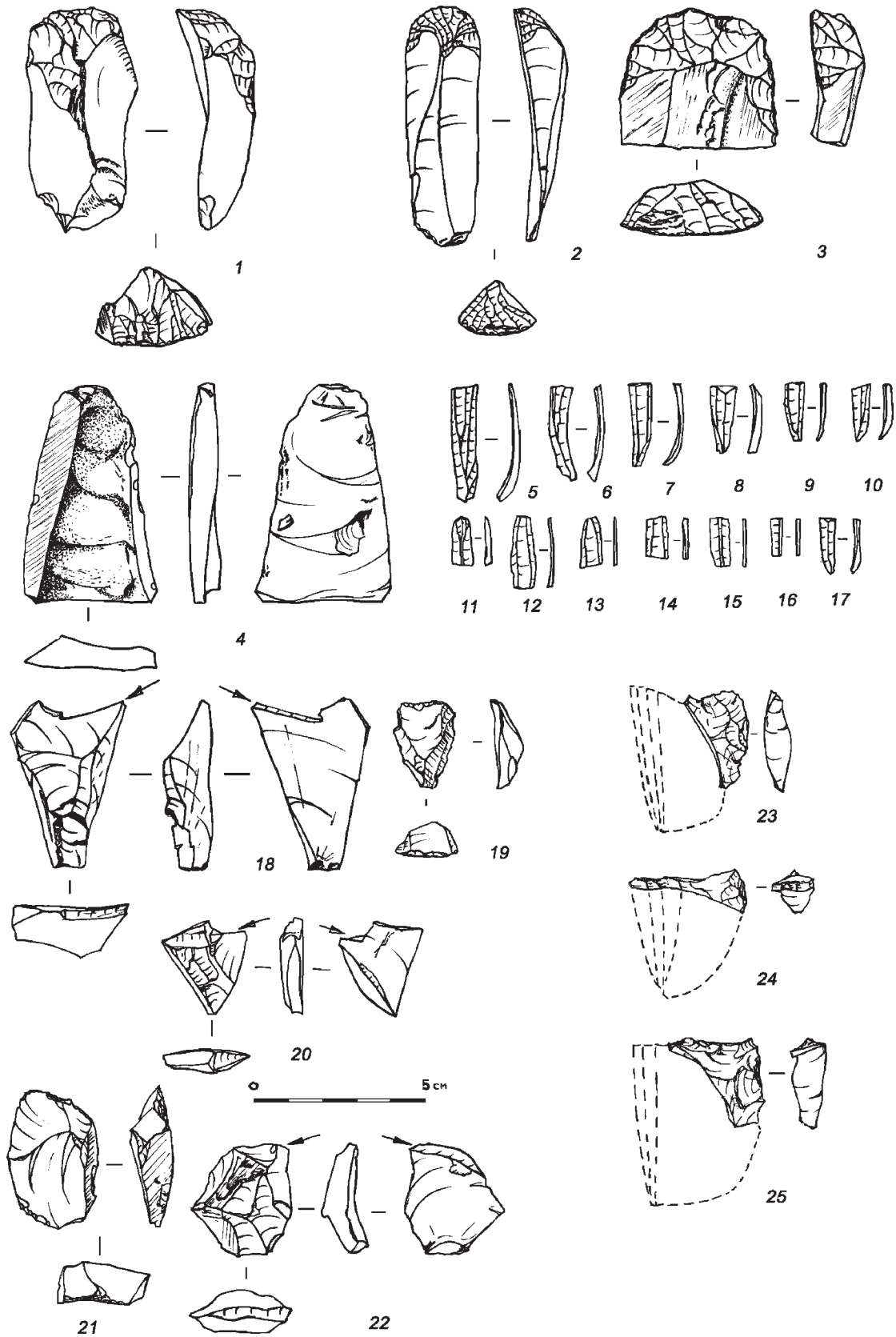


Figure 8. Stone artifacts from the Tytyl'vaam IV site, Locus 2: 1-3, end scrapers; 4, blade; 5-17, microblades; 18, 20, 22, burins; 19, micro-scraper; 21, tool on a flake; 23 - 25, rejuvenation spalls from the striking platform. Scale is in centimeters.

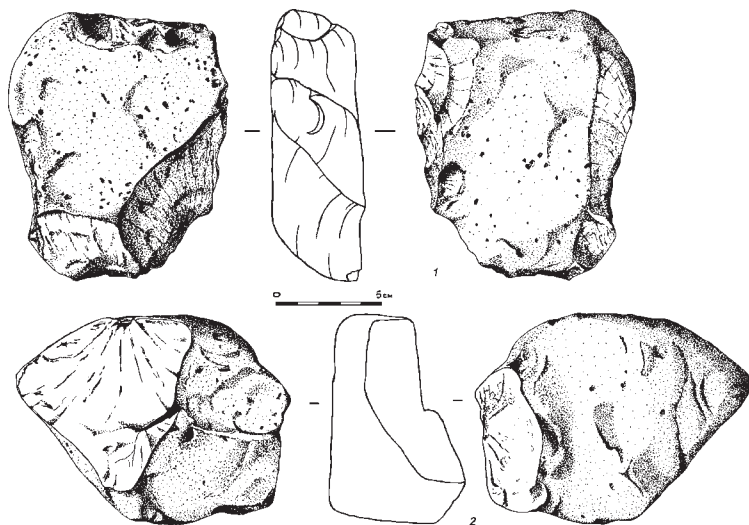


Figure 9. Uniface chopper from the Tytyl'raam IV site, Locus 2.

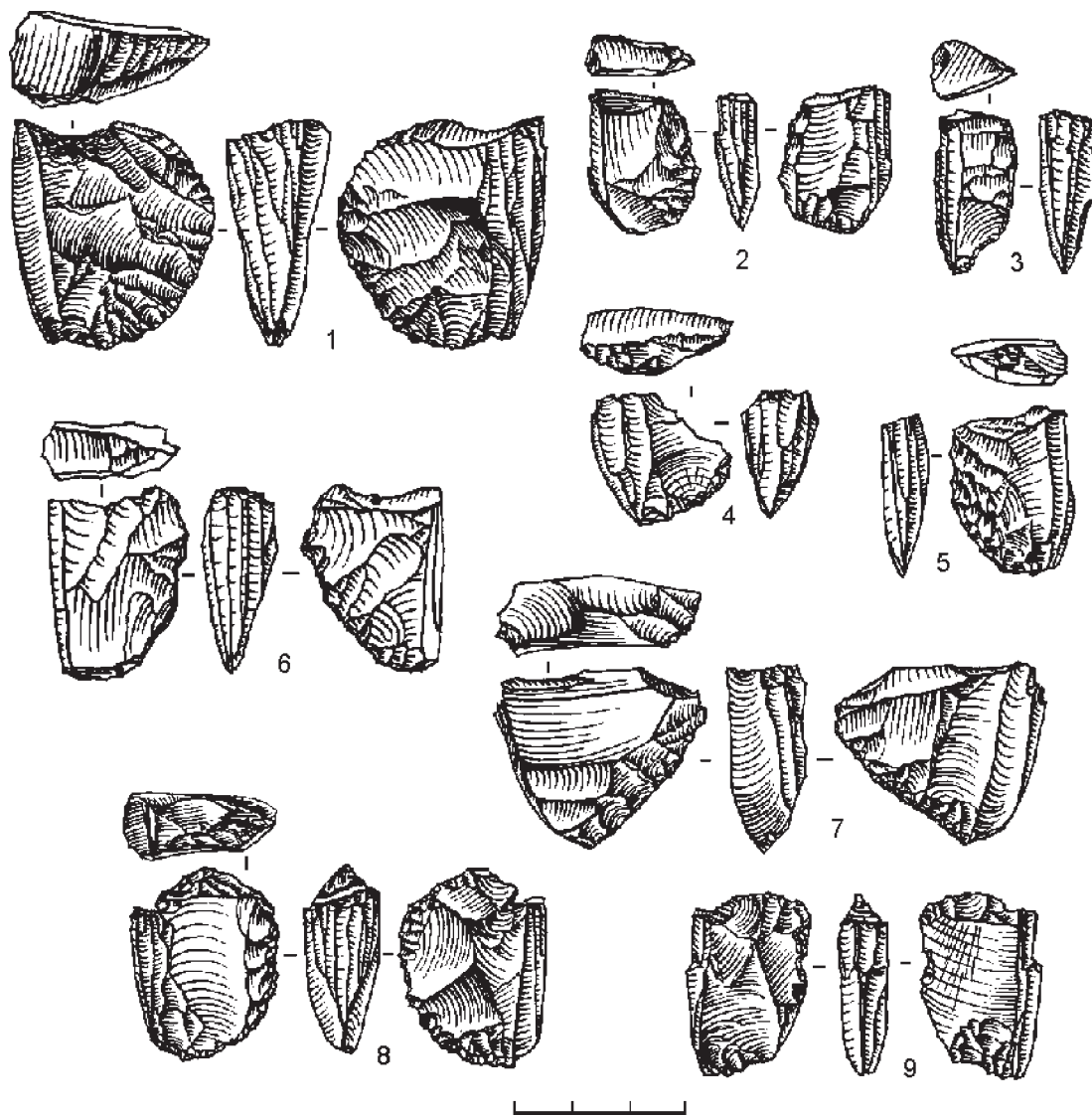


Figure 10. Selected wedge-shaped cores from sites in Kamchatka: 1, 5, 6, Ushki I (excavations of N. N. Dikov); 2-4, 7-9, Ushki V (excavations of the author). Scale is in centimeters.

Chapter 3

The Khaya IV Site: A New Paleolithic Complex of the Okhotsk-Kolyma Upland

Sergei B. Slobodin

INTRODUCTION

The Khaya IV Site was discovered in 2001, in the course of walking survey routes along the valley of the Bol'shaya Khaya River, located on the Okhotsk-Kolyma Upland 120 km north of Magadan at latitude 60°42' N, longitude 151°35' W. The preliminary investigation of the site, limited largely to a surface collection, yielded materials that, after analysis, led us to the conclusion that "the time of the first formation of the cultural layer may be defined preliminarily . . . as the period of the Early Holocene. This is demonstrated by the presence of microblades with no bifacial tools" (Slobodin 2002).

Additional research conducted at the site in 2003 through shovel tests produced material that dramatically changed our original ideas of the age and the character of the tool kit.

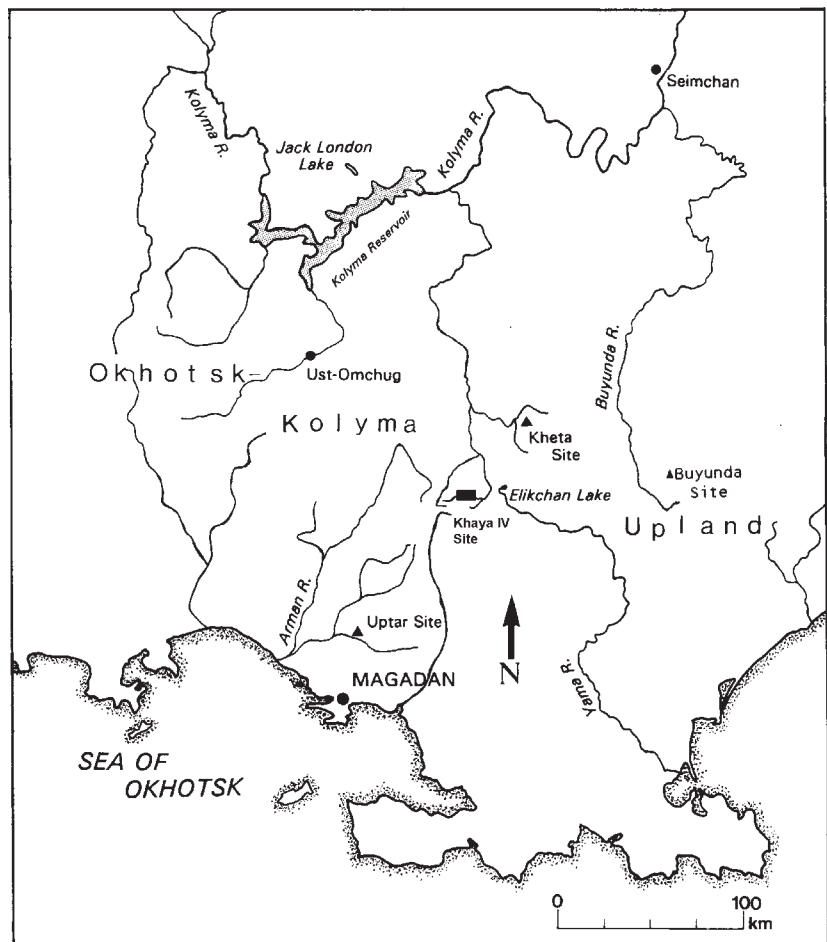


Figure 1. The Okhotsk-Kolyma Upland in the area of the site.

GEOGRAPHY, GEOLOGY, AND PALEO-GEOMORPHOLOGY

As to relief type, the Okhotsk-Kolyma Upland is a complex, dissected upland with a dense and sophisticated pattern of waterways. The average absolute elevation of mountain massifs is 1,000 - 1,500 m. The basic orographic units are the Maymanjinsky Range in the east, with absolute heights of 1300 - 1450 m; the Ol'skiye table mountains in the west, 1300 - 1650 m high. The main waterway is the Maltan River, flowing into the Bokhapcha River; the Bol'shaya Khaya River is a large, left-hand tributary of the Maltan River. Eighteen km to the northeast of the site is the series of Elikchan Lakes.

The climate is extreme continental, with severe winters and dry, relatively warm summers. According to the Atka Meteorological Station, located in the Elikchan basin, the average annual temperature is -12.2° , the average summer monthly temperature is $+9.4^{\circ}$, and the average January temperature, -35.7° (centigrade scale). Throughout the year, the dominant winds are from the northwest. During a relative short time in the summer months south winds prevail. The average annual precipitation is 293 mm, with a maximum of 190 mm in the summer months. The snow falls in late September or early October and melts in early June.

Vegetation follows vertical zonality. In the valleys and on the lower parts of mountain slopes, there is open larch woodland with an under-story of dwarf stone pine. At the elevation of 900 to 1,100 m, the almost impenetrable brush of dwarf stone pine is replaced by typical mountain tundra vegetation. In the upper mountain belt, there are mostly barren rocky spaces. Spread in the Bol'shaya Khaya River valley is Dahurian larch and chosenia willow, with under-story of dwarf stone pine, alder, dwarf birch, and willows. In the valleys and on the slopes widely spread are lowbush cranberry, ledum, and blueberry. Among herbaceous plants, numerous species of sedges and grasses prevail. Large areas are covered with lichens (reindeer moss).

The Bol'shaya Khaya River valley extends 22 km from west to east. Absolute elevation of the valley floor at the river source achieves 1,260 m, at the estuary, 820 m. Main tributaries are Otmerenny, Spokoyny, Ozyorny, and Pology creeks (Fig. 2).

The river source is in the Ola table mountains, where mountaintop elevation along the upper river course is 1,570 to 1,664 m; from there the river drops down from the deep saddle that connects it with another Maltan River tributary, the Khurendja River, and where lie the sources of the Ola River that flows into the Sea of Okhotsk. On this upper section there are deep canyons, with basalts revealed in the walls. The valley floor itself has the shape of a rosary or string of beads, where broad expanses are interspersed with constrictions determined by neotectonics. Some 6 km from the source, the valley floor widens to 1.5 km; here the river is joined by two large tributaries, Ozyorny and Pology creeks. The floor is swampy, the surface of the wide bottomland covered with smaller bush and swamp vegetation. The valley sides are covered by larch forest, which does not extend above the foothills.

In the basin at the mid-course of the Bol'shaya Khaya River, where the site is located, the elevation of mountain ranges decreases to 1,000 or 1,200 m. Steep slopes are covered with larch forests almost up to their summits; only on some domelike crests is vegetation absent. In the area where Otmerenny and Spokoyny creeks flow into the Bol'shaya Khaya, there is yet another signifi-



Figure 2. Geomorphological pattern of the basin located at mid-course of the Bol'shaya Khaya River (after Glushkova and Slobodin n.d.). Denudation relief: 1, slopes of sloughing talus; 2, slopes marked by water erosion; 3, slopes with solifluction remodelling and accumulation. Fluvial relief: 4, undissected river bed and low flood plain; 5, high flood plain; 6, first fluvial terrace; 7, second fluvial terrace; 8, terrace ridge. Other: 9, accumulative terrace steps; 10, alluvial-proluvial debris cones; 11, geomorphological borders, both established (a) and assumed (b); 12, the site. Shown with Russian labels, the Bol'shaya Khaya River crosses the center of the map from west to east, with Otmerennyi Creek joining it from the northwest, Spokoyniy Creek from the south.

cant expansion of the valley. In this area there is a small rectangular depression of 4 by 4 km. The depression surface is swampy; the bed of the river crossing it is cut into a large number of smaller branch channels. On the surface of the high river plain, there are many flood-plain lakes, partly covered with swamp vegetation. Around the mouths of tributaries there remain fragments of the first and second fluvial terraces, respectively 2-3 and 6-7 m high. At the feet of mountain slopes, numerous temporary waterflows have formed powerful mountain aprons of transported sediments. In the river bed, 2.5 km above the mouth of Otmerennyi Creek, there is an ice field about 0.6 km long.

In the lower course, the Bol'shaya Khaya River valley narrows again, the river flows into one bed, and its depth grows at some places to 1-1.5 m. The river then begins to meander, the size of meanders seldom exceeding 150-200 m. At its mouth the river smoothly enters the Mal'tan River valley. There is no mouth broadening or delta.

Geomorphology of the site area is presented comprehensively in recent research by O. Glushkova and S. Slobodin (2005). Geologically, the area is located at the juncture of the Yana-Kolyma fold zone and the Okhotsk-Chukotka volcanic belt, a circumstance that has determined the very special composition of the rocks there. The Bol'shaya Khaya River begins at the Ola basalt plateau made up of Cenotype Late Cretaceous basalts. The basalts are underlaid by volcanic ash deposits united into the Ola Suite, composed of glassy felsite liparites, tuffs, welded tuffs, and ignimbrites. In the basin of the mid-course of the Bol'shaya Khaya River (the site area) there are andesites, andesitic basalts, and lavas of the mid-composition of the Malan Suite of the Late Cretaceous. In the lower river course, there are Jurassic sandstones and aleurolites.

On the bottom of the Bol'shaya Khaya River valley and on its slopes, various permafrost relief forms are widely spread. On the surface of the high flood plain and on the first fluvial terrace, there are permafrost polygons with traces of bulging and deep fractures along the melted veins of ice. Here, under the soil and vegetation layer of small bushes and tundra herbaceous plants, ice lenses are exposed, up to 0.4 m thick. The terrace surface is wavy and raised. The soil horizon does not exceed 10-20 centimeters, the soil mostly dry sod peat. Judging by its thickness, it is very young, being formed on shingle beds and the substrate of rock debris and loam.

The camp of ancient hunters was found on an elongated stony step of the second fluvial terrace of the right bank of the Bol'shaya Khaya River, 8 km above its mouth (Figs. 1, 2). The weakly vegetated site is approximately 300 m long and 65-70 m wide, elongated to the west-northwest, perpendicular to the river bed. Its surface is dry, covered by rare small larch trees to 1.5 m high and by dwarf stone pines. The terrace height above the river bed is about 12 m, the absolute surface elevation, about 900 m. It is separated from the first fluvial terrace by a step about 4 m high, below which it smoothly transfers into the first fluvial terrace 2-3 m high, composed of pebbles of different sizes and extending along the bank for more than 1 km. From the site to the mouth of Spokoyny Creek, the terrace gradually widens from 10 m to 200 m. In the river bed, boulders and cobbles of various compositions and degrees of roundness predominate. Individual boulders have a diameter to 0.4 m. In the camp area, the surface microrelief is uneven, wavy, because of the dense network of permafrost polygons. There are separate clusters of bedrock blocks, large and sharp-angled, with blocks to 0.5 m in diameter.

In shovel tests at the site, the following order of sediments has been preliminarily determined:

1. 0.00 – 0.02 m – soil and vegetation layer
2. 0.02 – 0.10 m – gray loamy sand
3. 0.10 – 0.11 m – tephra (in lenses)
4. 0.11 – 0.30 m – grayish-yellow (reddish) loamy sand with intrusions of small sharp-angled debris and poorly rounded pebbles.

Below lies the bedrock with flattened blocks up to 0.4 m in diameter.

Stratigraphy of the Late Quarternary deposits in the research area has been studied quite comprehensively. Some 14 to 16 km to the northeast of the site, in the area of the Elikchan depression, detailed research has involved boring into the lacustrine deposits. The most completely and compre-

hensively studied is the largest of the four lakes, Lake Grand. From various parts of the lakes, several cores more than 9 m long have been extracted. The sediments are aleurites with interlayers of sand, vegetative detritus, and gravel. Samples for radiocarbon and palinological analysis have been taken from various horizons. Sixteen radiocarbon ages embrace the time between 23,700 and 3,500 years. One can judge the age and paleogeographic situation at the time the lacustrine sediments accumulated by the recognized zones of different pollen spectra. These cuts embrace partly the period of the Zyryan glaciation, the Kargin interstadial, the Sartan glaciation, the Late Ice Age–Early Holocene, and the Holocene (Anderson and Lozhkin 2002). In practically all cores extracted, tephra of 7650 ± 50 BP was exposed at the depth of 200–215 cm (Anderson et al. 1998). It is concluded that the sedimentation in Lake Grand has continued for almost 50,000 years and, consequently, the lake itself is very old.

Pollen analysis shows that during different time periods vegetation changed significantly. In the Zyryanka Interval, the area experienced a dry and cold glacial climate; sedge-grass tundra was widespread. During the Kargin Interstadial there was tundra vegetation on the middle and upper parts of mountain slopes, while in the lowest and most protected places in the valleys there were small numbers of larch trees. There was no dwarf stone pine. During the Sartan period (27,000 to 12,500 BP), various types of tundra dominated, including rocky tundra on dry debris slopes and sedge-moss communities with trailing willow trees at damp sites. Within the area under discussion, there are no clear traces of glacial activity; it is certain that during the last Late Pleistocene (Sartan) glaciation the research area was not glaciated. The glacier complex closest to the Bol'shaya Khaya River was located in the central part of the Maimanjinsky Range. At that time there appeared small valley glaciers that flowed along tributaries to the Yama River valley. In the Holocene, herbaceous tundra was gradually replaced with birch-alder shrub tundra, which was caused by the rise of average summer temperatures and humidity. Vegetation close to modern types appeared about 7,700 BP.

At the Malan River (22 km to the north of the Bol'shaya Khaya River), the series of exposures in the first fluvial terrace, 6–10 m high, has been studied (Lozhkin and Glushkova 1997). In the lower course of the Basandra River, flowing into the Malan, the height of the first fluvial terrace drops to 4–4.5 m. The radiocarbon dates obtained as well as palinological and carpological analyses testify to their accumulation during the pre-Boreal and Boreal periods of the Holocene (10 to 8.5 thousand years BP). The materials confirm that in the Early Holocene light larch forests, dwarf birches, thick alder and willow shrubs were spread in the area. Dwarf stone pine was quite rare or completely absent during this time interval.

The currently available data permit the assumption that the first fluvial terrace of the Bol'shaya Khaya River had formed during the same time interval as the terraces on the Basandra and Malan rivers. The second fluvial terrace is represented by small remnant fragments and must have formed during Sartan time. In its mid-course the Bol'shaya Khaya is rock-defended, whereas down the river it is cumulative. Alluvial origin is proven by the fact that among the debris pebbles and boulders are of varying petrographic composition. The latter allows us to consider the relatively flat spot with the archaeological site to be a fragment of a 10-meter rock-defended terrace of the Bol'shaya Khaya River. The terrace has a 2-meter step, clearly exposed in relief, which separates it from the surface of the first fluvial terrace 2.5–3 m high. At the site there are clusters of lithocrystalclastic tuffs and rhyolites. Most differences are hornfelsed (flinted).

ARCHAEOLOGY

In total, six shovel tests were made at the site, each 1-2 m², total area about 8 m². Tests 2 and 3 were placed at the locality where surface material was collected in 2001. Tests 4 and 5 were laid out at similar spots of surface finds but have not been excavated.

The shovel tests are located from the edge of the second terrace (Test 2) and to a distance of 40 m farther into it (Test 9). Considering the area of cultural materials spread on the terrace surface, the total area of the site is tentatively estimated to be at least 1,000 to 1,500 m².

The cover deposits at the site bear the traces of cryogenic processes that violated the stratigraphy; layers and, consequently, cultural materials were mixed. This is shown as well by the vertical position of many artifacts. Those found were from the layer between the surface and a depth of 30 cm. The lower surfaces of artifacts from Level IV (grayish-yellow or reddish loamy sand) show a film of some oxides (samples currently under analysis).

The tool kit obtained from the tests is homogeneous, both in material used and in tool typology and workmanship. As a rule, the raw material was chert plates, their source beyond the site, probably on the rockfall slopes of the hill located 0.5-1.0 km away. Some chert plates found at the site bear minimum traces of retouch (Fig. 3, e). Some plates have traces of river rounding. Examination of river spits showed such plates to be available only in the valley of Spokoyny Creek and farther, downstream from the creek mouth, in the valley of the Bol'shaya Khaya River itself.

A small amount of chalcedony, in the form of rounded pebbles brought from the river bed at the site, was also used. Mostly amorphous flake cores and flakes of chalcedony have been found, but in 2004 chalcedony arrow points were also recovered.

Among the findings are cores and their preforms, blades, some microblades, burins, a graver, points, bifaces and their preforms, a scraper, pointed tools, pendants, a pebble chopping tool, technical spalls, and flakes.

Cores. These are divided among the following types:

1. Three flat cores, with a broad face and a narrow striking platform, steeply beveled to the rear, so that the front and the platform make a sharp angle; these were used for producing blade-like flakes. Dimensions: height 8-11 cm, width 5.6-6.5 cm, thickness 2-4 cm (Fig. 3, a, b, h).
2. Six end-cores (in Russian, *tortseviye*) on plates with a few spalls from the narrow side and a partly retouched striking platform. Dimensions: height 5.5-9 cm, face width 1.8-3.5 cm, length 4.5-5.5 cm (Fig. 3, c, j, k; 4:a).
3. One flattened subprismatic core with a broad front and a beveled striking platform, prepared with two spalls; its front bears the negatives of 6 blade spalls. Dimensions: height 6.2 cm, width 3.9 cm, thickness 3.5 cm (Fig. 3, g).
4. Two flattened cores with two opposite, moderately beveled, retouched striking platforms. Dimensions: height 7.7-8.3 cm, width 4.5-5 cm, thickness 3.7-4.6 cm (Fig. 3, d, f, i).

- Two subprismatic cores with a straight striking platform worked by flattening retouch; their longitudinal planes were only partly used for producing blades. Dimensions: height 4.4-6 cm, width 2-3 cm (Fig. 6, a).

Blades and microblades. The site assemblage includes a large number (over 200) of blades and blade-like spalls (Fig. 5, d, u; 6, d, f, k, l). Many are worked by lateral retouch and bear the traces of utilization (Fig. 5, t, cc). Some smaller blades can be interpreted as microblades from their size (Fig. 5, o, p; 6, i, j), but must have been struck not from microcores but from some end-cores. Blades as preforms were used for manufacturing angle burins, scrapers, and arrow points.

Manufacturing spalls. These mostly are spalls (flakes) from rejuvenated core striking platforms that take a part of the front and a part of the platform. There also are some core tablets (Fig. 6, e).

Several boat-shaped spalls (Fig. 5, h) were found. It is commonly accepted that in Northeast Asia these are associated with wedge-shaped microcore production; however, no wedge-shaped microcores were found at the site. There are no ski spalls, either, although they are a necessary component of microcore preparation.¹ Probably these are not boat-shaped but biface-edge spalls (Fig. 5, g).

Three spalls of the frontal part of end-cores; these also take a part of the basal platform. On them, one can clearly see the negatives of microblade spalls (4, o, p; 6, p).

Bifaces are represented by several complete tools as well as by tool fragments and preforms (Fig. 4, k; 6, m).

One complete biface, practically flat in its cross-section (proportion of thickness to width, 1:5.7), is asymmetrically ovate in the plane. Both faces of the biface are completely worked by flat pressure or gentle percussion retouch. It can be defined as a backed biface. One lateral edge of the tool is worked by dulling steep retouch; another, convex, by regular lateral pressure retouch more carefully (Fig. 4, f).

Another biface is made on a plate of silicified tuff and has an asymmetric ovate or sub-triangular shape. It is mostly worked by lateral retouch (Fig. 4, j).

Another biface with roughly retouched edges is lanceolate in the plane (Fig. 5, gg). On its faces there are parts of preform cortex of a chert plate.

A biface preform of oval leaf shape, from Test 9, is 15 by 8 by 2 centimeters in size (Fig. 4, b). The flattening spall of a similar tool with a partly bifacially retouched edge was found in Test 2 (Fig. 4, h).

Judging by rather careful retouch, some biface fragments must represent tools broken after completion (Fig. 4, c; 5, q). Among them there are fragments of middle parts of ovate or lancelet bifaces, tips, biface edge spalls. They might have been either knives or spear and dart points.

¹ Both of these relate to the widespread and early “Yubetsu” technique of producing the core from a small biface. There are, of course, other techniques for shaping cores to produce microlithic blades [eds.].

Tentatively, before its function (knife? point?) is further defined, an asymmetrically triangular tool on a thin flake (Fig. 5, a) is referred to the group of bifaces.

The collection contains several bifacially retouched artifacts of subrectangular shape, apparently biface preforms (Fig. 4, e).

Points are represented by several types.

1. Judging by the size and carefully retouched tip of biface, this is the fragment of a bifacially retouched spear point. It is carefully covered with thinning retouch and has a flattened lens-like cross-section (5, bb);
2. Bifacially retouched arrow points of leaf shape with round base and flattened lens-like cross-section (Fig. 5, r; 6, b);
3. Arrow points with partly retouched surfaces and asymmetrical cross-sections, one-sidedly convex or subtriangular (Fig. 5, b, s, aa, ff). Judging by the subtriangular cross-sections of some, they were made on blades;
4. Bifacially retouched arrow points of subtriangular shape with straight bases (Fig. 5, n). The cross-section is flattened lens-like.

Scrapers. These are represented by several morphologically clear tools and flakes with trace scars from scraping.

One scraper is made on a flake, is subrectangular in shape and broken diagonally (Fig. 4, i). Its straight edge is worked by steep retouch. Its dorsal face is partly worked; a part of its surface is the natural plane of a plate. The ventral side is not worked.

Another scraper is made on a flake by intermittent lateral retouch; it is drop-shaped (Test 9). The scraper edge is convex and steeply retouched (Fig. 5, w).

A side-scraper is made on a flake with a high back. The dorsal surface is worked with large spalls and smaller lateral retouch along the perimeter. From the ventral side, a part of the bulb of percussion is worked by flattening retouch (Fig. 6, o).

Burins. These are grouped into three types: dihedral, made on a chert-plate; angle and transverse, both made on blade-like spalls.

The angle burin, made on a blade-like flake, removed the burination spall along the longitudinal edge; it was rejuvenated at least twice (Fig. 5, x).

One transverse burin is made on a blade-like flake. The working edge is produced by a transverse spall removed from the distal end of a preform (Fig. 5, v). Another transverse burin is made on a spall from an elongated chert plate; its thin end was worked by lateral unifacial retouch, followed by removal of a transverse spall (Fig. 5, j).

The dihedral burin is made on a chert plate; it has minimal additional work on edges and flat surfaces, so on this background one can clearly see the beak-shaped edge of the dihedral burin formed by several crossing spalls (Fig. 6, n).

A **graver**, or a **drill tool**, is made on a flat chert plate. Its sharp working edge is formed by a few burinated spalls with some rejuvenated by steep retouch. The edge is heavily polished from use (Fig. 6, e).

Pointed tools are represented by two artifacts. One is made on a broad, large (6 by 7 cm) but thin (about 1 cm) flake, with the dorsal surface completely worked by flattening retouch. Its ventral side was not worked. The sharp point is distinguished by convergent, unifacially retouched margins of the flake (Fig. 4, j).

Another pointed tool, represented by a fragment, is made on a blade-like flake. It is worked by steep lateral unifacial retouch from its dorsal side and has a bent profile.

Ornaments are represented by a few artifacts. One is a thin flat rectangular plate (1.2 x 2.7 cm, 0.35-0.45 cm thick) with rounded angles and a uniconic hole (0.33 cm in diameter) at the margin. The pendant surface is polished. It is made from greenish steatite with veins. At the margin of the pendant one can see traces from another byconic hole, on which the pendant margin was broken and then polished (not illustrated).

Four other ornaments are small, flat rounded beads of a soft rock, 0.6-0.7 cm in diameter, with holes in the middle (Fig. 5, y, z).

A **chopping tool** is made from a large rounded chunk of weathered rock, different from stone debris intruding into soft deposits at the site as well as from the terrace bedrock (Fig. 4, l). Its sharp, slightly curved edge is formed by several spalls from both sides of the preform. The oval back of the tool is not worked.

Notched tools were produced on flakes (Fig. 5, i) and blades or blade-like flakes (Fig. 5, k).

A few thousand flakes were found at the site; however, many are broken into several pieces or naturally separated along the planes of the platy structure. This significantly distorts the real statistics. Most flakes are small and medium-sized. Large spalls were used as tool preforms and, judging by their dorsal facets, were specially prepared for spalling (Fig. 3, l; 4, d, m). It is more realistic to measure the total weight of the debitage obtained from the tests (total area 8 square meters), which is 19.5 kilograms, or an average of about 2.5 kg per m². This does not include the weight of tools.

Considering the supposed site area of 1,225 m² and considering the weight of the tool kit, smaller debitage that went to the back-dirt, unidentified raw material fragments, and complete tools taken from the site by its inhabitants, the total weight of the raw materials moved to the site might have exceeded 3,000 kg.

In 2004, additional research was conducted at the site in collaboration with I. Vorobei, Senior Researcher of Magadan Oblast Local Museum. The results of this research have not yet been processed, but the newer findings do not contradict the materials obtained in 2003. The cores still tend to be flattened monofrontal one-two-platform types for obtaining middle-sized blades and blade-like flakes. Microblades are exceptional, although a fragment of an end-core on a chert plate with negative scars of microblade spalls was found.

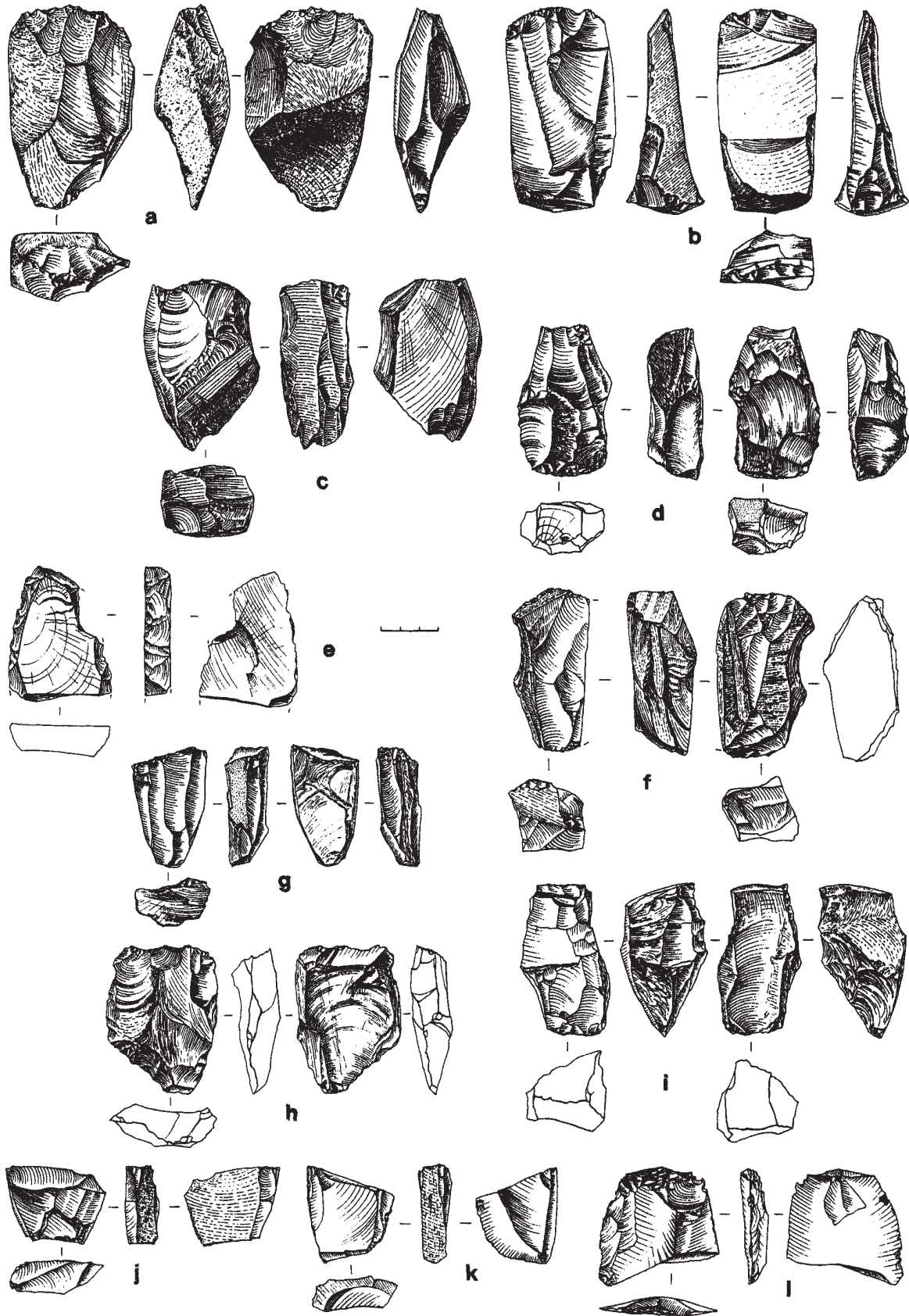


Figure 3. Chipped artifacts: a-d, f-k, cores; e, l, preforms. All siliceous rock.

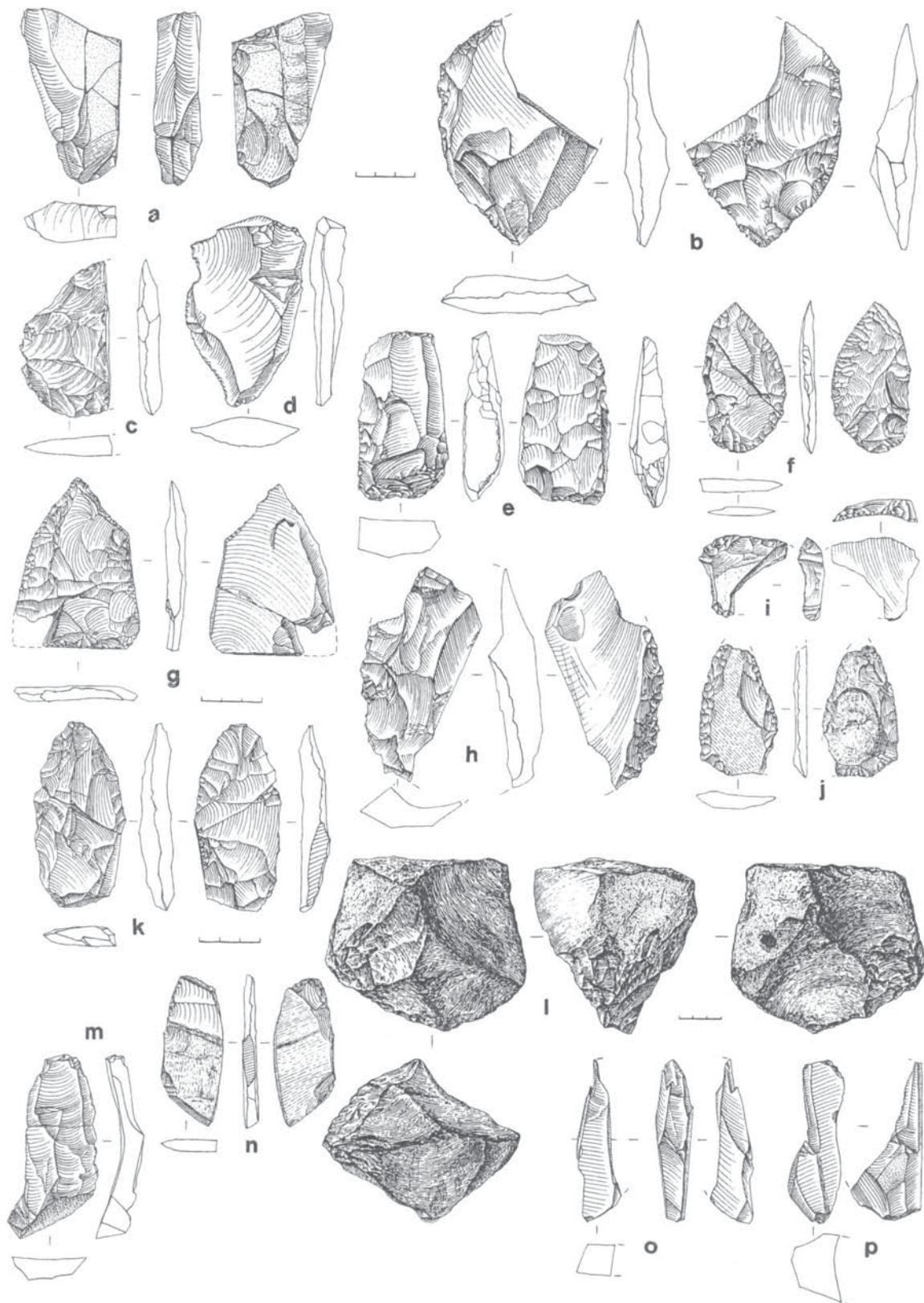


Figure 4. Chipped artifacts: **a**, end core; **b**, **f**, **j**, biface; **c**, biface fragment; **d**, levallois-like point; **e**, biface preform; **g**, pointed tool; **h**, biface thinning spall; **i**, scraper; **k**, biface preform; **l**, chopping tool; **m**, blade; **n**, preform, **o**, **p**, end-core frontal spalls. Chopping tool, **l**, is diabase; all others, siliceous rock.

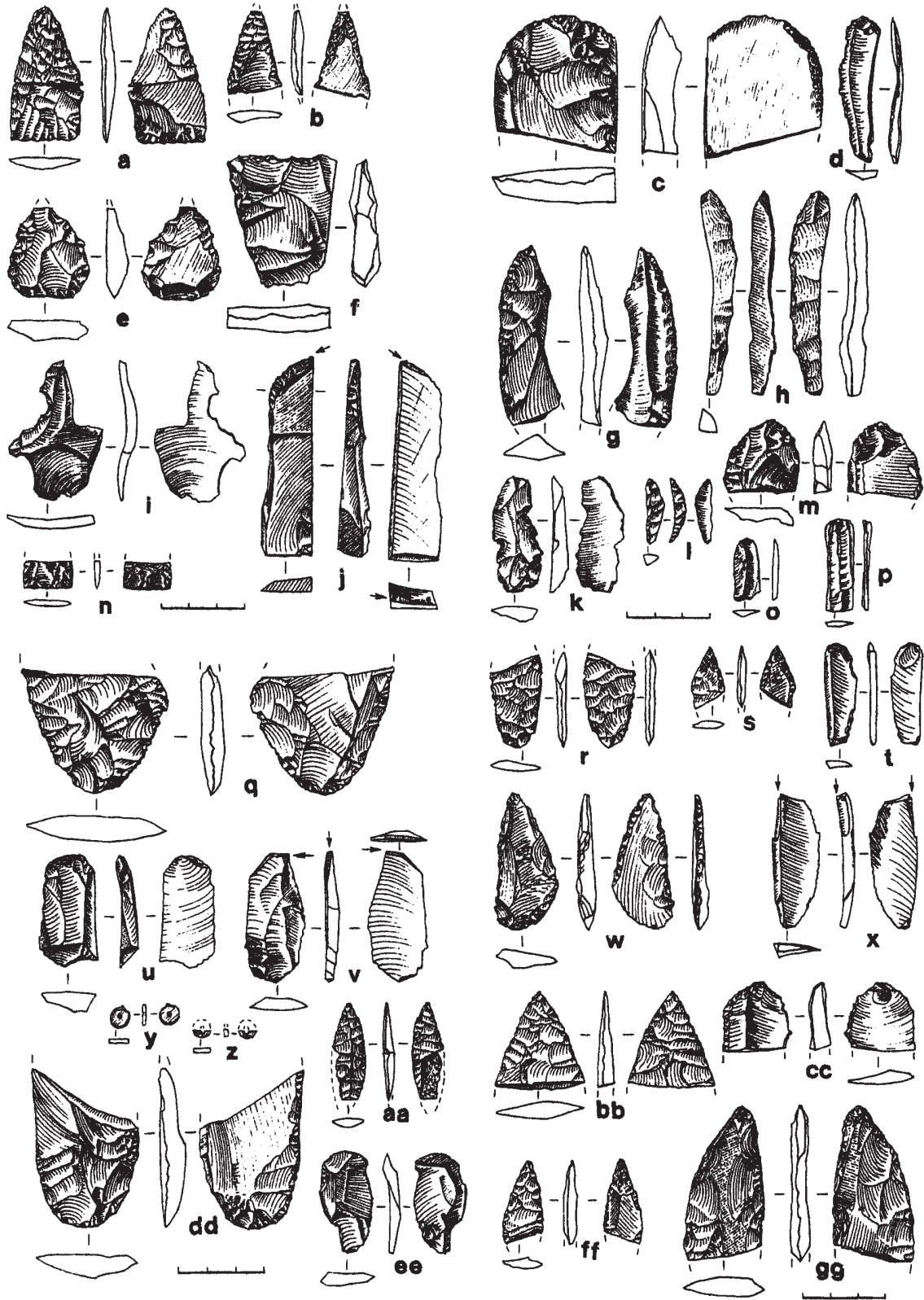


Figure 5. Chipped and polished artifacts: **a, e**, bifaces; **b, n**, points; **c, m**, tool preforms; **d**, retouched blade; **f**, biface preform; **g**, biface fragment, **h, l**, boat-shaped spalls; **i, k**, notched tool; **j**, transverse burin; **o, p**, microblades; **q, dd**, biface fragments; **r, s, bb, ff, gg**, points; **t, cc**, retouched blades; **u**, blade; **v**, transverse burin; **w**, scraper; **x**, angle burin; **y, z**, beads; **aa**, spear point. Beads, **y**, and **z**, are soft slate, somewhat polished; spearpoint, **ee**, is finer chalcedony; all others, siliceous rock.

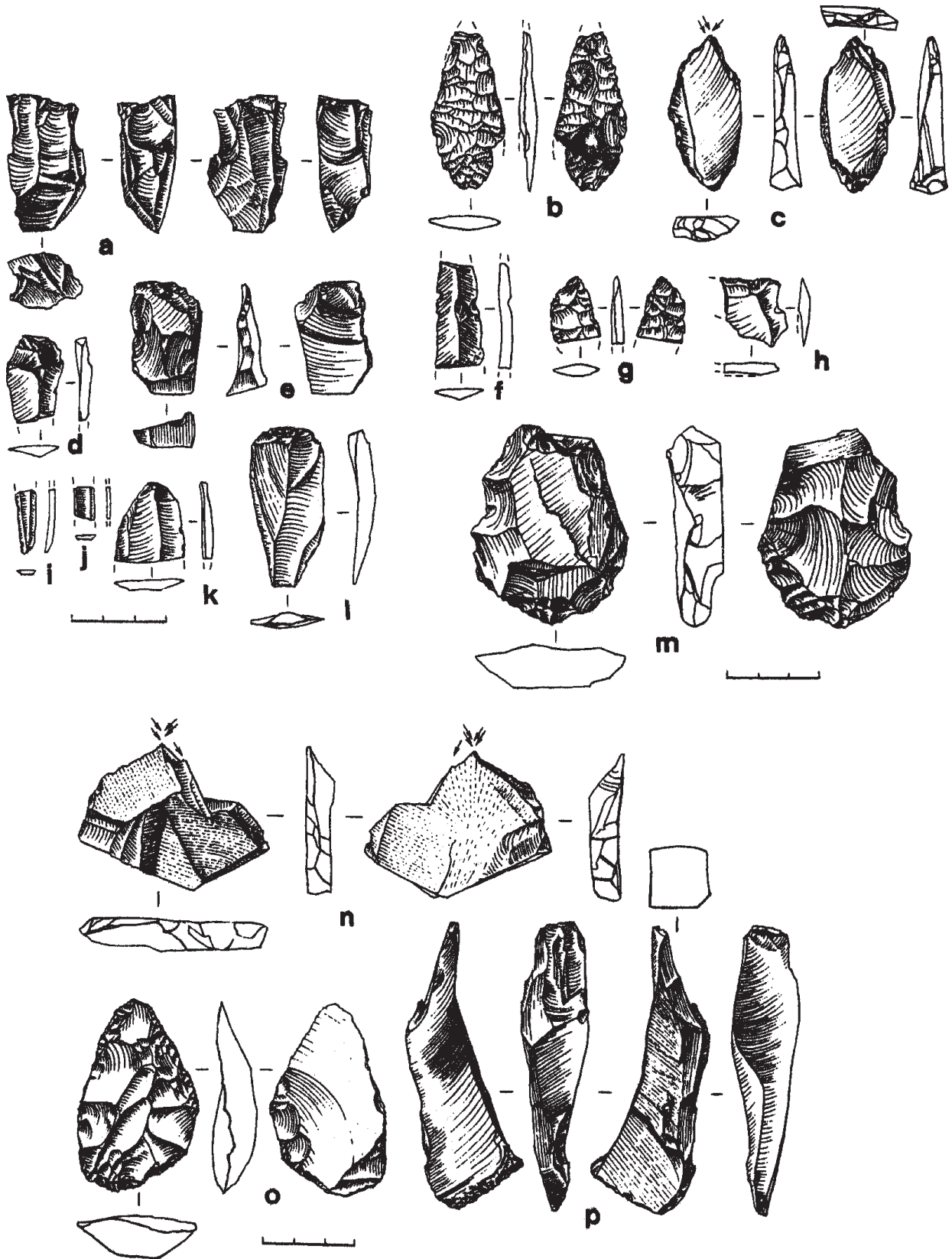


Figure 6. *a*, core; *b*, *g*, spear points; *c*, drill; *d*, *f*, *k*, *l*, blades; *e*, core tablet; *b*, unlabeled; *i*, *j*, microblades; *m*, biface preform; *n*, dihedral burin; *o*, scraper; *p*, end-core frontal spall. The unlabeled item, *b*, is chalcedony; all others are siliceous rock.

The finding of a transverse burin on a blade, with retouched margins, confirms that at the site transverse burins were used. Also informative is the angle burin on a blade-like flake with traces of multiple rejuvenations of the cutting edge from its retouched head. The typology of scrapers has been expanded, including now end- and double-end scrapers on blades.

COMPARATIVE NOTES

In the Okhotsk-Kolyma Upland several sites of Late Pleistocene-to-Early Holocene age have been known. Forty km northeast of the Khaya IV Site, at an elevation of 800 m above sea level, is the Kheta Site. Its Paleolithic complex lay at the base of Late Pleistocene deposits covered with Early Holocene tephra. Found there were Yubetsu-type wedge-shaped cores, ski spalls, microblades, leaf-shape and oval bifaces, end-scrapers, transverse and angle burins, and pendants (Slobodin and King 1996; Slobodin 2001). The Kheta complex shares common features with Yakutia's Dyuktai culture and Primor'e's Ustinovka culture.

In the central part of the Okhotsk-Kolyma Upland, 500 km northeast of the Khaya IV site, at an elevation of 600 m above sea level, there is the Druchak-Vetrenny Site. Deposits containing cultural materials were disturbed by cryoturbation and solifluction. The tool kit includes Yubetsoid wedge-shaped cores, microblades, ski spalls, bifacial points, end-macro-scrapers; transverse, angle, and dihedral burins; bifacially worked oval axes, adzes, etc. Typological characteristics of the tool kit expose the genetic connection of the Druchak complex with the Final Paleolithic industries of Pribaikal'e, dated at 13,000 to 14,000 years BP (Vorobei 2003).

In the Early Holocene, the Sumnagin tradition was spreading over the Okhotsk-Kolyma Upland. The Sumnagin sites Urtychuk IV and Azamat were found and investigated not far (7-15 km) from the Khaya IV Site at an elevation of 1,000-1,100 m above sea level. They produced C-14 ages of 8285 to 8780 years (GX-17063, Beta-156847). The tool kit of the sites consists of prismatic microcores, hundreds of microblades, including those retouched, end scrapers. A hundred km north-east of the Khaya IV Site, along the line of the Okhotsk-Kolyma watershed, at an elevation of 800 m above sea level, another site of this period, Buyunda III, was explored. According to the series of C-14 dates, its age is 8146-8704 BP (GX-17064, DRI-3283). Besides conic microcores, microblades, and end-scrapers, its tool kit includes a bifacially worked adze, typical for the Sumnagin complexes in Yakutia (Slobodin 1999). The Uptar Site, with characteristic, bifacially shaped lanceolate points and oval bifaces, has an Early Holocene date, but probably pertains to the Pleistocene (Slobodin and King 1996; Slobodin 2001).

So far we can only make assumptions about Khaya IV's cultural reference and age. However, it is clearly seen that the general characteristic of the Khaya IV tool kit lies beyond Mesolithic and Neolithic technological traditions of Northeast Asia and is close to Paleolithic characteristics of the vast East Siberian region. This is shown by the presence in the tool kit of transverse burins, end-cores, large oval bifaces, and end scrapers on blades.

The Paleolithic age of the site is also indicated in the artifacts reflecting the transition from the subprismatic technique of obtaining blades from broad core surfaces to the end-core technique, placed in early stages of the Late Paleolithic (over 30,000 years BP) at the Kara Bom Site in Altai (Derevyanko et al. 2002:82-86) and at the middle stage of the Late Paleolithic (25,000-18,000 BP)

in Zabaikal'e (Transbaikal Area) (Konstantinov 1994:130-132). In Angara, a complex similar to that from Khaya IV is known at the Ust'-Kova site (Mid-Ust'-Kova complex). Common features are flat cores with the beveled platform for producing blades, blades, oval and asymmetrically triangular bifaces, *pièce esquillée*, and the absence of the microblade technique. The complex's age is 24,000 BP (*Khronostratigrafiya paleoliticheskikh . . .* 1990).

In Yakutia, at the early stages of the Dyuktai culture (Ust'-Mil' and Ezhantsy sites) is placed the combination of large pebble subprismatic cores and slightly exhausted end-cores (Mochanov 1977:52, 56, 223). In Chukotka, end-cores are considered tools typical of Paleolithic time (Dikov 1993:27-29).

Common features of the Khaya IV complex in the technique of primary reduction and tool working are traced in materials from Level 2 of the Ustinovka I site of the Russian Far East, which Vasil'evsky and Gladyshev (1989) date at 22,000 to 14,000 years BP; other suggestions are even older, 33,000 to 30,000 BP (Kononenko 2001:50). These days it is assumed that in the Far East there existed a pre-Ustinovka, "so far conventional," complex of mid-Sartan time, containing "cores of parallel reduction flaking, blades and tools on blades, biface 'boat-like' tools. Microcores and everything associated with their formation and reduction have not been exposed in it. . . . There is no microlithic technique so far, or it is in the initial stage of formation" (D'yakov 2000:170). These characteristics quite precisely correspond to those of the Khaya IV Site.

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Part II

The Dissemination of Obsidian

The two papers of Part II deal with the identification of obsidian sources in Northeast Asia with evidence of the presence of identifiable obsidian in archaeological sites. The first of these, devoted especially to Primor'e and Sakhalin, but with considerable reference to Japan, deals especially with the Paleolithic, with emphasis on the earliest use within each region. The second, on the other hand — a preliminary and previously unreported consideration of obsidian in Kamchatka — is confined to the Neolithic and early metal-using (or Paleometal) periods. Given that knowledge of the Paleolithic in Kamchatka is confined to the Ushki sites, from which no samples are reported in the study, the lack of heavy Paleolithic coverage is not surprising, although one may hope that obsidian from the terminal Paleolithic level VI at that site, reported in Chapter 5 as including artifacts of that material, will be incorporated in any extension of the study. All in all, and as is clear in Chapter 4, this is research in which Japanese prehistorians have had an obvious priority, just as the Japanese islands also had significant priority in the spread of obsidian use in prehistory.

The so-called “fingerprinting” of obsidian through sophisticated analytic techniques, with identifications of volcanic sources drawn on by specific sites, has provided an impressive tool to prehistorians. Permitting a view of social and trade networks in some of the least transparent depths of prehistory (see, for instance, Shackley 1998), it is of great promise for areas favored by the presence of glass-forming volcanic eruptions. The method has been extended to Alaska, where samples have been collected widely and a series of chemically demonstrated glass groups have been identified among artifacts, with a number of groups attributable to known sources (e.g., Cook 1995). Although reportage is far from complete, the most widely used source in mainland Alaska appears to have been a set of nodular flows in the drainage of the Koyukuk River (Clark and Clark 1993).

Unfortunately, comparable studies have not yet advanced into Chukotka. Although the descriptions of the collections from Tytyl'vaam IV (Chapter 2) and of the Khaya site (Chapter 3) fail to suggest any heavy use of obsidian at those times and places, the reported identification of obsidian from sites on St. Lawrence Island and the Seward Peninsula near Cape Prince of Wales as having an origin in obsidian pebbles from Chukotka's Anadyr River (Cook 1995) suggests that study of obsidian in that Northeast Asian province will provide important information concerning relationships across the Bering Strait in the more recent millennia.

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Northeast Asia, the western approach to Bering Strait.

Chapter 4

Recent Studies of Obsidian Exchange Networks in Prehistoric Northeast Asia

Yaroslav V. Kuzmin

INTRODUCTION

Archaeological obsidian source studies in Northeast Asia were first initiated in Japan in the 1960s (e.g., Suzuki 1973), and in the Russian Far East in the late 1980s and the 1990s (e.g., Vasilievsky and Gladyshev 1989; Kuzmin and Popov 2000). In this review I consider the territories of the modern Russian Far East, of Japan, and of the Korean Peninsula. My aims are a general overview of current progress in the identification of obsidian sources in Northeast Asia — with special focus on the Russian Far East — and an indication of the major spatio-temporal patterns of obsidian use and transportation from source to place of utilization.

The identification of sources of high-quality volcanic glass is extremely important in the studies of prehistoric contacts, exchanges, and migrations. Unlike *indirect evidence* such as similarities in pottery styles, stone tool typology, geographic proximity, etc., instrumental geochemical data, being *direct evidence*, provides reliable verification of these issues. As has been pointed out, obsidian source studies serve as a powerful tool in the study of prehistoric human subsistence and mobility, “indicating contacts of which we had no proof, and in some cases no idea, prior to the obsidian provenancing programmes – a reminder that obsidian provenancing has been a success story for archaeology as well as archaeometry” (Williams-Thorpe 1995).

METHODS AND MATERIALS

For the purpose of obsidian source identification, several geochemical methods have been used. Among them, the most common are X-ray fluorescence (XRF) and Instrumental Neutron Activation (INAA) analyses. They permit detection of up to 30 chemical elements with sensitivity to 10^{-4} percent (one part per million, or ppm) of the element mass. General descriptions of methods of obsidian geochemical analysis can be found in contributions to Shackley (1998).

For the southern territory of the Russian Far East, including Primor’e (Maritime) Province, Sakhalin Island, and the Amur River basin, about 400 samples of obsidian and other volcanic glasses (obsidian-perlite and perlite) were collected and analyzed by INAA and XRF methods during 1992–2004 (e.g., Kuzmin and Popov 2000; Kuzmin 2005). Among them are about 140 samples taken directly from natural outcrops, and about 265 specimens representing prehistoric tools and flakes.

For Japan, the exact number of analyzed samples is unknown to me; the estimate would be several thousand samples of both geological and archaeological obsidian. For the Korean Peninsula, the number of samples is still low (e.g., Son and Shin 1991; Obata 2005), estimating fewer than 100 specimens in total, including our own dataset for the Paektusan volcano (Popov et al. n.d.).

In this review, I take into special account prehistoric (Paleolithic and Neolithic) sites, and to some extent Paleometal (i.e., Bronze and Early Iron Age) complexes. The boundary between Paleolithic and Neolithic in Northeast Asia is determined by the appearance of pottery in the latter (e.g., Kuzmin 2003). Special focus here is on the *earliest evidence* of the acquisition and use of obsidian as raw material.

RESULTS

The Southern Russian Far East

Archaeological complexes with an abundance of obsidian are known from Primor'e Province and Sakhalin Island. The main sources of geological obsidian in the continental part of the Russian Far East are basalt plateaus, including the Shkotovo and Shufan plateaus in southern Primor'e, the Obluchie Plateau in the middle section of the Amur River basin, and possibly the Sovgavan and Nelma plateaus near the Japan Sea coast in northern Primor'e.

The Shkotovo and Shufan plateaus are the best-studied areas in the Russian Far East in terms of volcanic glasses, which were created by flows of pyroclastic basalts during the Neogene (Miocene-Pliocene). In the lower layers of the basalt sequences are found glass-like obsidian tuff layers. The bottoms of lava flows are usually represented by a "cortex crust" of pure obsidian. River channels that cut through the plateaus are rich in obsidian pebbles. The most abundant basaltic obsidian sources are situated at the basin headwaters of the Ilistaya [formerly Lefu], Artemovka [formerly Lefu], Partizanskaya [formerly Suifun], and Arsenievka [formerly Daubikhe] rivers.

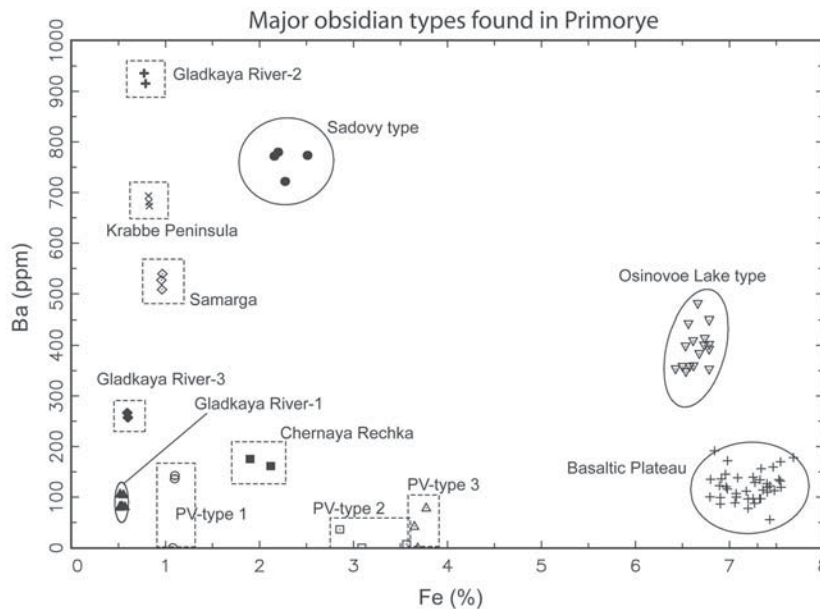


Figure 1. Two dimensional plot of geochemical groupings of obsidian in Primor'e.

The distant source of archaeological obsidian in Primor'e, the Paektusan (Changbaishan) volcano on the modern border of China and North Korea, was determined after geochemical analysis that compared obsidian flakes given to Russian archaeologists by North Korean scholars in the 1970s (see Kuzmin et al. 2002a:513), with rhyolite-type obsidian artifacts that were collected by our team in Primor'e in the 1990s. The result has been published in English (e.g., Kuzmin et al. 1999, 2002a).

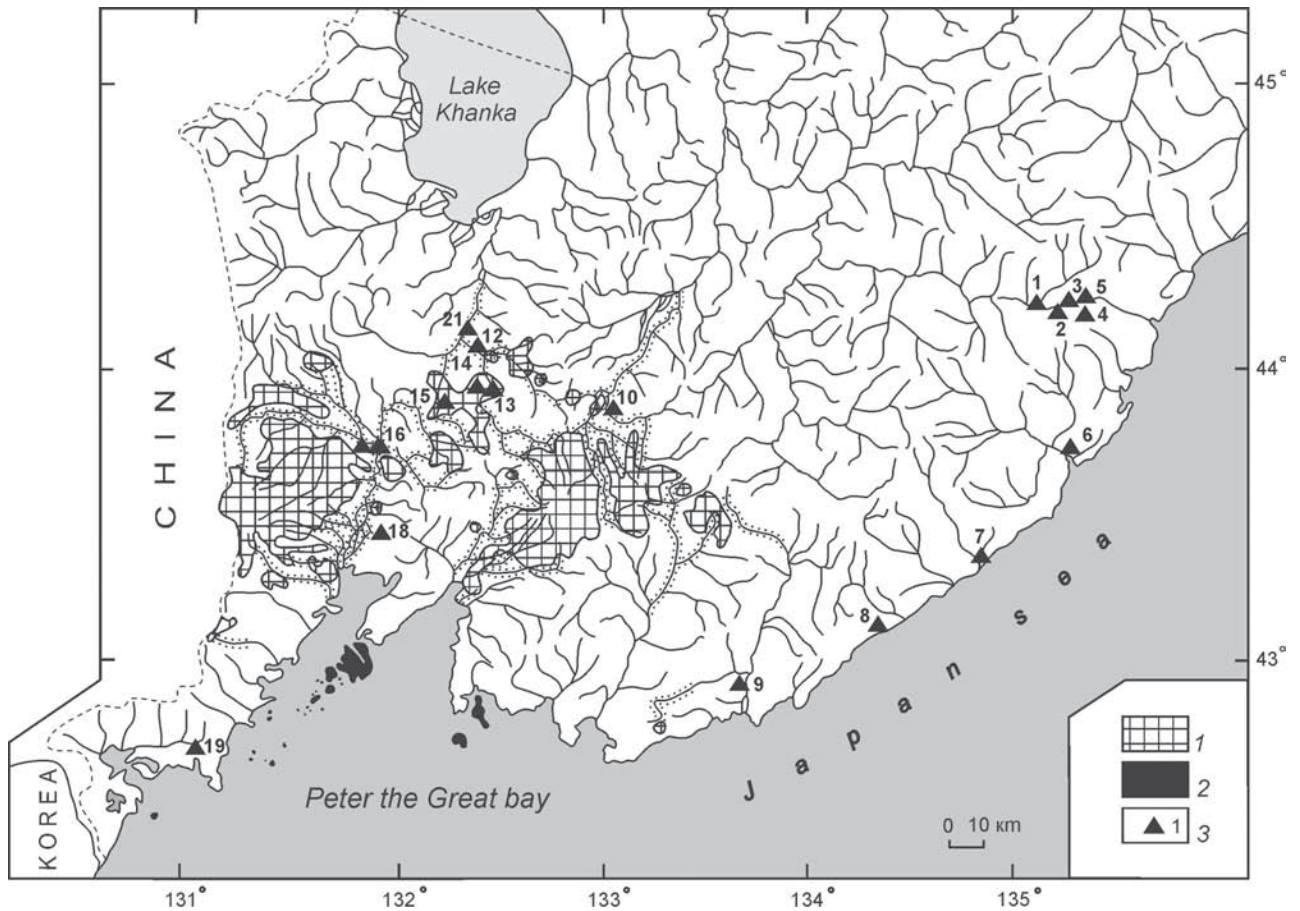


Figure 2. The Basaltic Plateau obsidian source and related archaeological sites in Primor'e: 1, basalts; 2, islands; 3, archaeological sites with Basaltic Plateau obsidian (site numbers from Kuzmin et al. 2002a).

Thus, two main sources of archaeological obsidian in Primor'e were identified using geochemical methods (Fig. 1). The Basaltic Plateau 'local' source of obsidian has its origin at the Shkotovo Plateau (latitude 43°18' to 43°51' N, longitude 132°02' to 133°35' E, elevation ca. 100 to 370 m above sea level [a.s.l.]) (Fig. 1, Basaltic Plateau group; Fig. 2). The Paektusan 'remote' source is located on the volcano of that name (42°00' N, 128°04' E, ca. 2400-2700 m a.s.l.) (Fig. 1: PV-type 1 group; Fig. 3). There is also a minor 'local' source of

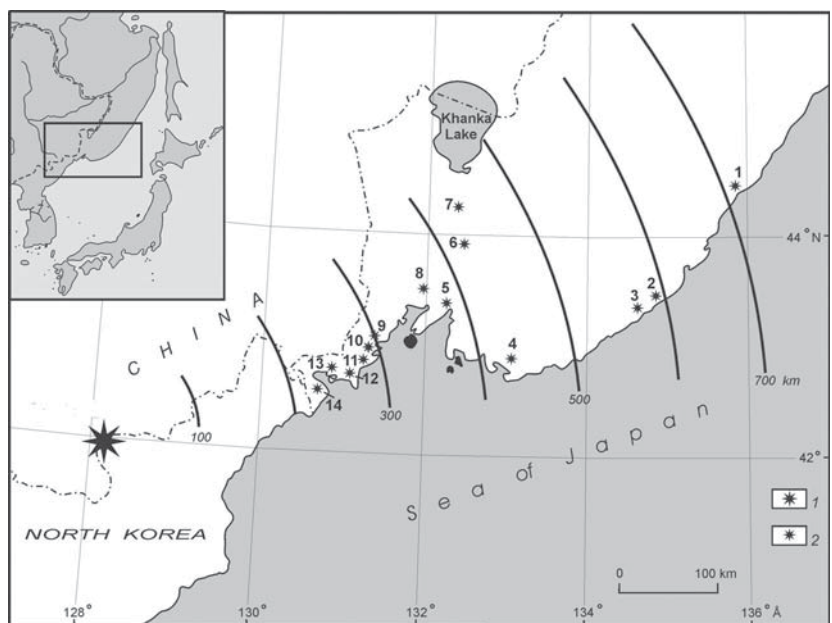


Figure 3. The Paektusan obsidian source and related archaeological sites in Primor'e: 1, source; 2, archaeological sites (site numbers from Kuzmin et al. 2002a).

obsidian, the Gladkaya River (42°44' N, 130°55' E, 40-100 m a.s.l.), situated in southwestern Primor'e (Fig. 1: Gladkaya River-1 group).

Obsidian that originated at the Basaltic Plateau source is widely distributed in Primor'e, where it is found at more than 20 archaeological sites (Fig. 2). The distance between source and site varies from several hundred meters to 250-300 km. The age of the earliest sites with evidence of obsidian use in Primor'e can be estimated as ca. 15,000 radiocarbon years (hereafter ages or dates are given as BP). The Paektusan obsidian is also broadly dispersed in Primor'e, and identified at about 15 prehistoric sites (Fig. 3). The distance between source and site in this case is ca. 200 to 700 km. The age of the earliest cultural complexes with this obsidian is assumed as ca. 10,000 BP, by which date long-distance transport of obsidian from source to site over a distance of 400 to 500 km had begun.

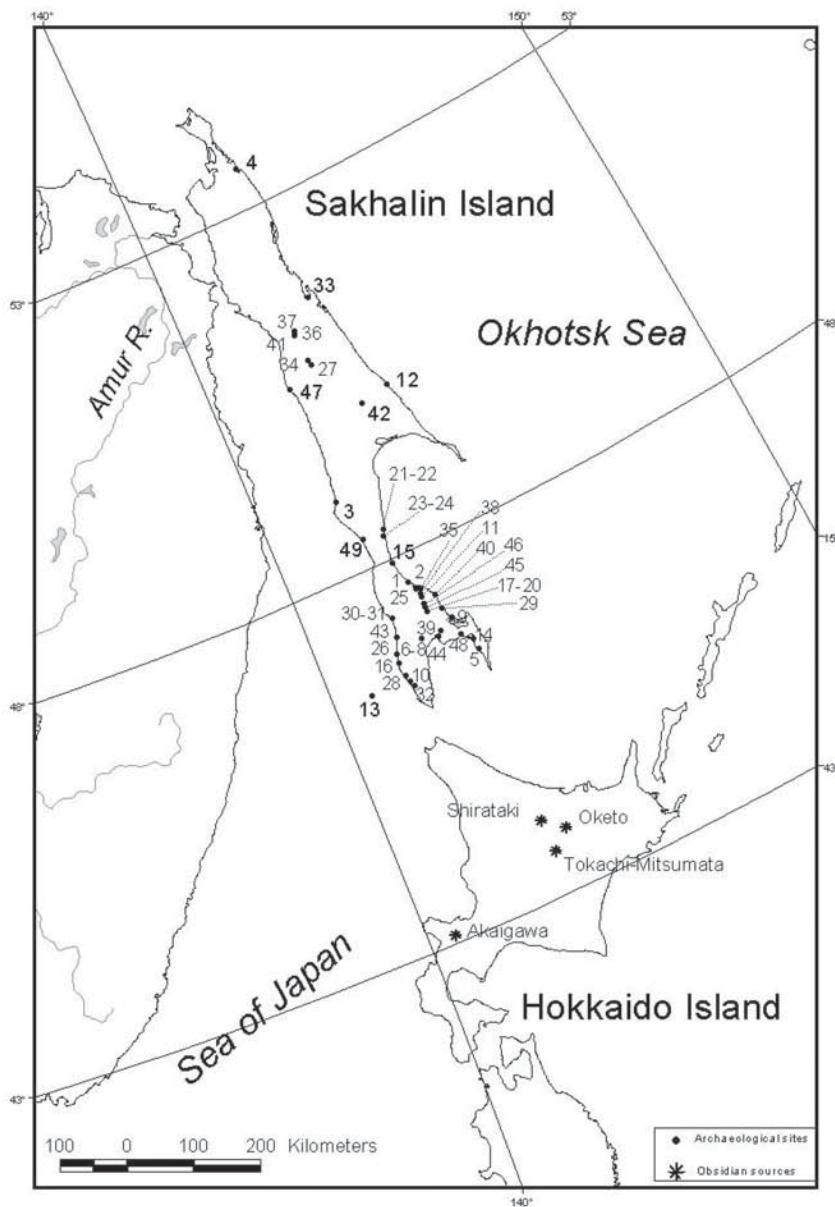


Figure 4. The location of the Hokkaido obsidian sources and related archaeological sites on Sakhalin Island (site numbers from Kuzmin et al. 2005).

On Sakhalin Island, no reliable sources of obsidian are known (Kuzmin and Popov 2000; Kuzmin et al. 2002b). However, obsidian artifacts are plentiful in the prehistoric archaeological complexes. Samples from about 50 sites were analyzed in conjunction with obsidian from geological sources located on neighboring Hokkaido Island (Fig. 4), and it turned out that almost all artifacts had originated at two major sources of Hokkaido obsidian, Shirataki (groups H-1 and H-2 on Fig. 5) and Oketo (group H-3 on Fig. 5), and a few artifacts are associated with the minor source of Akaigawa (group H-4 on Fig. 5). The distance from source to utilization site on Sakhalin varies from ca. 450 km (Akaigawa source) to ca. 1000 km (Shirataki and Oketo sources). On southern Sakhalin, the earliest obsidian use is dated to ca. 19,400 BP at the Ogonki 5 site (No. 6 on Fig. 4) (Kuzmin et al. 2004); the distance here between site and source is ca. 250 km. To central Sakhalin, obsidian came at ca. 11,400 BP (Ostantsevaya Cave, No. 42 on

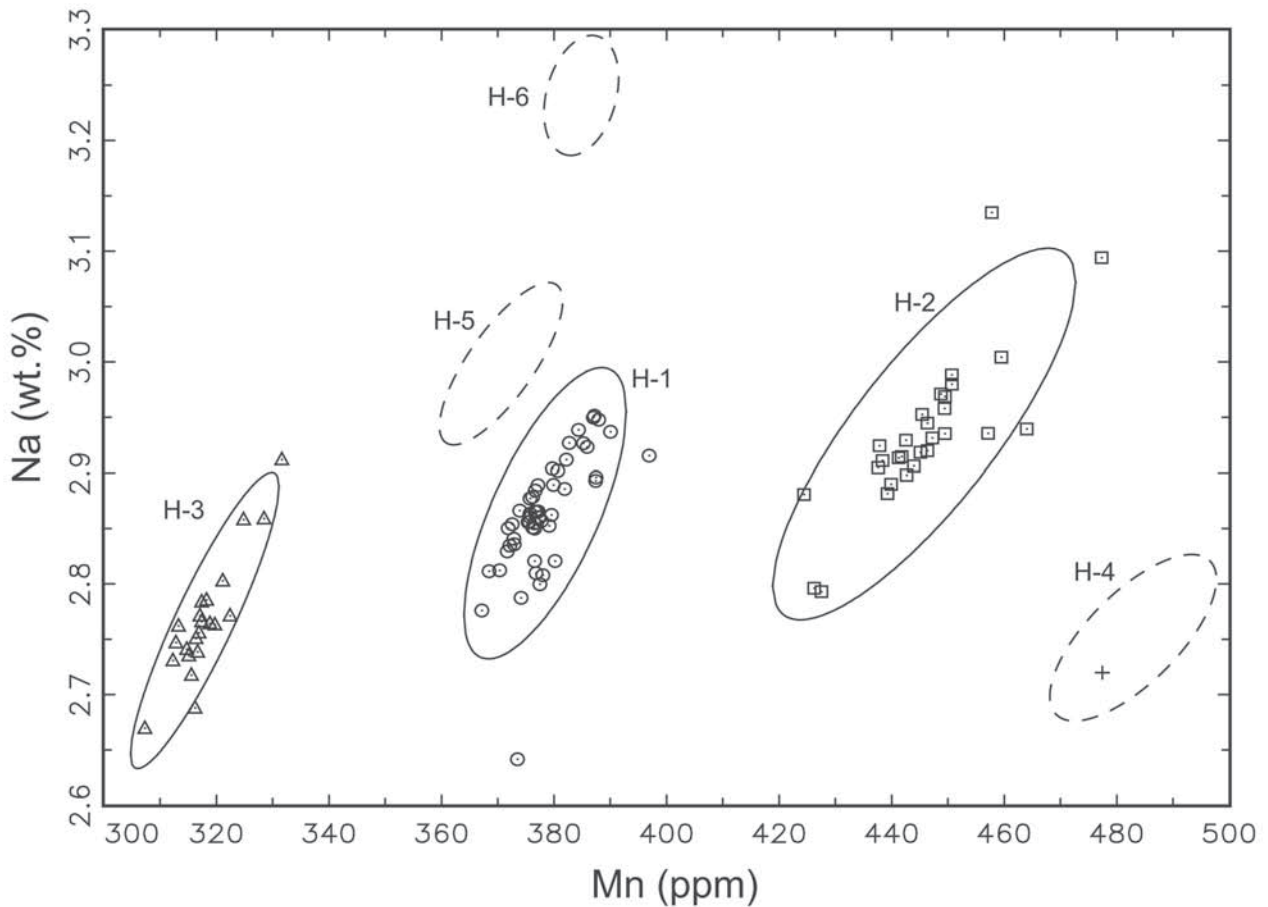


Figure 5. Two dimensional plot of geochemical groupings of the obsidian in Sakhalin and Hokkaido.

Fig. 4), with distance from source to site ca. 700 km. To northern Sakhalin, obsidian was transported for the first time at ca. 10,000 BP (estimated) (Odoptu site, No. 4 on Fig. 4), over a distance from the source of ca. 1000 km.

As for the Amur River basin, obsidian tools and flakes are quite rare in prehistoric assemblages, where they constitute a separate geochemical group, the Osinovoe Lake type (Fig. 1). The possible source of this archaeological obsidian was recently found in the basalts of the Obluchie Plateau. The distances between source and sites vary from 150 km to 800 km. The earliest use of obsidian is estimated as ca. 13,000 BP for the Gromatukha Initial Neolithic complex (Kuzmin and Popov 2000).

The results of obsidian provenance studies allow us to establish that the wide use of the basaltic volcanic glass was begun at least as early as 15,000 BP. The utilization of this type of volcanic glass by prehistoric populations of Primor'e and the Amur River basin is an exceptional feature in obsidian exploitation in the region of the North Pacific rim. In general, obsidians of acidic (rhyolitic) composition were the most widely used in prehistory, for example in Japan.

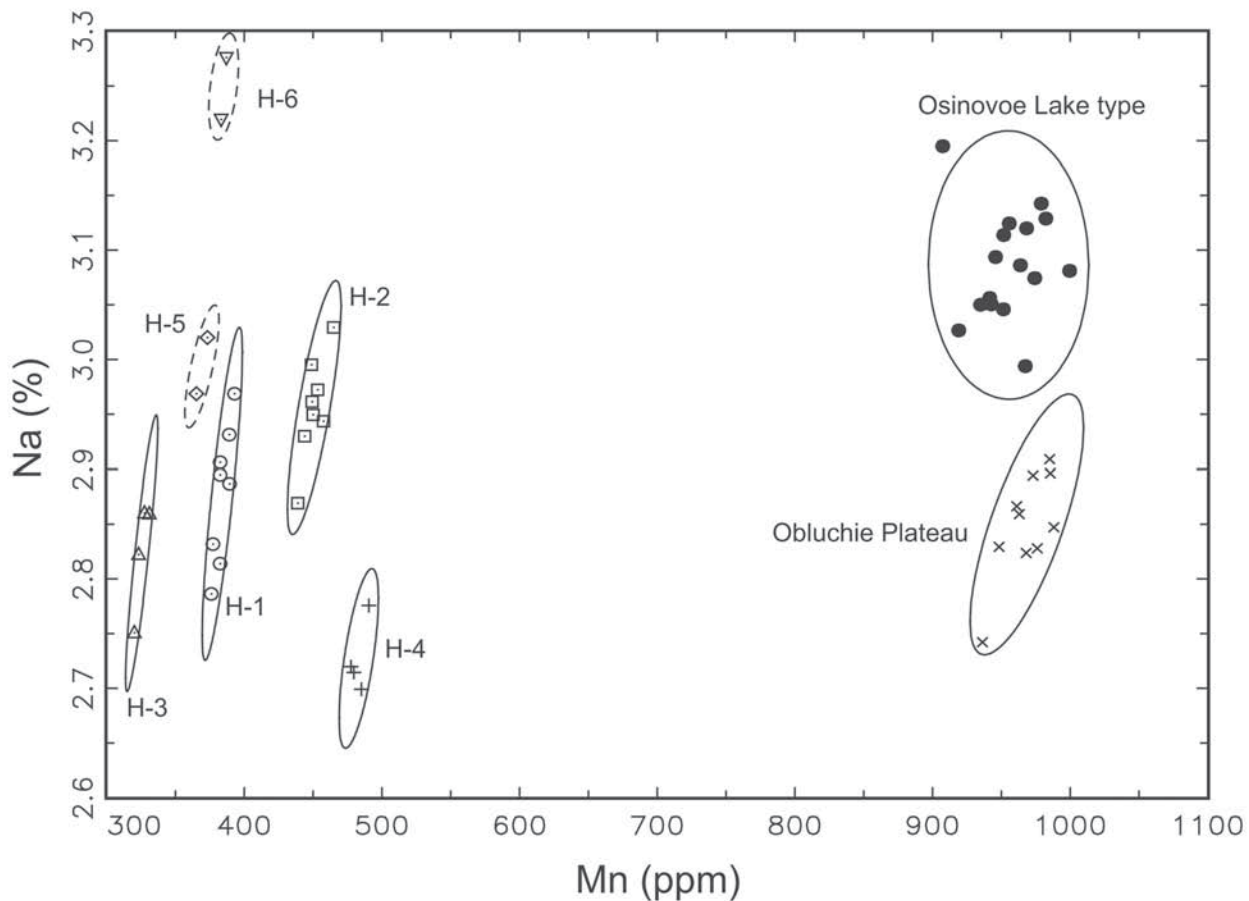


Figure 6. Two dimensional plot of geochemical groupings of the obsidian sources in Hokkaido; and archaeological specimens (Osinovoe Lake type) and geological source (Obluchie Plateau) from the Amur River basin.

Japan

The Japanese Archipelago is the best-studied area in Northeast Asia in terms of archaeological obsidian and its sources. Summaries of the work since the 1960s may be found in Suzuki and Tomura (1983), Yamamoto (1990), Ono et al. (1992), and Habu (2004). Hall and Kimura (2002) recently presented a summary of geochemical data for Hokkaido obsidian. Four major sources used by prehistoric people were identified: Shirataki, Oketo, Akaigawa, and Tokachi-Mutsumata (Fig. 4). The earliest use of obsidian is known at the Wakabano Mori site on the Tokachi Plain, which is ^{14}C -dated to ca. 30,000 BP (Obihiro Board of Education 2004).

On Honshu there are many sources of high-quality volcanic glass. Several important ones are located in the Shinshu region of the central part of the island, including the Wada and Yatsugatake localities (Tsutsumi 1998). On the Kanto Plain, several sources are associated with recent volcanoes in the Hakone area. One of the most important is located on remote Kozu-jima (Kozu Island), off the Honshu mainland (Oda 1990; Motohashi 1996). The area of this source was never connected with the main body of Honshu even during the Last Glacial Maximum, ca. 20,000-18,000 BP, when sea level dropped ca. 120 m below modern and the strait separating Kozu-jima from the Kanto Plain was still some 50 km wide. The earliest use of obsidian on Honshu is documented at the Musashidai site (Keally and Hayakawa 1987; Oda 1990), with an age estimate of ca. 30,000 BP.

On Kyushu Island, the most important obsidian source, Koshidake, is located in the northwestern part of the region. It was extensively used by ancient people, and the distribution network covered a vast area including all of Kyushu, the neighboring southern coast of the Korean Peninsula, and the Ryukyu Islands. The longest exchange networks, up to 1000 km, existed in later prehistory, Late and Final Jomon (after ca. 4000 BP) (Obata 2005). The earliest site with obsidian artifacts on Kyushu is Ishinomoto near the city of Kumamoto, ^{14}C -dated to 32,800-31,600 BP, where volcanic glass tools originated from the Aso-2 tephra (Kumamoto Prefecture Board of Education 1999).

The Korean Peninsula

This area is still in the infant stages of obsidian source studies, despite the fact that tools and flakes made out of high-quality volcanic glass are widely distributed in Korea (e.g., Nelson 1993; Yonsei University Museum 2001). Until recently, few attempts had been made to match obsidian artifacts with existing sources (Son and Shin 1991; Sato 2004; Obata 2004).

Our own research with volcanic glasses from Paektusan volcano (Kuzmin and Popov 2000; Kuzmin et al. 2002a; Popov et al. n.d.) allows us to suggest that Paektusan was the major source of obsidian for the Korean Peninsula. Recently, Paektusan obsidian was identified at the Janghung-ri site (Hantan River basin, in the central part of the peninsula) which is ^{14}C -dated to ca. 24,400 BP (Popov et al. n.d.). This is the earliest reliable evidence for obsidian use in Korean prehistory. Obsidian from the Kyushu sources (mainly Koshidake and Hario-jima) was identified at some Neolithic sites on the southeastern Korean coast (Takahashi et al. 2003).

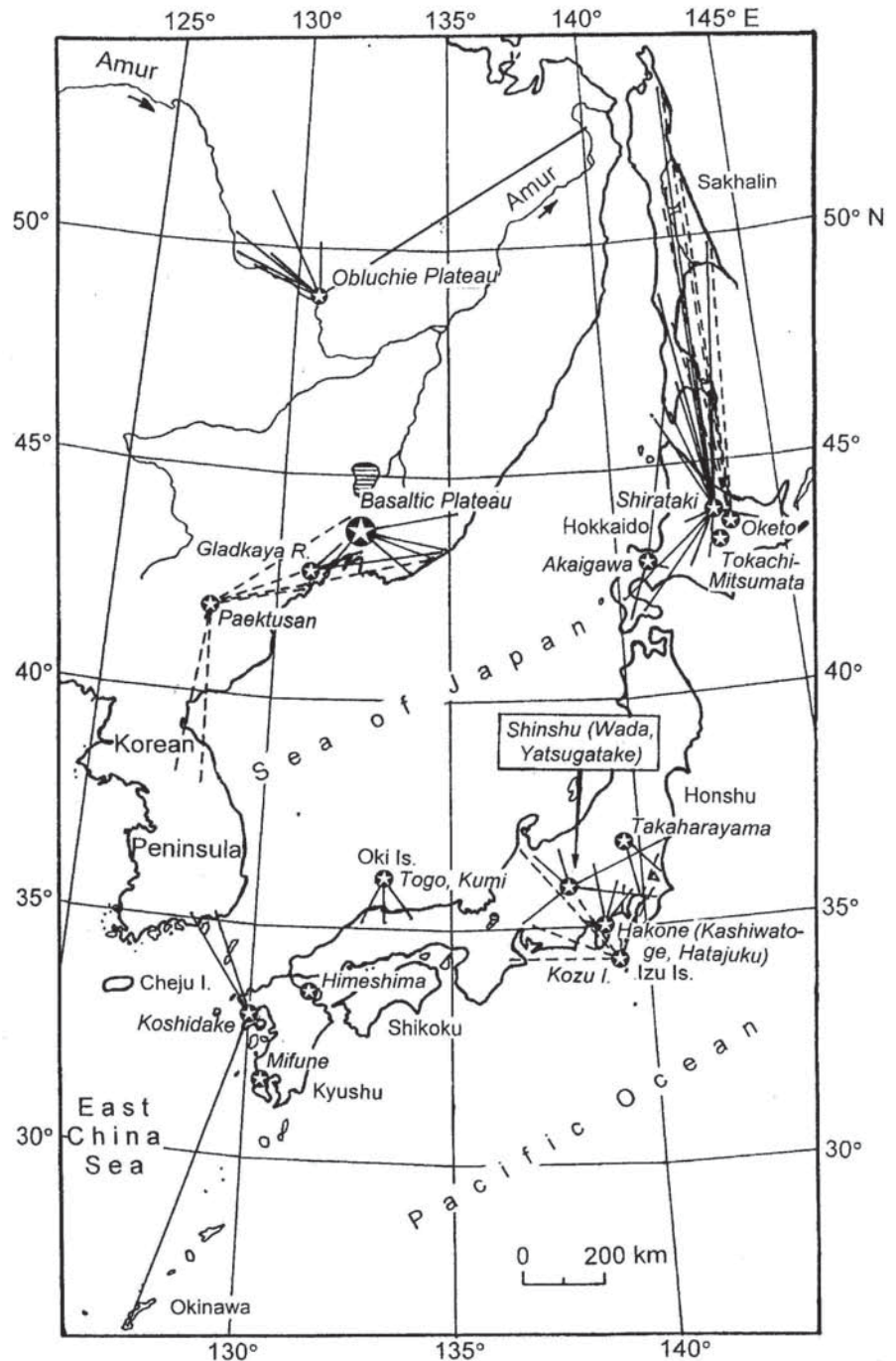


Figure 7. Major obsidian exchange networks in Northeast Asia as discussed in the present text.

DISCUSSION

There are several issues that should be identified in this review. To deal with a minor matter first, there is the question of priority in the study of obsidian sources in Primor'e. Kononenko and Cassidy (2000:206) discuss the source of obsidian for tools found at the Ustinovka site complex, identifying the source as located about 200 km south of the sites, but no reference is given for this information. In fact, this was a conclusion of the team under my leadership, first published in English in 1999 (Kuzmin et al., 1999; see also Kuzmin et al., 2002a:513). Similarly, the recent claim of a group led by T. Doelman that they had identified Paektusan obsidian in Primor'e for the first time ("we found that volcanic glass was transported from a distant source into areas where it was already available" [Daelman et al. 2004:113]) fails to recognize that the same conclusion had been reached several years before by researchers under my leadership. Their statement, therefore, is entirely misleading.

Beyond this, a major unsolved problem for obsidian provenance studies in the Russian Far East is whether or not obsidian was introduced to the Amur River basin and Primor'e from the Japanese Islands. Based on a very limited amount of data, it has been suggested that obsidian from sources on Honshu and Hokkaido, as well as from the smaller Oki Islands source near the coast of western Honshu, was brought to Primor'e and the Amur River basin in the Upper Paleolithic (e.g., Kimura 1998; see review in Sato 2004). However, other than personal communications regarding some of the analytical data (see Kuzmin and Popov 2000:158-159), no results of geochemical analysis have been officially released. Also, the distinct difference in geochemical composition between archaeological obsidian from the Amur River basin and obsidian from Hokkaido sources is obvious (Fig. 6). Thus, the suggestion that obsidian was exchanged between Japan and the mainland Russian Far East is not so far supported by reliable data.

Alternatively, in the obsidian database for the Russian Far East one archaeological sample from the Osinovka site in Primor'e, an item of rhyolitic obsidian, is geochemically close to the Shirataki source of Hokkaido (Akaishiyama and Horokozawa, and Hachigozawa localities) (Kuzmin et al. 2002a:513). However, analysis of additional Osinovka samples does not provide any support for this single indication, and I conclude tentatively that Hokkaido obsidian was not introduced to Primor'e. More research is needed to finally clarify this problem.

Another important problem is the presence of Paektusan obsidian in prehistoric complexes of the Russian Far East outside of Primor'e Province. For example, obsidian exchange between the Paektusan source and the Amur River basin (Khummi site), suggested by Sato (2004), should not be accepted as proven until full analytical details become available. According to the Russian Far East obsidian database (Kuzmin and Popov 2000; Kuzmin 2005), all obsidian artifacts from the Amur River basin, recovered at sites from the lower stream (Malaya Gavan site) to the headwaters (Gromatukha, Osinovo Ozero, and other sites), which are separated by more than 1000 km, belong to a single geochemical group that is not similar to the Paektusan source groups (Fig. 1).

A study of archaeological collections from southern Sakhalin (Fitzhugh et al. 2004:102) has suggested that the percentage of obsidian artifacts at some Sakhalin sites is smaller than the obsidian percentage in sites of the Kuril Islands. However, the study (Fitzhugh et al. 2004) was very limited in the number of sites examined (only three sites pertaining to the Paleometal stage), and this conclusion may not ultimately hold. According to recent results (e.g., Vasilevski 2003:66-67), obsidian was

one of the dominant types of raw material in use on Sakhalin Island since the Upper Paleolithic, ca. 19,400 BP.

Recently, Doelman et al. (2004:121) stated: “It has been suggested that the reason obsidian from Paektusan Volcano moved into the Basaltic plateau, an area where plentiful volcanic glass sources are readily available, was because the local sources did not provide enough good quality material (Kuzmin et al. 2002:513). Preliminary fieldwork conducted in 2001 by some of the authors of this paper suggests that this hypothesis is no longer tenable.” This is misleading, however, for in the paper by Kuzmin et al. that is cited (in the present paper, Kuzmin et al. 2002a) the specific words on page 513 are the following: “Palaeolithic sites located near the rivers that drain the Shkotovo basaltic plateau suggest that the local Basaltic Plateau source could supply enough raw material for tool manufacturing. However, prehistoric people did not only exploit the local Basaltic Plateau source, but they also used obsidian from the more remote Paektusan source, indicating that the strategy in obtaining good quality raw material in prehistory was quite complex.” Thus, Doelman et al. (2004) have unfortunately misrepresented our results.

CONCLUSION

In the prehistory of Northeast Asia, several large-scale exchange networks of obsidian existed (Fig. 7). Among them, the Shirataki, Oketo, Koshidake, and Paektusan networks were the largest in terms of the distance of exchanges, which sometimes exceeded 1000 km. In general, the earliest networks originated in Japan (Honshu, Kyushu, and Hokkaido Islands) at ca. 33,000-30,000 BP, corresponding to the Early Upper Paleolithic. At ca. 24,000 BP, the Paektusan network began to function. At ca. 19,000 BP, the Shirataki network spread into Sakhalin Island.

In the Upper Paleolithic (ca. 33,000-10,000 BP), exchange distances in Japan were up to 200-300 km in the cases of Honshu and Kyushu, and as much as 1000 km in that of Hokkaido. In the Russian Far East, obsidian was transported up to 400-500 km, and in Korea up to 500 km.

In Primor’e, Sakhalin Island, and the Korean Peninsula, the earliest sites with obsidian use (ca. 24,000-10,000 BP) have microblade technology as the major type of stone chipping. It thus seems that obsidian was valuable as a raw material especially for microblade manufacture.

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Chapter 5

Obsidian Sources and Prehistoric Obsidian Use on the Kamchatka Peninsula: Initial Results of Research

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INTRODUCTION

This paper presents the first data concerning sources of archaeological obsidian in one of the most promising areas of Northeast Asia for obsidian provenance studies, the Kamchatka Peninsula. The importance and prospects for volcanic glass source studies in the Russian Far East have been demonstrated by a series of recent papers reported by our team (e.g., Kuzmin et al. 2002a, 2002b; Kuzmin and Popov 2000). This new information will contribute toward a greater understanding of Kamchatkan archaeology, an area that is important in terms of its relationship to the peopling of the New World during the Late Glacial and the Early Holocene periods, especially with regard to Alaska and the Aleutian Islands.

The general geomorphic features of the Kamchatka Peninsula include two major mountain ranges, Central and Eastern, studded by numerous modern volcanoes; mountains in the southern part of the peninsula with several volcanoes; and lowlands along the western coast on the Sea of Okhotsk (Suslov 1961). The highest peak in the Central Range is the Ichinsky Volcano (3,607 m above sea level); and in the Eastern Range the highest point is the volcanic cone of the Klyuchevskaya Sopka (at 4,850 m). The geology of Kamchatka has been well studied (e.g., Khain 1994), and general petrological information about volcanic rocks is readily available (e.g., Volynets et al. 1990; Leonov and Grib 2004).

Obsidian as raw material has been known in the prehistoric complexes of Kamchatka since at least the beginning of the twentieth century (e.g., Jochelson 1928; Rudenko 1948), and its significance became more evident in the early 1960s when excavations at the Ushki site-cluster began, together with a reconnaissance of the entire peninsula (Dikov 1965, 1968). Several studies of the archaeology of Kamchatka (e.g., Dikova 1983; Ponomarenko 1985, 2000; Ptashinsky 2003) have since confirmed the abundance of obsidian in the prehistoric assemblages; however, before the early 2000s no attempts were made to identify the sources of archaeological obsidian. The first data on the geochemical compositions of such obsidian and on geological sources of volcanic glasses were obtained by our team in 2003-2005, with the identification of existing and potential sources of obsidian used by prehistoric populations. We present here our initial results, along with a preliminary interpretation.

ARCHAEOLOGICAL BACKGROUND

Three major prehistoric cultural stages are recognized on the Kamchatka Peninsula: the Paleolithic, Neolithic, and Paleometal (or Early Iron Age) (e.g., Dikov 2003, 2004; Kuzmin 2000). The Upper Paleolithic of the Kamchatka Peninsula is represented by two lowermost layers, VI and VII, at the Ushki site-cluster in the Kamchatka River Valley located in the central part of the peninsula (e.g., Dikov 1996). The age of layer VII of the Ushki sites, based on radiocarbon dates, is estimated at ca. 14,300-10,400 radiocarbon years (hereafter, age BP) (Dikov 1996), or perhaps only ca. 11,300-10,000 BP, according to the latest research (Goebel et al. 2003). The age of layer VI of the Ushki cluster is ca. 11,100-10,000 BP. The following stage, Neolithic, began in Kamchatka during the Holocene Climatic Optimum, ca. 6000-5000 BP, and continued until ca. 1500 BP. Up to 100-150 Neolithic sites have been found in Kamchatka, but only about ten of these have been well excavated and dated. The Paleometal stage (ca. 1500-300 BP) followed the Neolithic.

As to the Upper Paleolithic, the main raw material types in layer VII of the Ushki cluster are silicified shale, chalcedony, and basalt, while obsidian is quite rare; in layer VI, flint, chalcedony, and obsidian are the major raw materials. During the Neolithic, the chief raw materials were flint, obsidian, jasper, and basalt. At several sites, obsidian tools comprise more than 90% of the total artifact assemblage. During the Paleometal, the relative intensity of obsidian use was reduced, in comparison with the Neolithic.

GEOLOGICAL BACKGROUND

On the Kamchatka Peninsula more than 30 volcanic glass localities are known (Shevchuk 1981). There are three main regions with abundant sources of volcanic glass: 1) the Central Range; 2) the Eastern Range; and 3) the southern part of the peninsula. All the sources belong to Neogene and Quaternary volcanic fields. In the Central Kamchatka volcanic belt, obsidian-bearing formations are dated to the Oligocene-Neogene, and in the Eastern Kamchatka volcanic belt, chiefly to the Quaternary (Khain 1994: 307-312). In southern Kamchatka, obsidian-bearing formations are dated to the Neogene (Pliocene). Volcanic glasses create extrusive domes, lava and pyroclastic flows, and are also found in the pyroclastic rocks (tephras and pumice tuffa) in the form of fragments. According to their chemical compositions, the volcanic glasses correspond to dacitic and rhyolitic perlites. Most of the obsidian from Kamchatka has excellent properties for tool technology, which probably influenced the wide distribution of obsidian found in the prehistoric cultural assemblages.

Central Range [Sredinny Khrebet]

The largest sources of obsidian are found in the Central Range of Kamchatka, located at the higher elevations as open-air scatters of colluvial origin on tundra-covered mountain plateaus. Dacitic and rhyolitic obsidians are present as blocks and large chunks; color and structure vary, and in some places iridescent types have been found.

At the headwaters of the Vayampolka River in the northern part of the Central Range, the Itkavayam obsidian source is located. Volcanic glasses here are represented by black and brown massive and breccia-like rhyolitic obsidians. This source consists of three sub-sources located along the slopes of Ritman Volcano (Shevchuk 1981). The first sub-source includes obsidian lava flows up to 200 m thick, which appear in the circle fault of the Ritman Volcano summit, and constitute a plateau-like surface. The color is mostly black, sometimes reddish (due to scattered hematite crystals); the texture is glossy and conchoidal, and the thin edge is transparent. The second sub-source is situated 2.5 km southwest of the Obsidianovy Volcano, and is represented by obsidian lava flows, also creating a plateau-like surface. The color of the obsidian is black and “sealing-wax” red, the texture massive, and it is frosted. The third sub-source is located along the southeastern slope of Ritman Volcano. At this location, the obsidian is black, with conchoidal texture and a glossy shining glass containing small phenocrysts.

In the middle portion of the Central Range is situated the Ichinsky cluster of obsidian sources, the largest single location for volcanic glass on the Kamchatka Peninsula. There are several sub-sources within the Ichinsky source district, which altogether covers an area of ca. 700 km². Obsidians of Pliocene and Middle Pleistocene ages are located in dacite and rhyolitic extrusive domes. According to geochemical data, there are two major sources of obsidian present, termed Ichinsky and Payalpan. Ichinsky obsidians are found within the Pleistocene extrusive domes on the northern and northwestern slopes of Ichinsky Volcano and in the headwaters of the Belogolovaya and Bystraya Rivers; the glass has a massive banded texture, and either black- or blue-colored obsidian is found. The Payalpan source, of Pliocene age, is located 25 km northeast of Ichinsky Volcano, along the western slope of the Maly Payalpan Volcano, in the form of a colluvial scatter ranging up to 200-250 m in length. The texture of the obsidian is massive or breccia-like, and the color is dark with semi-transparent brown veins.

South of the Ichinsky obsidian source-cluster, there is a smaller obsidian source in the crater lake of Khangar Volcano. Three small islets in the lake consist of volcanic glass of dacite composition. The crater itself was formed as a result of the Khangar volcanic eruption about 6900 BP (Melekestsev et al. 1996).

Eastern Range [Vostochny Khrebet]

The Eastern Range has several active volcanoes, such as Krashenninnikov, Karymskaya Sopka, and Avachinskaya Sopka. In the central part of the range, several localities with volcanic glasses are known, correlated with the Pleistocene phase of the acidic ignimbrite volcanism. The glasses are represented mainly by perlites. One of the best known localities is within the Uzon caldera. An obsidian source is also known in the Karimsky volcanic massif, situated in the southern part of the Eastern Range. Here, pure obsidians are embedded in the pumice “noble” tuffa from the Odnoboky Volcano, with an age of ca. 100,000 years (Masurenkov 1980). Younger pyroclastic pumices of the Akademii Nauk [Academy of Sciences] Volcano in the southern part of the Eastern Range, dating to ca. 28,000-40,000 years ago, also contain obsidian fragments; the texture is massive, with a transparent thin edge, and the color is black. Obsidian is plentiful along the shore of the caldera lake of this volcano.

Southern Kamchatka

South of the city of Petropavlovsk-Kamchatsky, several volcanic glass sources of Neogene and Quaternary ages are known. One of the largest is the Nachiki source with perlites and pure obsidians located at the extrusive dome of the Shapochka Volcano which emerged during the Pliocene. A distinct feature of the Nachiki source is the presence of plagioclase and pyroxene phenocrysts in the black glass matrix. Natural outcrops of this source can be seen at the Nachiki summit. A second obsidian source is located on the watershed of the Bannaya and Plotnikova rivers, which we have named the Bannaya River source. Here, numerous nodules of high-quality, transparent obsidian (up to 3-7 cm in diameter) are visible in the rhyolites and perlites of the extrusive dome of Mt. Yagodnaya. A third source (Tolmachev Dol) is located west of the Sopka Gorevaya Volcano, in the Tolmachev Dol River valley. It occurs in the slaggy lava cone of the Chasha maar, dated to ca. 4600 years ago. Among the fragments of volcanic tephra, large (up to 30 cm long) pieces of obsidian of an unusual light gray color can be found.

MATERIALS AND METHODS

To accomplish the primary goal of our study, samples of obsidian were collected from archaeological assemblages in Kamchatka, the sites ranging in age from the Late Paleolithic to the Paleometal (Table 1). In total, 32 sites and site clusters were sampled, and 244 specimens were submitted for analysis. Samples were also collected from geological outcrops containing highly knappable volcanic glass throughout the peninsula. In total, 35 geologic samples from 12 different localities were analyzed.

The geochemical study was conducted by instrumental neutron activation analysis (INAA). INAA is one of the most superior methods for studying the chemical composition of volcanic glasses, with sensitivity limits for most elements in the parts-per-billion to parts-per-million range. The advantage of INAA is that one can use small samples (starting from a few milligrams) to determine the amounts of more than 25-35 elements, including most of the rare earths (REEs), to reveal a unique "geochemical fingerprint" for each volcanic glass source. For our study, the INAA analysis was performed at the Research Reactor Center, University of Missouri, in Columbia.

Samples were cleaned to rid the surface of contaminants, and then divided into aliquots of 100 milligrams each. The samples were exposed to thermal neutrons from the reactor after which the abundances of up to 28 chemical elements, such as Al, Cl, Dy, K, Mn, Na, Ba, La, Lu, Nd, Sm, U, Yb, Ce, Co, Cs, Eu, Fe, Hf, Rb, Sb, Sc, Sr, Ta, Tb, Th, Zn, and Zr, were determined (e.g., Glascock 1992). Concentration data for the elements were obtained by using short- and long-irradiations of the samples. For some artifact samples, only the short-irradiation was applied, with the content of seven elements measured: Al, Ba, Cl, Dy, K, Mn, and Na (Table 2).

Statistical groupings for the major geochemical sources, based on bivariate plots, cluster, and discriminant classification analyses (Glascock et al. 1998), were identified with the help of GAUSS software (available from the Archaeometry Laboratory at MURR; Internet address: <http://www.missouri.edu/~glascock/archlab.htm>). As a result, sources for the obsidian artifacts are securely established.

RESULTS AND DISCUSSION

The concentrations of elements measured in the obsidian specimens were tabulated with a spreadsheet program which facilitated the generation of bivariate plots showing different combinations of element pairs. Bivariate plots of Ba vs. Mn, Th vs. Cs, and Ta vs. Fe are shown in Figures 1-3, respectively, illustrating the major geochemical groups. In Table 2, the means and standard deviations for the 13 source groups identified from the INAA data are summarized. In general, six groups contain both archaeological and geological obsidians; five groups have only archaeological samples; and two groups of geological obsidians did not match any of the archaeological specimens.

The Major Sources of Archaeological Obsidian

Data for the source groups identified by both archaeological and geological obsidians are summarized in Table 3. Three of the sources are located in the Central Range. Obsidian from the *Itkavayam* source (Table 2, group K-3) is identified at five sites on the western coast of Kamchatka: Palana-airport, Inchegitun 1, Chimei, Galgan 1, and Kulki, with distances from source to sites ranging from 90 to 170 km (Fig. 4, a). Three other sites linked to this source are situated much farther away, on the

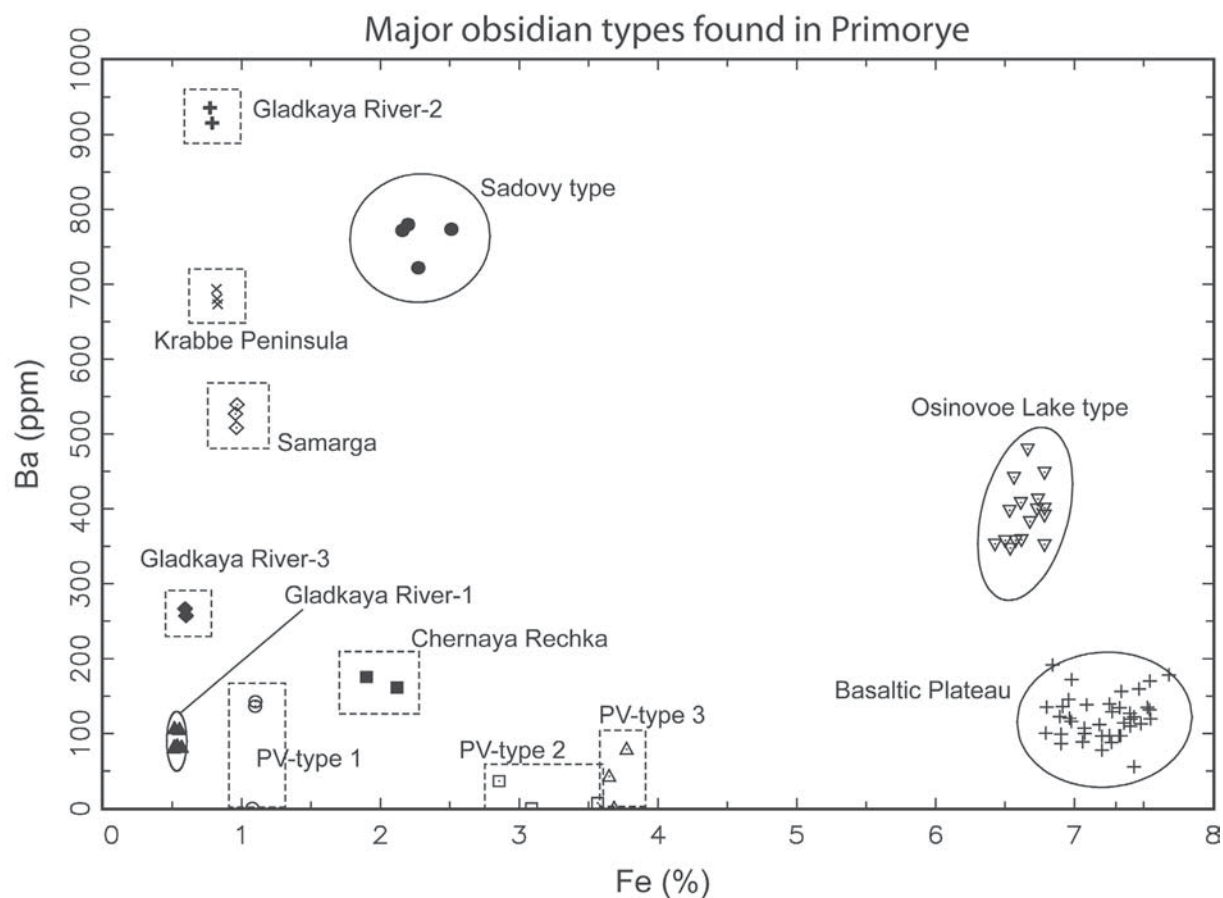


Figure 1. Bivariate plot of barium (Ba) vs. manganese (Mn), discriminating geochemical groups of Kamchatka obsidian (ellipses indicate 95% confidence level).

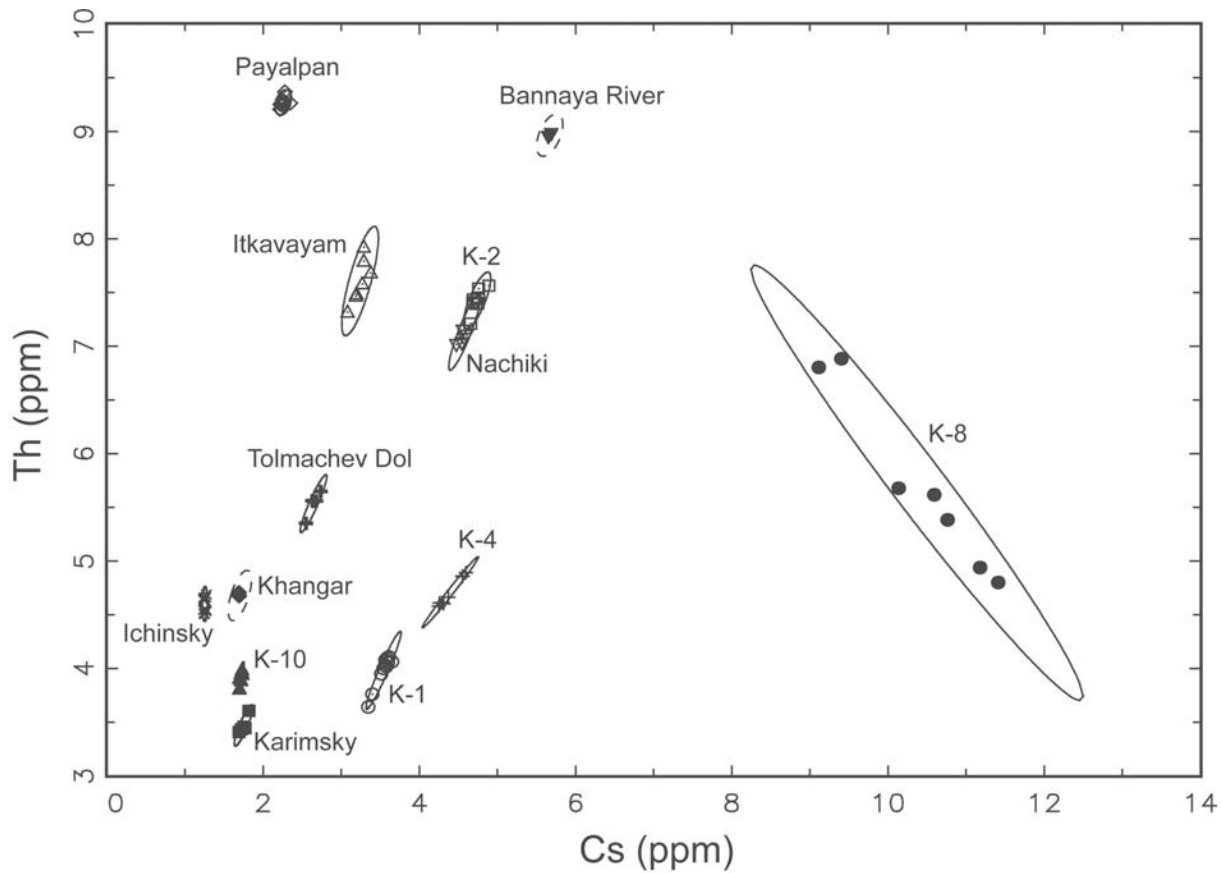


Figure 2. Bivariate plot of thorium (Th) vs. cesium (Cs), discriminating geochemical groups of Kamchatka obsidian (ellipses indicate 95% confidence level).

eastern coast: Elisovo 2, Nerpichye Lake, and Zeleny Kholm (Fig. 4), at distances of 220-560 km from the source. Obsidian from the *Payalpan* source (Table 2, group K-5) is found at ten archaeological sites in the central part of Kamchatka: Anavgai, Ilmagan, Plotnikova River, Avacha River, Viluchinsk 1, ASK, Kozlov Cape, Elisovo 2, Avacha (lower stream), and Avacha, with distances between the source and sites ranging from 70-90 km to 280-310 km (Table 3, Fig. 4, b). The *Ichinsky* source (Table 2, group K-7) matches artifacts found at three sites: Avacha 9, Ozernovsky 1, and Ozernovsky 2. They are located distances ranging from 260 to 470 km from the source (Table 3, Fig. 4, c).

In the Eastern Range, one obsidian source, *Karimsky* (group K-9), was identified in the Akademii Nauk caldera of Karymsky Volcanic Centre. It matches artifacts from a single site, Kopyto 1, which is located ca. 40 km away (Table 3; Fig. 4, d).

On southern Kamchatka, two sources were found. Obsidian from the *Nachiki* source (group K-6, Table 2) is found at three sites: in the vicinity of the source (Plotnikova River site); ca. 25 km from the source (Sokoch Lake site); and ca. 50 km from the source (Avacha River, animal farm) (Table 3; Fig. 4, e). The *Tolmachev Dol* source obsidian (group K-11, Table 2) was found at two sites, Sokoch Lake and Viluchinsk 2, situated 60-65 km from the source (Table 3; Fig. 4, f).

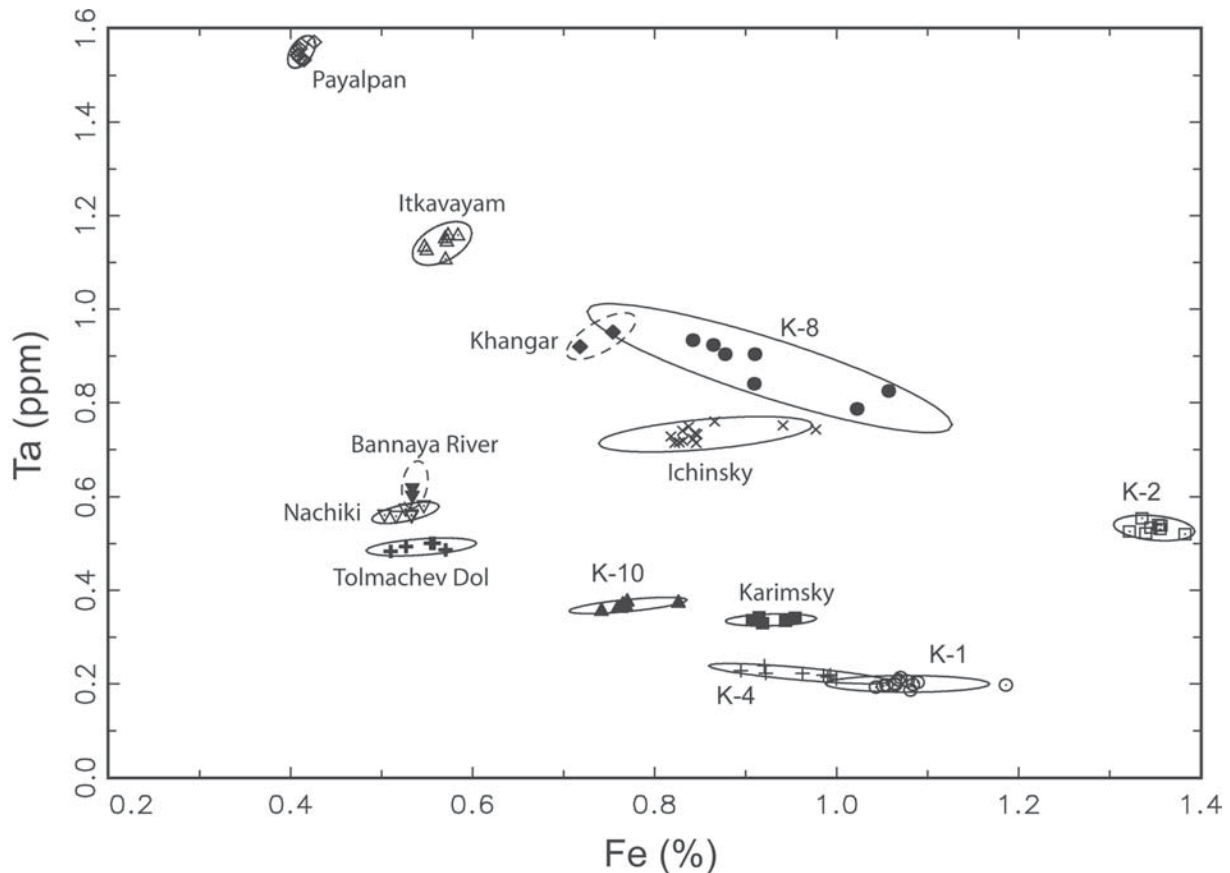


Figure 3. Bivariate plot of tantalum (Ta) vs. iron (Fe), discriminating geochemical groups of Kamchatka obsidian (ellipses indicate 95% confidence level).

Archaeological Site Groups with Unidentified Sources

Five geochemical groups of archaeological obsidian could not be assigned to any of the known sources on Kamchatka. The search for these sources is one of our tasks for the near future.

The *K-1 Group* is represented by 94 artifacts from 32 sites, mostly from the southeastern part of the peninsula (29 sites), and from three sites on the northwestern coast (Fig. 5, a). The *K-2 Group* is represented by 38 artifacts from 17 sites, located mainly in the southern part of Kamchatka (Fig. 5, b). The *K-4 Group* constitutes 21 artifacts from 11 sites, located in the vicinity of the city of Petropavlovsk-Kamchatsky, except for the Kozlov Cape site on the Kronotsky Peninsula and the Lopatka site in southernmost Kamchatka (Fig. 5, c). Twelve artifacts from two sites in the northern part of Kamchatka, Vaimitangin and Pachachi on the Olytorsky Gulf coast, belong to the *K-8 Group* (Fig. 5, d). It was noted long ago that all projectile points from this region were made from obsidian (Bilibin 1934: 48). The *K-10 Group* comprises 14 samples from two sites along the eastern slope of the Central Range, Anavgai and Esso, and from the Lisy site on the Kronotsky Peninsula (Fig. 5, e).

Sources Apparently Not Used in Prehistory

Two obsidian sources do not match any of the artifacts we analyzed (Fig. 5). The *Khangar* source (group K-12, Table 2; Fig. 5, f, IX) is located at the Khangar Volcano in the Central Range. Volcanic glasses of dacitic composition, which create the extrusive dome, have extensive phenocrysts and consequently are of poor tool-making quality. The second source, *Bannaya River* (group K-13, Table 2; Fig. 5, f, IV), was found 10 km from the Nachiki source and is represented by high-quality volcanic glass from an extrusive dome. Perhaps the small size of the obsidian nodules (less than 5 cm in diameter), constituting only 1-2% of the matrix volume, and the very limited overall size of the deposit (about 100 by 70 m), without natural accumulations of obsidian pebbles in the Bannaya River channel, discouraged the use of this source by prehistoric people.

Obsidian Use in Prehistoric Kamchatka

It is clear that obsidian played a major role as an important raw material in the prehistoric subsistence of the Kamchatka Peninsula. Generally, the archaeological survey results allow us to estimate that about 800 archaeological sites with obsidian tools and debitage are known on Kamchatka. This suggests the great potential for future detailed obsidian source studies.

Our initial data for obsidian in Kamchatka shows that during the Neolithic period, distances from source(s) to sites ranged from ca. 90 km up to ca. 470 km (obsidian from the Ichinsky source at Osernovsky 1-2 sites, Table 3). For some sites, such as Avacha River (animal farm), Plotnikova River, and Sokoch Lake, all associated with the Nachiki source, and Sokoch Lake, associated also with the Tolmachev Dol source, obsidian quarries are located only 5-60 km away. Definite long-distance exchange or trade of obsidian existed from the Maly Payalpan and Ichinsky sources, with distances up to ca. 315-470 km.

During the Paleometal period, long-distance exchange from the Itkavayam source can be detected, with distances up to ca. 450-560 km (Table 3). Also, the extensive use of the Payalpan source is noteworthy, with distances up to ca. 280-315 km. Some sources situated relatively near sites were also used — for example, the Karimsky source (Table 3).

CONCLUSION

The first results for identification of archaeological obsidian sources on the Kamchatka Peninsula have proven to be interesting. It is apparent that long-distance obsidian exchange or trade of obsidian has been in existence on the Kamchatka Peninsula since the Neolithic, ca. 3500 BP, or even earlier. Sources and sites where obsidian occurs are separated from each other by distances ranging from a few kilometers to as much as several hundred kilometers. Several obsidian sources still have not been identified; at least five possible sources are still to be located. This will be our task for the immediate future. It is not clear how prehistoric people obtained obsidian, either by direct access to the sources or by exchange. The mechanism for this obsidian acquisition thus also deserves special attention. Nevertheless, the initial results show the great potential for future obsidian provenance studies on Kamchatka.

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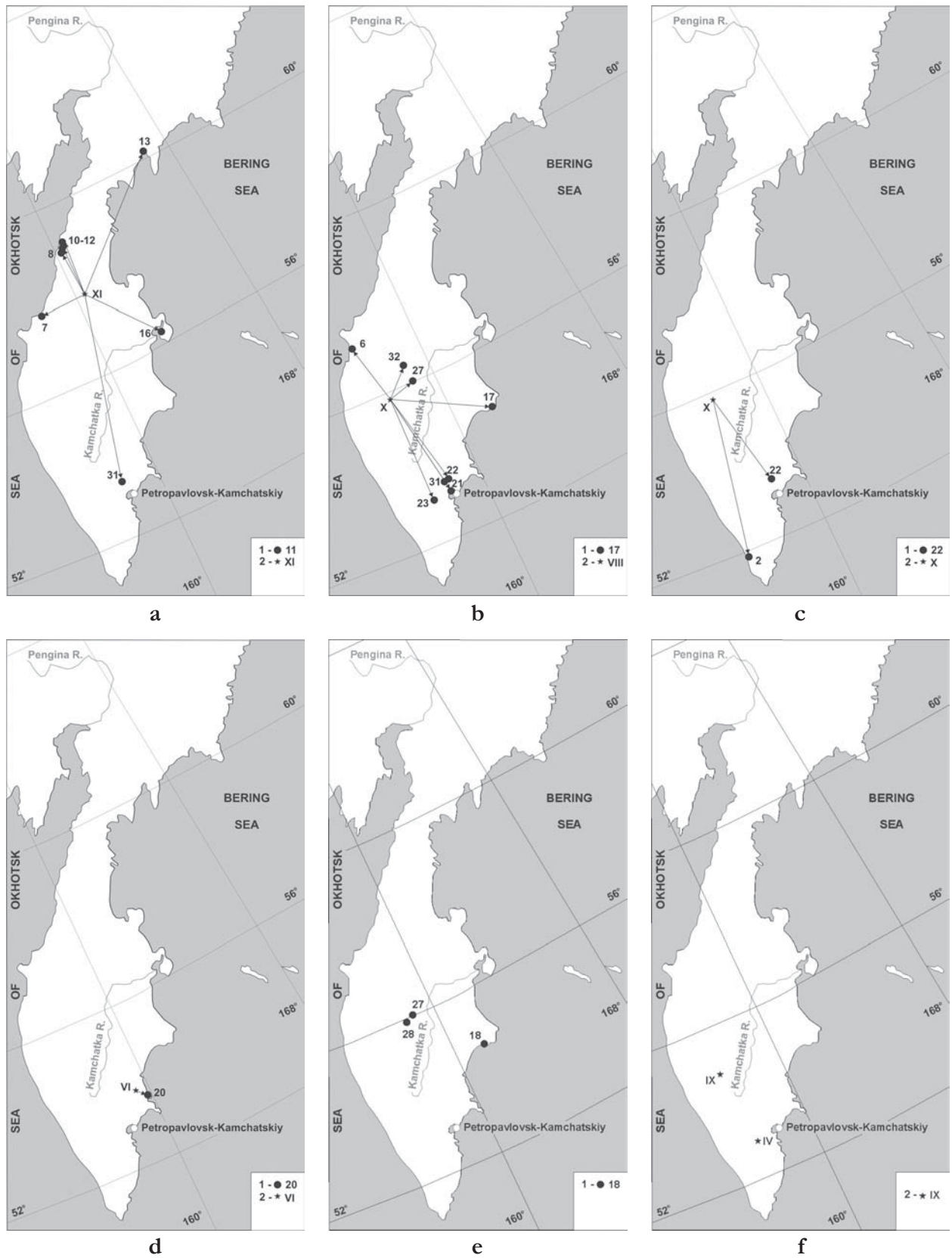


Figure 4. Identified obsidian sources with associated sites (within-figure legends: 1, dot, sites numbered as in Table 3; 2, star, source): a, Itkavayam source; b, Payalpan source; c, Ichiniskiy source; d, Karimskiy source; e, Nachiki source; f, Tolmachev Dol source.

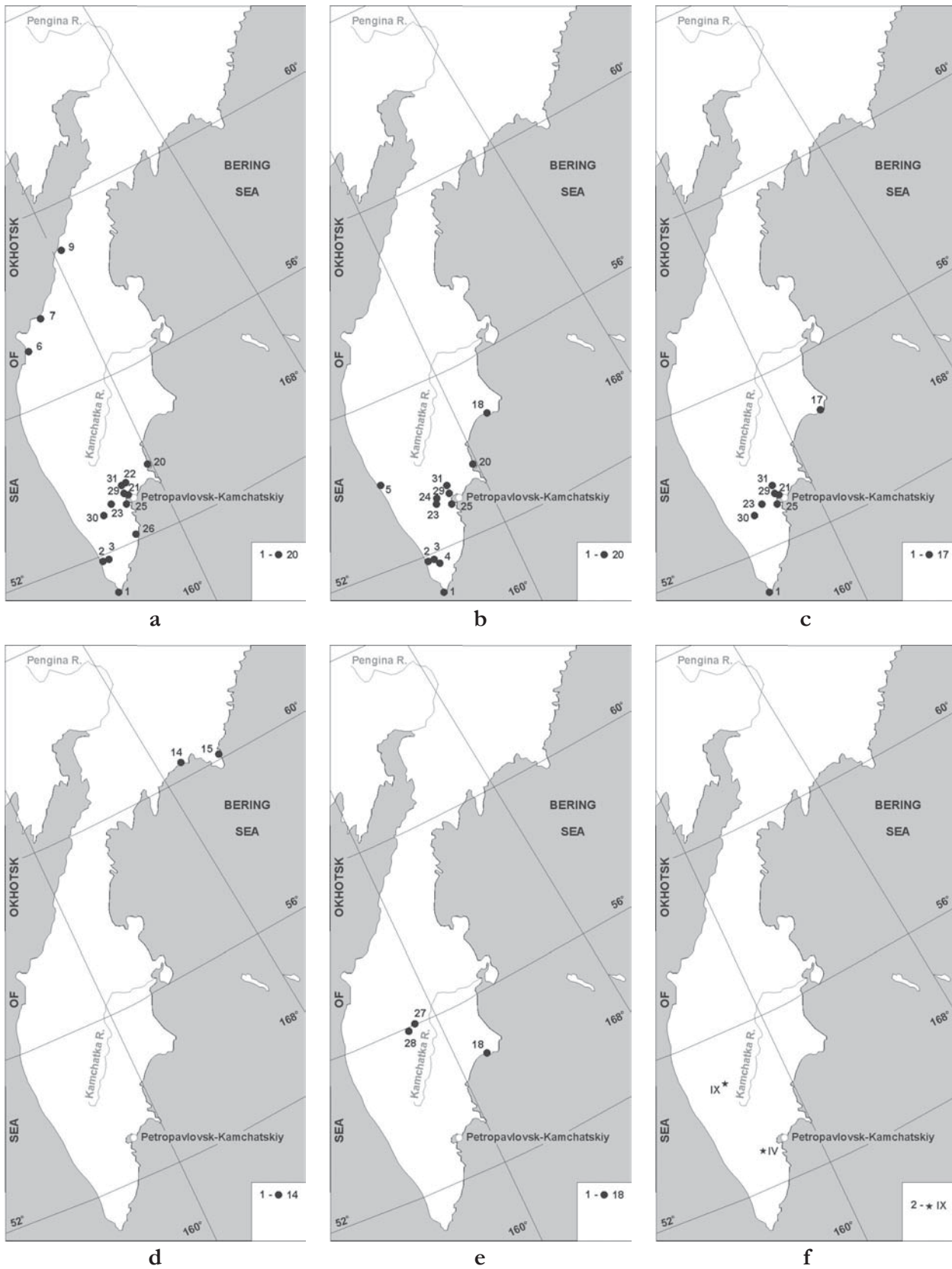


Figure 5. Additional archaeological sites and sources. **a-e**, archaeological Sites without identified obsidian sources (within figure legends: 1, dot, sites identified in Table 3): **a**, K-1 geochemical group; **b**, K-2 geochemical group; **c**, K-4 geochemical group; **d**, K-8 geochemical group; **e**, K-10 geochemical group. **f**, obsidian sources without known affiliated sites: **IV**, Bannaya River source; **IX**, Khangar source.

Table 1. Archaeological sites and site clusters on the Kamchatka Peninsula studied (the numbers correspond to those on Figs. 4 through 14)

| Site No. | Site/cluster name | Type of site | Age [epoch, ¹⁴ C date(s)] | Quantity of obsidian* |
|----------|--|------------------|---|---------------------------|
| 1 | Lopatka Cape | Surface | Late Neolithic; 2200 ± 100 BP (MAG-313) | Moderate |
| 2 | Ozernovskiy 1-4 | Surface | Late Neolithic | Moderate |
| 3 | Ozernaya River 1-2 | Surface | Late Neolithic | Moderate-high |
| 4 | Kurilskoe Lake | Surface | Late Neolithic | Moderate-high |
| 5 | Kekhta River | Surface | Neolithic | Moderate |
| 6 | Ust-Kovran | Cultural layer | Paleometal; 1740 ± 35 BP (GrA-10104), 1560 ± 60 BP (GIN-9295) | Moderate-high (ca. 34%)** |
| 7 | Kulki | Cultural layer | Neolithic | Moderate (17-20%)** |
| 8 | Palana-airport | Cultural layer | Neolithic | Moderate |
| 9 | Anadyrka 1 | Cultural layer | Paleometal; 1350 ± 50 BP (GIN-8036), 1180 ± 40 BP (GIN-8035) | High (65-70%)** |
| 10 | Inchegitun 1 | Cultural layer | Paleometal | High (65-70%)** |
| 11 | Chimei | Cultural layer | Paleometal | High (65-70%)** |
| 12 | Galgan 1 | Cultural layer | Paleometal; 1480 ± 50 BP (GIN-8144), 1350 ± 40 BP (GIN-8145), 1200 ± 50 BP (GIN-8140) | High (73-77%)** |
| 13 | Zeleny Kholm | Cultural layer | Paleometal | Little |
| 14 | Pakhachi | Surface | Neolithic | Moderate (17-28%)** |
| 15 | Vaimintagin | Surface | Paleometal | Little (4-5%)** |
| 16 | Nerpichye Lake | Surface | Paleometal | Moderate |
| 17 | Kozlov Cape | Surface | Paleometal | Moderate |
| 18 | Lisy | Surface | Paleometal | Moderate |
| 19 | Zhupanovo (Cape Pamyatnik) | Cultural layer | Paleometal; 1550 ± 100 BP (IVAN-172), 1450 ± 70 BP (IVAN-171) | Little (3-4%)** |
| 20 | Kopyto 1 (Zhupanovo River mouth) | Cultural layer | Paleometal | Moderate (14-27%)** |
| 21 | Avacha | Cultural layer 2 | Neolithic; 3540 ± 100 BP (MAG-310), 2990 ± 100 BP (KRIL-252) | High (60%)** |
| | Avacha River, lower stream | Cultural layer | Neolithic | High |
| | Avacha River, animal farm | Cultural layer | Neolithic | Predominant |
| 22 | ASK (Avacha 9) | Cultural layer | Neolithic | Predominant (95-97%)** |
| | Severnye Koryaki airport | Cultural layer | Neolithic | Predominant |
| 23 | Plotnikova River (Nachiki Lake) | Surface | Neolithic | Moderate-high |
| 24 | Sokoch Lake | Cultural layer | Neolithic | High (70%)** |
| 25 | Primorsky | Surface | Paleometal | Moderate-high |
| | Viluchinsk 1-5 | Surface | Paleometal | Moderate-high |
| | Sarannya Bay | Surface | Paleometal | Moderate-high |
| | Turpanka Bay | Surface | Paleometal | Moderate-high |
| 26 | Veselaya River (tributary of the Mutnaya R.) | Surface | Neolithic | Predominant (97-98%)** |
| 27 | Anavgai | Surface | Final Paleolithic – Early Neolithic | Predominant (93-95%)** |
| 28 | Esso | Surface | Neolithic | Predominant (92-94%)** |
| 29 | Bolshoi Kamen | Cultural layer | Paleometal | High (60-67%)** |
| 30 | Karimshina River | Surface | Paleometal | Moderate-high |
| 31 | Elisovo 1-5 | Surface | Paleometal | Moderate-high |
| | Nikolaevka | Surface | Paleometal | Moderate-high |
| 32 | Ilmagan | Surface | Neolithic | Predominant (94%)** |

* The estimated percentage of obsidian in unspecified assemblages is: a) little (less than 5 %); 2) moderate (5-30%); 3) moderate-high (30-60 %); 4) high (60-90 %); 5) predominant (more than 90%)

** Based on published sources (Ponomarenko 1985, 2000; Ptashinsky 2003)

Table 2. Concentration of elements measured by INAA in obsidian samples from the Kamchatka Peninsula.

| Name Group No. No. of samples [§] | K-1 11 (*98) | | K-2 8 (*38) | | Itkavayam K-3 7 (*25) | | K-4 8 (*21) | | Payalpan K-5 8 (*19) | | Nachiki K-6 8 (*17) | | Ichinsky K-7 13 (*15) | |
|---|-----------------|--------------|----------------|--------------|-----------------------------|--------------|----------------|------|----------------------------|------|---------------------------|------|-----------------------------|------|
| | mean | s.d. | mean | s.d. | mean | s.d. | mean | s.d. | mean | s.d. | mean | s.d. | mean | s.d. |
| Al (%) | *6.99 ± 0.27 | *7.42 ± 0.37 | *6.97 ± 0.25 | *6.75 ± 0.40 | *6.65 ± 0.29 | *6.95 ± 0.28 | *7.63 ± 0.24 | | | | | | | |
| Fe (%) | 1.08 ± 0.04 | 1.35 ± 0.02 | 0.57 ± 0.01 | 0.96 ± 0.04 | 0.41 ± 0.01 | 0.53 ± 0.01 | 0.86 ± 0.05 | | | | | | | |
| Mn (ppm) | *489 ± 8 | *590 ± 10 | *543 ± 10 | *392 ± 17 | *377 ± 6 | *752 ± 25 | *560 ± 7 | | | | | | | |
| Na (%) | *3.09 ± 0.06 | *3.25 ± 0.04 | *3.22 ± 0.03 | *2.95 ± 0.05 | *2.83 ± 0.06 | *3.08 ± 0.04 | *3.20 ± 0.08 | | | | | | | |
| K (%) | *2.59 ± 0.20 | *4.01 ± 0.21 | *3.27 ± 0.17 | *2.78 ± 0.18 | *3.91 ± 0.18 | *3.80 ± 0.19 | *3.26 ± 0.21 | | | | | | | |
| Cl (ppm) | *335 ± 59 | *603 ± 75 | *121 ± 22 | *355 ± 25 | *218 ± 32 | *393 ± 38 | *225 ± 58 | | | | | | | |
| Co (ppm) | 1.29 ± 0.12 | 0.59 ± 0.02 | 0.35 ± 0.01 | 1.03 ± 0.08 | 0.15 ± 0.01 | 0.22 ± 0.02 | 0.96 ± 0.10 | | | | | | | |
| Zn (ppm) | 35.2 ± 2.1 | 65.4 ± 3.1 | 34.9 ± 2.8 | 35.1 ± 2.7 | 24.8 ± 3.9 | 32.3 ± 1.0 | 34.1 ± 2.0 | | | | | | | |
| Sc (ppm) | 3.03 ± 0.54 | 7.48 ± 0.10 | 1.99 ± 0.06 | 3.26 ± 0.14 | 1.72 ± 0.32 | 2.02 ± 0.03 | 1.81 ± 0.06 | | | | | | | |
| Sb (ppm) | 1.28 ± 0.41 | 1.01 ± 0.10 | 0.40 ± 0.04 | 1.73 ± 0.22 | 0.41 ± 0.02 | 0.50 ± 0.05 | 0.12 ± 0.01 | | | | | | | |
| Cs (ppm) | 3.54 ± 0.09 | 4.74 ± 0.07 | 3.24 ± 0.10 | 4.40 ± 0.15 | 2.26 ± 0.04 | 4.58 ± 0.07 | 1.25 ± 0.01 | | | | | | | |
| Rb (ppm) | 60 ± 2 | 105 ± 1 | 74 ± 2 | 67 ± 1 | 92 ± 1 | 100 ± 2 | 70 ± 1 | | | | | | | |
| Ba (ppm) | *798 ± 60 | *968 ± 55 | *874 ± 49 | *882 ± 60 | *264 ± 40 | *682 ± 44 | *1080 ± 20 | | | | | | | |
| Sr (ppm) | 205 ± 20 | 84 ± 41 | 114 ± 22 | 157 ± 7 | 54 ± 5 | 77 ± 10 | 371 ± 68 | | | | | | | |
| La (ppm) | 11.6 ± 0.1 | 27.0 ± 0.4 | 16.4 ± 0.2 | 12.8 ± 0.1 | 24.3 ± 0.3 | 22.8 ± 0.3 | 18.5 ± 0.2 | | | | | | | |
| Ce (ppm) | 23.6 ± 0.4 | 61.6 ± 1.2 | 33.6 ± 0.8 | 26.7 ± 0.6 | 44.4 ± 0.9 | 45.4 ± 0.8 | 33.7 ± 0.5 | | | | | | | |
| Nd (ppm) | 9.6 ± 1.2 | 31.0 ± 1.5 | 12.3 ± 1.0 | 11.6 ± 1.2 | 14.1 ± 0.6 | 17.8 ± 1.5 | 12.2 ± 0.7 | | | | | | | |
| Sm (ppm) | 2.25 ± 0.41 | 7.50 ± 0.08 | 2.70 ± 0.03 | 2.78 ± 0.56 | 2.48 ± 0.05 | 3.56 ± 0.72 | 2.12 ± 0.03 | | | | | | | |
| Eu (ppm) | 0.48 ± 0.04 | 1.01 ± 0.01 | 0.44 ± 0.01 | 0.49 ± 0.01 | 0.30 ± 0.01 | 0.50 ± 0.01 | 0.51 ± 0.01 | | | | | | | |
| Tb (ppm) | 0.31 ± 0.03 | 1.22 ± 0.02 | 0.37 ± 0.01 | 0.39 ± 0.01 | 0.29 ± 0.01 | 0.39 ± 0.01 | 0.22 ± 0.01 | | | | | | | |
| Dy (ppm) | *1.94 ± 0.27 | *7.77 ± 0.38 | *2.24 ± 0.34 | *2.58 ± 0.24 | *1.69 ± 0.25 | *2.21 ± 0.19 | *1.17 ± 0.24 | | | | | | | |
| Yb (ppm) | 1.78 ± 0.13 | 5.18 ± 0.14 | 1.73 ± 0.08 | 2.11 ± 0.07 | 1.35 ± 0.03 | 1.85 ± 0.12 | 1.08 ± 0.03 | | | | | | | |
| Lu (ppm) | 0.29 ± 0.02 | 0.78 ± 0.01 | 0.31 ± 0.03 | 0.34 ± 0.01 | 0.27 ± 0.02 | 0.29 ± 0.01 | 0.18 ± 0.01 | | | | | | | |
| Ta (ppm) | 0.20 ± 0.01 | 0.53 ± 0.01 | 1.14 ± 0.02 | 0.22 ± 0.01 | 1.55 ± 0.01 | 0.56 ± 0.01 | 0.73 ± 0.01 | | | | | | | |
| Zr (ppm) | 131 ± 9 | 282 ± 10 | 125 ± 8 | 145 ± 8 | 96 ± 5 | 114 ± 6 | 133 ± 10 | | | | | | | |
| Hf (ppm) | 4.07 ± 0.10 | 8.66 ± 0.14 | 3.44 ± 0.08 | 4.41 ± 0.09 | 2.94 ± 0.08 | 3.92 ± 0.11 | 3.42 ± 0.11 | | | | | | | |
| Th (ppm) | 3.98 ± 0.15 | 7.43 ± 0.11 | 7.61 ± 0.21 | 4.71 ± 0.13 | 9.27 ± 0.05 | 7.14 ± 0.13 | 4.60 ± 0.07 | | | | | | | |
| U (ppm) | 1.50 ± 0.36 | 2.95 ± 0.17 | 4.20 ± 0.26 | 1.72 ± 0.52 | 4.53 ± 0.27 | 2.76 ± 0.11 | 2.53 ± 0.24 | | | | | | | |

Table 2 (continued)

| Element | Karimsky K-9 | | K-10 | | Tolmachev Dol K-11 | | Khangar K-12 | | Bannaya River K-13 | |
|----------|-----------------|--------------|--------------|--------------|-----------------------|-------------|-----------------|------|-----------------------|------|
| | mean | s.d. | mean | s.d. | mean | s.d. | mean | s.d. | mean | s.d. |
| Al (%) | *7.48 ± 0.24 | *7.19 ± 0.30 | *7.16 ± 0.26 | *6.89 ± 0.22 | 7.44 ± 0.29 | 6.66 ± 0.03 | | | | |
| Fe (%) | 0.93 ± 0.08 | 0.93 ± 0.22 | 0.77 ± 0.03 | 0.54 ± 0.02 | 0.74 ± 0.02 | 0.53 ± 0.35 | | | | |
| Mn (ppm) | *337 ± 12 | *483 ± 11 | *616 ± 9 | *611 ± 4 | 657 ± 4 | 554 ± 6 | | | | |
| Na (%) | *3.02 ± 0.07 | *3.34 ± 0.08 | *2.94 ± 0.05 | *2.95 ± 0.01 | 3.64 ± 0.03 | 2.97 ± 0.01 | | | | |
| K (%) | *3.17 ± 0.10 | *2.95 ± 0.06 | *3.12 ± 0.14 | *3.03 ± 0.16 | 2.83 ± 0.07 | 3.40 ± 0.05 | | | | |
| Cl (ppm) | *44.7 ± 16.9 | *751 ± 132 | *245 ± 24 | *339 ± 77 | 362 ± 9 | 532 ± 31 | | | | |
| Co (ppm) | 0.91 ± 0.16 | 0.65 ± 0.01 | 0.53 ± 0.02 | 0.27 ± 0.08 | 0.23 ± 0.04 | 0.20 ± 0.04 | | | | |
| Zn (ppm) | 42.8 ± 2.6 | 37.4 ± 1.0 | 37.2 ± 2.0 | 32.1 ± 2.8 | 45.4 ± 1.9 | 34.7 ± 0.4 | | | | |
| Sc (ppm) | 3.25 ± 0.06 | 3.05 ± 0.08 | 2.14 ± 0.04 | 1.52 ± 0.09 | 1.55 ± 0.02 | 2.38 ± 0.01 | | | | |
| Sb (ppm) | 0.24 ± 0.03 | 0.41 ± 0.07 | 0.44 ± 0.05 | 0.35 ± 0.04 | 0.24 ± 0.01 | 0.70 ± 0.01 | | | | |
| Cs (ppm) | 10.4 ± 0.9 | 1.75 ± 0.05 | 1.71 ± 0.02 | 2.64 ± 0.07 | 1.69 ± 0.01 | 5.67 ± 0.03 | | | | |
| Rb (ppm) | 114 ± 4 | 51 ± 1 | 62 ± 1 | 76 ± 1 | 71 ± 3 | 127 ± 3 | | | | |
| Ba (ppm) | *575 ± 63 | *645 ± 10 | *1396 ± 61 | *1017 ± 24 | 767 ± 11 | 639 ± 10 | | | | |
| Sr (ppm) | 155 ± 19 | 142 ± 24 | 288 ± 16 | 188 ± 16 | 205 ± 4 | 38 ± 0.04 | | | | |
| La (ppm) | 15.9 ± 2.6 | 15.4 ± 0.2 | 17.8 ± 0.3 | 18.1 ± 0.2 | 20.6 ± 0.1 | 23.3 ± 0.2 | | | | |
| Ce (ppm) | 33.9 ± 5.1 | 35.2 ± 1.6 | 36.6 ± 0.9 | 33.5 ± 1.1 | 41.1 ± 0.1 | 48.7 ± 0.4 | | | | |
| Nd (ppm) | 13.8 ± 2.3 | 17.2 ± 1.0 | 14.7 ± 1.0 | 11.9 ± 1.1 | 17.1 ± 0.2 | 20.4 ± 0.3 | | | | |
| Sm (ppm) | 3.23 ± 0.26 | 3.77 ± 0.06 | 2.94 ± 0.03 | 2.19 ± 0.04 | 3.01 ± 0.02 | 3.82 ± 0.01 | | | | |
| Eu (ppm) | 0.50 ± 0.04 | 0.59 ± 0.01 | 0.62 ± 0.01 | 0.46 ± 0.02 | 0.66 ± 0.01 | 0.46 ± 0.01 | | | | |
| Tb (ppm) | 0.45 ± 0.01 | 0.60 ± 0.02 | 0.37 ± 0.01 | 0.26 ± 0.01 | 0.36 ± 0.01 | 0.46 ± 0.01 | | | | |
| Dy (ppm) | *2.58 ± 0.33 | *4.06 ± 0.34 | *2.23 ± 0.25 | *1.68 ± 0.28 | 1.78 ± 0.41 | 2.83 ± 0.11 | | | | |
| Yb (ppm) | 1.52 ± 0.10 | 2.89 ± 0.05 | 1.69 ± 0.09 | 1.26 ± 0.05 | 1.77 ± 0.04 | 2.37 ± 0.03 | | | | |
| Lu (ppm) | 0.27 ± 0.01 | 0.44 ± 0.02 | 0.28 ± 0.01 | 0.20 ± 0.003 | 0.27 ± 0.01 | 0.36 ± 0.01 | | | | |
| Ta (ppm) | 0.87 ± 0.06 | 0.34 ± 0.01 | 0.37 ± 0.01 | 0.49 ± 0.01 | 0.93 ± 0.02 | 0.61 ± 0.01 | | | | |
| Zr (ppm) | 104 ± 15 | 155 ± 12 | 136 ± 11 | 89 ± 1 | 151 ± 7 | 141 ± 5 | | | | |
| Hf (ppm) | 2.99 ± 0.37 | 4.64 ± 0.11 | 3.71 ± 0.26 | 2.49 ± 0.06 | 4.19 ± 0.08 | 4.24 ± 0.10 | | | | |
| Th (ppm) | 5.73 ± 0.83 | 3.47 ± 0.08 | 3.92 ± 0.06 | 5.53 ± 0.11 | 4.69 ± 0.02 | 8.97 ± 0.02 | | | | |
| U (ppm) | 2.99 ± 0.22 | 2.02 ± 0.21 | 2.04 ± 0.15 | 2.40 ± 0.14 | 2.95 ± 0.29 | 3.40 ± 0.21 | | | | |

All samples were analyzed by short-irradiation, but only a few of the artifacts were analyzed by long irradiation. The number of samples analyzed by the short-irradiation is indicated by the star () sign.

Table 3. Distances from obsidian sources to archaeological sites on Kamchatka Peninsula

| Source Name (Group No.) | Site No.* | Site Name | Number of Samples | Distance from Source (km) |
|-----------------------------|-----------|----------------------------------|----------------------|---------------------------------|
| Itkavayam (K-3) | 31 | Elisovo 2 | 1 | 560 |
| | 16 | Nerpichye Lake | 1 | 220 |
| | 7 | Kulki | 1 | 170 |
| | 8 | Palana-airport | 3 | 100 |
| | 10 | Inchegitun 1 | 5 | 120 |
| | 11 | Chimei | 2 | 140 |
| | 12 | Galgan 1 | 7 | 90 |
| | 13 | Zeleny Kholm | 1 | 450 |
| Payalpan (K-5) | 21 | Avacha | 1 | 315 |
| | 21 | Avacha River, lower stream | 1 | 310 |
| | 25 | Viluchinsk 1 | 1 | 320 |
| | 22 | ASK (Avacha 9) | 3 | 280 |
| | 23 | Plotnikova River (Nachiki Lake) | 1 | 310 |
| | 31 | Elisovo 2 | 1 | 290 |
| | 17 | Kozlov Cape | 1 | 280 |
| | 27 | Anavgai | 2 | 70 |
| | 32 | Ilmagan | 4 | 90 |
| | 6 | Ust-Kovran | 1 | 170 |
| Ichinsky (K-7) | 22 | ASK (Avacha 9) | 1 | 260 |
| | 2 | Ozernovsky 1 | 1 | 470 |
| | 2 | Ozernovsky 2 | 1 | 470 |
| Nachiki (K-6) | 22 | Avacha River, animal farm | 1 | 50 |
| | 23 | Plotnikova River (Nachiki Lake) | 8 | 5 |
| | 24 | Sokoch Lake | 1 | 25 |
| Karimsky (K-9) | 20 | Kopyto 1 (Zhupanova River mouth) | 2 | 40 |
| Tolmachev Dol (K-11) | 24 | Sokoch Lake | 2 | 60 |
| | 25 | Viluchinsk 2 | 1 | 65 |

*Site numbers correspond to those on Figs. 4 and 5.

PART III.

Pottery Prehistory

In the past, in neither Northeast Asia nor Alaska have prehistoric ceramic sequences received full treatment. As is the case with considerations of the archaeological sequences in general, surveys of archaeological ceramics with some claim to at least regional completeness appeared in Alaska much earlier than in Asia (e.g., de Laguna 1940; Dumond 1969; Oswalt 1955; Stimmel 1994), as well as did more intensive studies of some individual site collections (among others, Griffin and Wilmeth 1964; Oswalt 1952). But as charged by authors in this section, the American reports have focused on visible details and dating, largely to the exclusion of careful study of specific technological sequences evidenced by sherds and reconstructed vessels.

As a partial offset, the three chapters here provide a survey of the sequences of pottery production within Northeast Asia from the appearance of the first ceramic productions, conceptualizing the whole within a framework of technological evolution. Chapter 6 confines itself to the Neolithic period on Sakhalin, with only one slight brush with a possible Paleometal complex. Chapter 7 attempts the entire range of pottery production farther north, a region including Chukotka and Kamchatka, from its beginning in the Neolithic through the Paleometal and finally into the contact period; inability to expand the sample from the zone of known Eskimo occupation limits the discussion of prehistoric pottery of that zone, however. Chapter 8 then concentrates on pottery remains from a portion of the excavations at Ekven, in northeast Chukotka on the Bering Strait, which appears to date no earlier than the late first millennium AD. It only partially fills the gap in Eskimo coverage in Chapter 7.

Unfortunately, from the viewpoint of the Americanist, this hiatus in coverage includes the period of the earliest known appearance in Asia of presumptive ancestral Eskimoan peoples around the BC-AD boundary. This will be touched on later, in Chapter 11 of Part IV.

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Northeast Asia, the western approach to Bering Strait.

Chapter 6

Pottery Making and the Culture History of Neolithic Sakhalin

Irina S. Zhushchikhovskaya and Olga A. Shubina

INTRODUCTION

Sakhalin is the largest island in the northern part of the Pacific Ocean, extending almost 2,000 km in a north-south direction (Fig. 1), along with the islands of the Japanese Archipelago forming the eastern boundary of the Japan Sea basin. In the north it almost touches the Asian mainland, where the minimum width of Tatar Strait is about 7.5 km. In the south, La Perouse Strait, 43 km wide at the narrowest point, lies between the coastal cliffs of the Kril'on Peninsula of Sakhalin and Cape Soya on Japan's Hokkaido. During the Pleistocene (1,800,000 to 12,000 years ago), changes in global climate brought substantial fluctuations in sea level: during glacial intervals Hokkaido, Sakhalin, and the Kurile Islands were connected to the continent, with the present straits dry land or chains of small islands; during warming periods these connections were broken (Aleksandrova 1982). The present coastal conformation dates from about 10,000 to 12,000 years ago, with global warming and the sharp rise in sea level. Today, natural conditions on the island are varied, the extreme south substantially different from the north in landscape, vegetation, and climate.

Sakhalin's settlement had ancient beginnings. According to modern data, the earliest archaeological sites belong to the early Paleolithic and date between 240,000 and 130,000 years ago (Vasilevsky 1999, 2000d, 2003a). From later times, a series of Upper Paleolithic sites and some from the Paleolithic-Neolithic transition have been discovered (Grishchenko 2003; Vasilevsky 2003a, 2003c; Vasilevsky and Grishchenko 2002). There are a large number of Neolithic sites within the chronological framework of 9,000 to 2,500 years ago, as well as those from the following Paleometal period, which dates from the middle of the first millennium BC to the middle of the second millennium AD. The cultural evidence of the islanders of the thirteenth to eighteenth centuries AD is interesting and varied, their ethnic foundation corresponding with the Ainu, the native inhabitants of Hokkaido and southern Sakhalin (Vasilevsky 1995b, 2000a; Vasilevsky and Plotnikov 1992).

Indeed, the geographic position of Sakhalin has affected features of its cultural history. The proximity of the mainland to the north of the island and the Japanese Archipelago to the south brought the possibility of contact with worlds very different in their traditions. Evidence of interactions with residents of both regions is evident in the archaeological materials, and in many ways bears on the content of our historical reconstruction.



Figure 1. Position of Sakhalin Island in the North Pacific.

Scientific interest in early cultures of the islands had its beginning in the second half of the nineteenth and the beginning of the twentieth centuries, when Russian and Japanese travelers and researchers made the first archaeological finds. Over the first half of the twentieth century archaeologists from Japan (Riudzo Torii, Kono Tsunekiti, Tsuboi Segoro, Kono Hiromiti, Kieno Kendzi, Baba Osamu, Kimura Sinroku, Ito Nobuo, Niiooka Takehiko, and others) carried out systematic but limited research, discovering about 300 early sites in southern Sakhalin and about 100 in the Kurile

Islands. From the 1930s to the 1960s, as a result of work on both Hokkaido and Sakhalin by Japanese scholars, a concept of the archaeology of the region was developed that involved two cultures of island and continental origins. The first was represented by Jomon ceramics with cord impressions, the second by pointed-bottom vessels with comb impressions (Vasilevsky 2003a, 2003b).

In the 1930s and 1940s local researchers worked in the northern part of Sakhalin, revealing the first evidence of a Neolithic culture (Zolotarev 1936). A new stage in the archaeological study of the island began in the 1950s, when the first expeditions of the Leningrad Division of the Institute of Archaeology, Academy of Sciences, USSR, were organized in the Far East. R. V. Kozyreva (Chubarova) was the first in Soviet times to carry out large-scale surveys and excavations in both northern and southern Sakhalin and in the Kurile Islands, and to develop the first Russian concept of the early history of the island, to the effect that Sakhalin was settled in the second millennium BC by migrants from Primor'e and Priamur'e. Accordingly, two Neolithic cultures — of northern and southern Sakhalin — were distinguished; in addition, there was a coastal culture of “shell middens,” the creators of which were presumably the legendary “Tonchi” people of the first millennium BC (Chubarova 1955; Kozyreva 1967). In the mid-1960s discoveries substantially increased the known age of the initial settlement of Sakhalin with an Early Neolithic microblade complex discovered in the north of the island (Vyazovskaya 1968).

In the 1960s and 1970s, a local professional subdivision of archaeological science began to be formed by the South Sakhalin Pedagogical Institute and the Sakhalin District Regional Museum. During the course of the last third of the twentieth century, the accumulation of material from excavations and surveys continued actively throughout the entire Sakhalin District; collections of stone, bone, and ceramic material were documented in clear stratigraphic levels, and dwelling complexes were studied. A series of radiocarbon dates has been amassed (Kuzmin et al. 2004; Shubin and Shubina 1984; Vasilevsky 1995a), methods of natural science have been introduced (Golubev and Kononenko 1987; Golubev and Zhushchikhovskaya 1987; Kononenko and Shubina 1991), and a series of descriptions and syntheses have appeared (Golubev and Lavrov 1988; Shubin 1977; Shubina 1990; Vasilevsky 1990; Vasil'evskii and Golubev 1976; Vasil'evskii, Lavrov, and Chan Su Bu 1982; and others).

The present circumstances include the rapid accumulation of new factual data, the discovery of a substantial number of previously unknown sites, and the elaboration of conceptual schemes pertinent to problems of cultural history. By the end of the 1990s the basic contours of archaeological systematization and periodization of the earliest history of Sakhalin had been formed, beginning with the Paleolithic period and terminating rather late, in the middle of the second millennium AD (Vasilevsky 1992, 1996, 2000b, 2000c, 2003a; Vasilevsky and Shubina 2002).

Among archaeological materials, ceramics hold one of the leading places. Collections include thousands of vessel fragments and whole artifacts, with descriptions and interpretations of the materials appearing in Japanese and Russian publications from the 1930s to the 1970s. A typical feature of these works is attention to the external, most vivid characteristics of the ceramics. Features of form and especially decoration of clay vessels served as the bases for identifying specific cultures.

In 1934 the Japanese scholar Ito Nobuo identified complexes with unusual ceramics on the west coast of southern Sakhalin — vessels with a rectangular cross-section that distinguished them from

the more common pots with rounded body. These ceramics received a special name — “Soni type” — based on the location of the first find, and the site itself was assigned to the Neolithic period (Ito Nobuo 1942; Vasilevsky 2003b; Vasilevsky and Shubina 2002).

In the 1950s and 1960s a variety of ceramic collections were obtained through surveys and excavations of sites in northern and southern Sakhalin, as well as in the Kurile Islands. Descriptions of ceramics in publications by R. V. Kozyreva, V. A. Golubev, and V. V. Vyazovskaya are rather general and undetailed. Nevertheless, some interesting observations can be made. At several sites specimens of both flat-bottomed and pointed- or round-bottomed vessels were present (Golubev 1968; Vyazovskaya 1968). Such combinations seemed unusual against the background of what was known of archaeological sites of the southern mainland of the Far East (Primor’e and Priamur’e), in which only flat-bottomed vessels appeared (Andreev 1957, 1963; Brodyanskii 1965, 1968; Okladnikov 1959, 1963). Sakhalin ceramics also varied by decoration, including cord impressions and geometric compositions created by applied ribs. Such forms of decoration did not have analogs in neighboring Primor’e and Priamur’e, but they found parallels in archaeological sites of the Japanese Islands. Thus, data collected in these decades resulted in variations proposed to the basic cultural and temporal systematization. Ceramics with cord-marked design were associated with a particular early stage in the history of Sakhalin and the Kuriles within the framework of the Neolithic. Ceramics with simple geometric bordering designs, by which vessels with separated neck and shoulders were decorated, corresponded also with the Neolithic, but with its later stage (Golubev 1968).

In the 1970s the primary emphasis in studies of Sakhalin ceramics was on collections from the Okhotsk culture, with large-scale excavations at several sites — Susuya, Ozersk 1, and others (Shubin 1979; Vasil’evskii and Golubev 1976). These sites represented a special period in the cultural history of Sakhalin and Hokkaido. From the time of the discovery of the Okhotsk culture on Sakhalin to the beginning of the 1990s, the culture was viewed as Neolithic, although well developed, and thought to have existed in the first half or middle of the second millennium AD (Shubin 1977; Vasilevsky 1990; Vasil’evskii and Golubev 1976). In R. S. Vasil’evskii and V. A. Golubev’s (1976) monograph, *Early Settlements in Sakhalin: The Susuya Site*, the ceramics from the site were characterized, with features of morphology and decoration emphasized, and a draft schema of ceramic evolution was proposed, based on stratigraphic context. The earliest horizons were concluded to be represented by ceramics with cord-marked decoration, the latest stratum by ceramics with impressions of patterned stamps (Vasil’evskii and Golubev 1976:65-83).

By the mid-1980s, as a result of expanded archaeological research several different traditions of early ceramics were distinguished, representing various cultural communities and presumably different temporal periods. The main traditions were based on the ceramic tradition of the South Sakhalin Neolithic culture, analogous to the earlier identified “Soni type” (Shubin, Shubina, and Gorbunov 1984); on the ceramic tradition of the Neolithic Imchin culture (Shubina 1985, 1990); and on the ceramic tradition of the Okhotsk culture (Shubin 1977, 1979; Vasil’evskii and Golubev 1976). These traditions were denoted by their clearest external characteristics, but ceramics as a separate category of archaeological resources were not an object of special and intense investigation.

In the middle to second half of the 1980s a new stage in the study of Sakhalin’s early ceramic cultures began, its basic content interdisciplinary investigation of ceramic complexes from the position of technology, morphology, and decoration. Analytical methods of natural science are em-

ployed to reconstruct pottery-making as a variety of production activity within the cultures (Golubev and Zhushchikhovskaya 1987; Zhushchikhovskaya 1990; Vasilevsky and Zhushchikhovskaya 1988; Zhushchikhovskaya and Shubina 1987). These orientations of method correspond to leading tendencies in worldwide archaeological science for the study of early ceramics (Nordstrom 1972; Rice 1987; Shepard 1985). Starting in the 1980s this approach was dominant in research with archaeological ceramics of the southern Far East, Primor'e and Priamur'e (Andreeva et al. 1986; Grebenshchikov 1989; Myl'nikova 1992; Zhushchikhovskaya 1984, 1986; Zhushchikhovskaya and Zalishchak 1983, 1986, 1990). At present, ceramic complexes from early sites are used as one of the most important sources of information for reconstruction of the economy and way of life of a prehistoric Far Eastern population (Grebenshchikov and Derevyanko 2001; Myl'nikova 1999; Zhushchikhovskaya 1997, 1999, 2001, 2002, 2004).

Here, we present an analytical survey of pottery-making traditions of Neolithic Sakhalin cultures, in accord with present knowledge and while touching on crucial problems in the archaeology of the region.

THE NEOLITHIC PERIOD ON SAKHALIN: PERIODIZATION AND SYSTEMATIZATION

In the present periodization of Sakhalin's early history, the Neolithic period is defined as the time from 9,000 to 3,000 or 2,500 years ago. Still earlier sites represent the transitional period between the Paleolithic and the Neolithic, 13,000 to 9,000 years ago, while later sites represent the Paleometal period, 2,500 to 500 years ago. The Neolithic itself is divided into several periods or stages, basically Early, Middle, and Late. Elaboration of the scheme with correction of prevailing ideas has been the case, especially in the last ten to fifteen years, with the discovery of new archaeological complexes and the serial radiocarbon dating of sites (Vasilevsky 1995a, 2000c, 2003a; Vasilevsky and Shubina 2002). Naturally, it can be expected that certain parts of the existing periodization will be further refined in the future.

On Sakhalin, as in other regions of the world, the Neolithic in comparison with the preceding time is marked by a series of progressive changes in economy, technology, and way of life. The process of adaptation to new climatic conditions after the appearance of global warming is reflected to a significant degree in these changes. The development of sedentism and of new directions in economic activity, the appearance of new kinds of hunting and fishing implements and of new techniques of working stone, and the mastery and distribution of the first artificial material — ceramics — are the elements researchers use to define the basic achievements of the Neolithic on Sakhalin (Golubev 1996; Vasilevsky 2000c).

All of these features in the evolution of Sakhalin's population were common in other regions of the Japan Sea basin — both mainland and islands. However, the common progressive dynamic varied in different areas (Aikens and Higuchi 1982; Andreeva 1991; Medvedev 2003; Nelson 1993; Pearson 1992; Vostretsov 1998).

Today, Neolithic sites are known in practically all parts of the island. Based on the results of excavations, complexes of archaeological sites and archaeological cultures are distinguished that

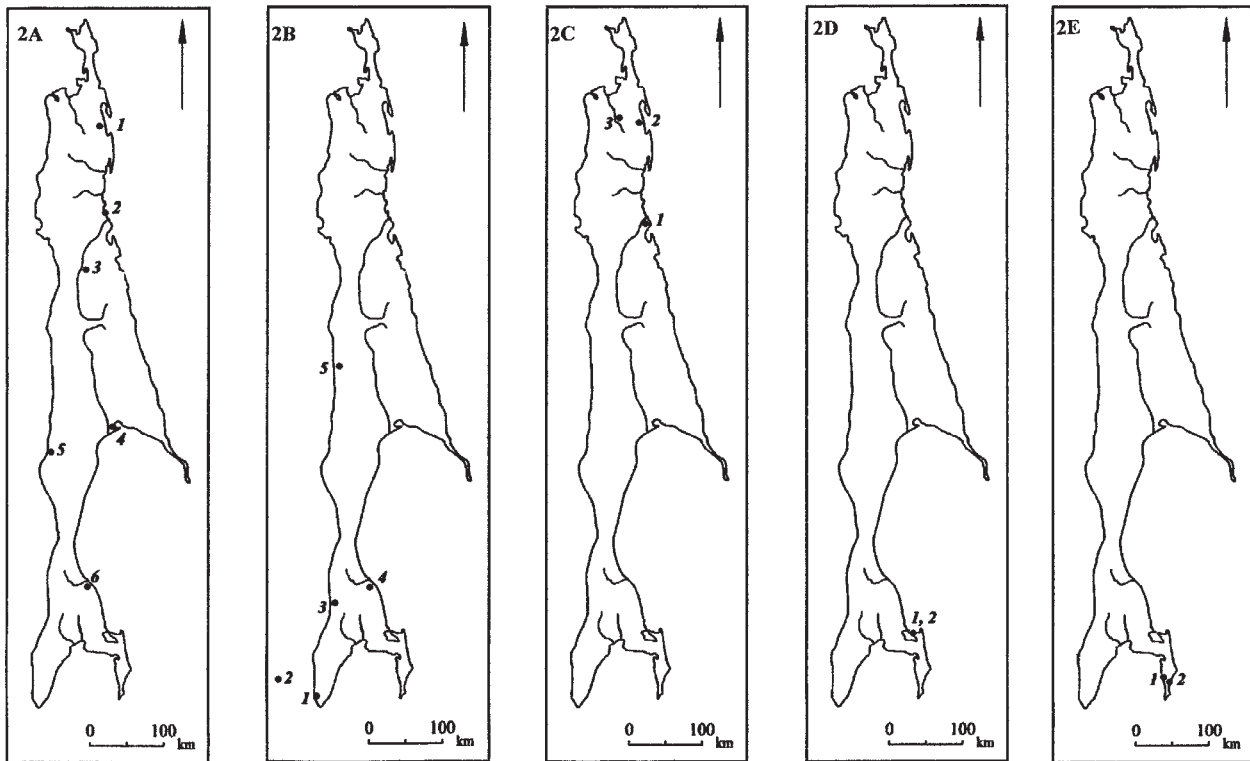


Figure 2. Major sites of Sakhalin cultures discussed: 2A, putatively Early Neolithic; 2B, South Sakhalin Neolithic culture; 2C, Imchin Neolithic culture; 2D, Sedykh Neolithic culture; 2E, Aniva culture.

correspond to different segments of the population within certain areas and times. A brief characterization of these complexes and cultures, aside from ceramics, will be given first. Ceramic collections will then be described separately.

Early Neolithic Sites

Sites of the earliest Neolithic stage have not presently been assigned to any definitely named culture. The character of the stone inventory and a small series of radiocarbon ages of 8,800 to 7,500 or 7,000 years permit placing these sites in the general period scheme as later than the transition from the Paleolithic to the Neolithic, 13,000 to 9,000 years ago, but earlier than the South Sakhalin Neolithic culture. These are the sites of Takoe 2, Ado Tymovo 2, Porech'e 4, Nyivo 2, Horizons 1 and 2A in multi-component Starodubskoe 3, and some others (Fig. 2, a). The sites are located in river valleys and on coastal terraces in straits and at lagoons of early Holocene age. The scale of work at these sites, which were discovered fairly recently, has thus far been limited, with an insignificant volume of material excavated (Gorbunov 2000; Vasilevsky 2000c, 2003a; Vasilevsky and Grishchenko 2002). However, there are already several radiocarbon determinations that indicate an early age for the sites — 8660 ± 70 (Starodubskoe 3) and 8780 ± 135 to 7520 ± 70 (Ado Tymovo 2) (Vasilevsky 2003a).

The features of the stone inventory represented in these Early Neolithic sites include the preparation of tools on microblades, blades, and flakes; secondary working by unifacial and bifacial retouch; and the appearance of grinding or polishing. A special category of finds in some such sites

contains fragments of rather archaic-looking ceramics. Based on their stratigraphic position and the radiocarbon dates obtained, these ceramics have been identified by researchers as the earliest on Sakhalin (Vasilevsky 2003a:32; Vasilevsky and Grishchenko 2002).

South Sakhalin Neolithic Culture

This culture represents the Middle Neolithic stage (Vasilevsky 2003a). Its primary area embraces the southwest coast of Sakhalin and nearby Moneron Island (Fig. 2, b), although artifacts of the culture are known also in the north of the island — at latitude 50° north on the west and north-east coasts. With such a broad geographic distribution of finds, extending beyond the limits of southern Sakhalin, A. A. Vasilevsky proposes adding the name “Soni culture” to identify its different ceramic type (Vasilevsky 2003a:37). There are a total of about 30 sites of this culture, most of them located on high sea or lagoon terraces (12-15 m and 20-40 m), which mark the location of the early coast during the climatic optimum about 7,000 to 5,000 years ago. The type sites are Sadovniki 2 (Shubin, Shubina, and Gorbunov 1982), Kuznetsovo 3, Kuznetsovo 4, and Starodubskoe 3 (House No. 154) (Vasilevsky 2000a).

At all of the site pit-house depressions are evident on the modern surface. These depressions, sub-square with rounded corners and 4 to 10 m on the side, were sunk into the ground to a depth of 0.15 to 0.5 m, sometimes even to 0.8 or 0.95 m. On the floor a system of post molds can be traced along the perimeter, as well as a narrow ditch under the walls. Two houses of the Sadovniki 2 site that were opened had no hearths, while two houses at Kuznetsovo 3 and one at Starodubskoe 3 had one hearth each, without traces of an enclosure.

The stone inventory of the South Sakhalin culture is technologically uniform. Tools were made predominantly of local material — flint, silicified slate, and argillite, with isolated specimens of jasper, chalcedony, and obsidian. Flaking technique is characterized by the use of cores with multiple platforms. Most tools were made on blades and blade-like flakes with various degrees of modification. The secondary working of tools included bifacial modification by percussion and pressure retouch, unifacial and bifacial edge retouch, and grinding (for chopping tools). Cutting, scraping, and chopping instruments as well as projectiles were large. Chopping tools — ground or polished axes — have a lenticular or subtriangular cross section, and several other ground stone items were found, both whole artifacts and fragments. Specific to the South Sakhalin Neolithic culture are ground stone rods 5 to 10 cm long. Some artifacts are treated as handles and sinkers based on form, others as points, and still others as instruments for weaving nets. These are viewed as partial evidence of a maritime adaptation.

The economy can be recognized as sedentary, based on both land and sea resources. The coastal arrangement of sites indirectly points to a maritime orientation. Further, the role of the sea in the life of the people is attested by finds such as a tiny stone figurine of a whale (sculpted on a slate pebble) found in a house at the Starodubskoe 3 site, and the vertebra of a seal in a house at the Kuznetsovo 3 site. Artifacts found on Moneron Island (Kologerasa Bay), separated from Sakhalin by a strait more than 50 km wide, attest the development of skillful sea travel.

The radiocarbon age of the Neolithic South Sakhalin culture has been determined as falling within the interval of 6740 ± 150 BP (5626 ± 345 cal. BC) to 5648 ± 490 BP (4495 ± 525 cal. BC).

Imchin Neolithic Culture

Sites of this culture, based on diagnostic materials, correlate with stages of the Middle and Late Neolithic (Vasilevsky 2003a). The area covers the sea coast and river valleys of northern Sakhalin as well as the 'Tym' River basin (Fig. 2, c). Type sites are Nogliki 1 (Kozyreva 1967), Imchin 2, and Imchin 12 (Shubina 1985, 1986, 1987, 1990), which are located on a paleo-terrace of the 'Tym' River, the largest in Sakhalin, at a considerable distance (12-20 km) from the Sea of Okhotsk. Sites of the Neolithic Imchin culture are characterized by valley locations, in contrast to the coastal locations of the South Sakhalin Neolithic culture.

Sites of the Imchin Neolithic culture are represented by house depressions that are obvious on the ground surface. At the sites of Imchin 2, Imchin 12, and Nogliki 1 a total of 20 houses were excavated, all of the round pit-house type, from 3 to 11 m in diameter, with the floor sunk into the ground to a depth of 0.3 to 0.6 m, and in rare cases as much as 1.5 or 2.0 m. Along the perimeter were low projections from 0.3 to 1.75 m wide — probably earthen bed platforms, sleeping places for the occupants. Most excavated houses had hearths, without evident traces of an enclosure, in or near the central part of the floor. Hearths were also noted outside the house depressions. Post molds from the roof support and interior features suggest a double, round framework for interior support of the roof. Of 18 houses studied at the Imchin 2 and Imchin 12 sites, seven have structural features that suggest an above-ground entryway.

The stone inventory from the Imchin 12 site is standard for the Neolithic Imchin culture (Shubina 1986). The technique of primary flaking was based chiefly on the use of discoidal or oval cores, but also amorphous cores. The products of flaking were predominantly amorphous, although blade flakes occasionally appear. The predominant form of secondary modification of tools was complete bifacial retouch, with grinding of tools that were connected with wood working. Of the entire collection, however, only a very small percentage of the tools has a stable form; through trace analysis most implements were found to be on flakes and spalls used without special modification.

Trace analysis in search of the function of stone tools revealed the basic orientation of activities connected with food procurement, processing the acquisitions of the hunt, domestic business, and tool manufacture (Kononenko and Shubina 1991). The tool kit contains up to 20 types. The base of the economy was fishing, hunting, and gathering. It can be supposed that in some degree sea mammal hunting and coastal collecting were also known.

The distribution of Imchin Neolithic sites, both in the river valleys at a substantial distance from the coast and on the sea coast itself, suggests a semisedentary character for the Neolithic population of northern Sakhalin. Sites distant from the sea are interpreted as winter villages and those on the coast as summer camps. The fact should also be considered that during the period 7,000 to 4,000 years ago, when the sea level was essentially higher, many sites that today are located 10-15 km from the coast were then positioned on the shores of straits, lagoons, estuaries, and fjords.

Radiocarbon dates of Imchin sites are spread over the broad interval of 5810 ± 90 BP (4680 ± 150 cal. BC) to 2570 ± 110 BP (643 ± 172 cal. BC). Considering results of calibration, it is possible to distinguish four chronological groups of houses in the range 6,800 to 2,500 calendar years ago. Three of them, 6,800-6,200 years ago, 5,000-4,500 years ago, and 4,100-3,800 years ago, correspond

to the Middle and Late Neolithic. The earliest dates, corresponding to 5,000 BC (calibrated), were obtained at the Imchin 12 site. The Imchin 2 site contains diachronic complexes that embrace the period from the beginning of the fourth to the middle of the first millennium BC. Clear delimitation of the cultural layers was absent; late features had penetrated into the early cultural layer, and the archaeological inventory is sometimes mixed.

In the excavators' opinion, all of the living complexes revealed at the Imchin 12 and Imchin 2 sites can be assigned to a single culture in different stages of development, with continuity manifested in the construction of houses and the characteristics of the stone and ceramic inventory. Changes in this inventory agree with the absolute dates of the living complexes (Shubina 1990; Zhushchikhovskaya and Shubina 1987). From another point of view, however, based on analysis of grouped calibration dates from Imchin sites, the houses at the Imchin 2 site may represent differing archaeological cultures of the Early and Developed Neolithic and early Iron Age. Correspondingly, the model of Imchin culture may require correcting (Vasilevsky 1995a, 2003a).

Sedykh Neolithic Culture

Within the framework of today's periodization this culture belongs to the Late Neolithic (Vasilevsky 2003a), distinguished as a result of archaeological excavations between 1990 and 2001 of the multi-component sites of Sedykh 1 (Vasilevsky 2003a:38-39) and Okhotskoe 3. The area of the culture is presently limited to these two sites, located on 4-6 m terraces of lagoons and lakes on the southeast coast of Sakhalin (Fig. 2, d). Five houses, represented by shallow rectangular depressions measuring 3.5 to 5.5 m across, were excavated. Four houses (at Sedykh 1) had hearths without evidence of enclosures, with post-molds and niches noted on the floor, and three houses had an above-ground entryway. Most houses were buried, covered by a cultural layer and housing complexes of the Okhotsk and Ainu cultures.

The stone implements were made of local flint and chalcedony. Tool production was based on amorphous flakes and blade flakes, while secondary modification of artifacts included unifacial and bifacial retouch and grinding. Among the stone artifacts collected in the cultural layer of the Okhotskoe 3 site were four tiny zoomorphic figurines representing a fish, a pinniped, and two stylized images probably of bears. This fact, as well as the topography of the site, point to a complex economy practiced by the bearers of the Neolithic Sedykh culture, with probable orientation toward the use of water resources.

An AMS age for one of the house complexes at the Sedykh 1 site is 3760 ± 40 (2155 ± 110 cal. BC or 4105 ± 110 BP in calendar years) (Vasilevsky 2003a:39).

Regarding the Neolithic period on Sakhalin, there is the much-discussed and complex question of determining its terminal stage and ascertaining signs of development of the ensuing Paleometal period. Until recently another archaeological culture, the Aniva, was assigned to the Late Neolithic (Vasilevsky 1988, 1995a; Vasilevsky and Zhushchikhovskaya 1988). A later point of view expressed by Vasilevsky (2002), however, assigns the Aniva culture to the early stage of the Paleometal period. In our view, the placement of the Aniva culture in the general scheme of periods is interesting in terms of the pottery-making tradition. Therefore, a description of the basic features of this culture permits certain judgments.

Aniva Culture

The area of the Aniva culture is southeast Sakhalin, the Tonino-Aniva Peninsula (Fig. 2, e), its sites representing villages on sea-coast terraces. The sites primarily studied are Yuzhnaya 2 and Kedrinka (Predreflyanka), where the remains of long-term houses have been excavated (Vasilevsky 1992, 1995a, 2002). House depressions 0.4-0.5 m deep have outlines close to oval or rectangular with smoothed corners. The structural features include a ramp-like entryway, clay coating of the pit walls, a system of support-post molds located along the circumference of the house floor and along the outside perimeter, and a hearth pit with a ring of large stones set in place.

The stone inventory of the sites includes retouched, ground, and cobble tools. Among the retouched artifacts, made predominantly of obsidian (80% of all artifacts) and siliceous stone, are knives with broad triangular or leaf-shaped blades and a set-off handle, trapezoidal scrapers, and points of arrows and darts. At the Yuzhnaya 2 site were artifacts on blades and blade-like flakes, which on the whole give the stone inventory of this site a more archaic appearance. Among the ground artifacts the most interesting are a few specimens of axes and adzes with distinct rectangular cross-sections and very pronounced facets. The appearance of chopping tools of this type is a stage marker in the development of the stone industry characteristic of cultures of the Japan Sea basin in the Late Neolithic and Paleometal periods (Vasilevsky 2000c). Cobble tools of the Aniva culture are abraded slabs and sinkers.

The economy of the occupants of the coastal sites was oriented toward fishing and hunting, with probable additional inland collecting.

A series of radiocarbon dates obtained for sites of the Aniva culture is confined to the second half of the second and to the first millennium BC, most dates falling in the eighth to fourth centuries BC (2710-2250 BP) (Vasilevsky 1995a). Based on the complex of features, the Aniva culture is similar to those of the Epi-Jomon community on Hokkaido and can be referred to as a Sakhalin version of the early Epi-Jomon (Aniva variant). It is suggested that sites of the Aniva culture are evidence of expansion of part of the Hokkaido population into southeastern Sakhalin during the first half to middle of the first millennium BC (Vasilevsky 2002).

NEOLITHIC POTTERY-MAKING TRADITIONS OF SAKHALIN: GENERAL CHARACTERISTICS

In this section we examine the basic features of early pottery-making traditions of Sakhalin Island as they are reconstructed today through analysis of ceramic complexes from archaeological cultures. In spite of the fact that sites of each culture include different categories of material, it is ceramics that serve as the greatest resource for identifying cultures.

Pottery-Making Tradition of the South Sakhalin Culture

Interesting and informative material was found during excavations at the sites of Sadovniki 2, Kuznetsovo 3, and Kuznetsovo 4 (Golubev and Zhushchikhovskaya 1987; Shubin et al. 1982). Most specimens in the collections are fragments; only in rare cases were whole artifacts encountered.

The largest number of vessels with good preservation come from the Sadovniki 2 site. Based on the results of the investigations, the tradition of pottery-making in the South Sakhalin culture is reconstructed as complete, possessing clearly outlined and specific features of technology, morphology, and decoration.

A distinct feature of the ceramics, noticeable even to the naked eye, is the presence of large, irregular, empty pores in the sherds. Based on binocular and petrographic analyses, we can judge the composition of the paste and the technology of its preparation. Natural clay was used as the foundation, to which a certain amount of organic plant temper was added, as identified from the character of the impressions in the matrix left after the organics burned out during firing (Fig. 3). In accordance with paleo-botanical determinations, fragments of stems and leaves of sedge (*Cyperaceae*), horsetail (*Equisetum*), and burdock (*Arctium lappa*) served as temper. The dimensions of the plant inclusions are rather large — from 0.5 to 2-3 cm in length. It can be suggested that the plants were broken into pieces by hand or cut up with a knife. The total amount of plant temper in the paste was not consistent and could vary from approximately 10% to 30%. Such plants as sedge and horsetail have a pronouncedly elongated fibrous structure and are therefore easy to separate into relatively equal fragments, which contributes to their more uniform distribution in the clay mass. Fibers of grass, coupling well with the clay, create a supple “frame” in the plastic paste, which makes the modeling process quicker and more successful, and protects the artifact from cracking when drying. Based on our experimental studies, additives of crumbled vegetation contribute to an increase in the working quality of oily clays, quickening the process of modeling and protecting the artifact from shrinking during drying (Zhushchikhovskaya 1998). The clay raw material of Sakhalin, especially of the southern regions of the island, has a high index of air shrinkage and generally necessitates the introduction of special additives (Zhushchikhovskaya 2004:73).

The method of modeling vessels is presumed to have been “slab construction” (Vandiver 1987, 1991); traces of the joining of individual strips and square slabs of clay can be seen on the inner and outer surfaces of large fragments. The thickness of the ceramic fragments is from 0.5 to 1.0 cm. The walls of artifacts are

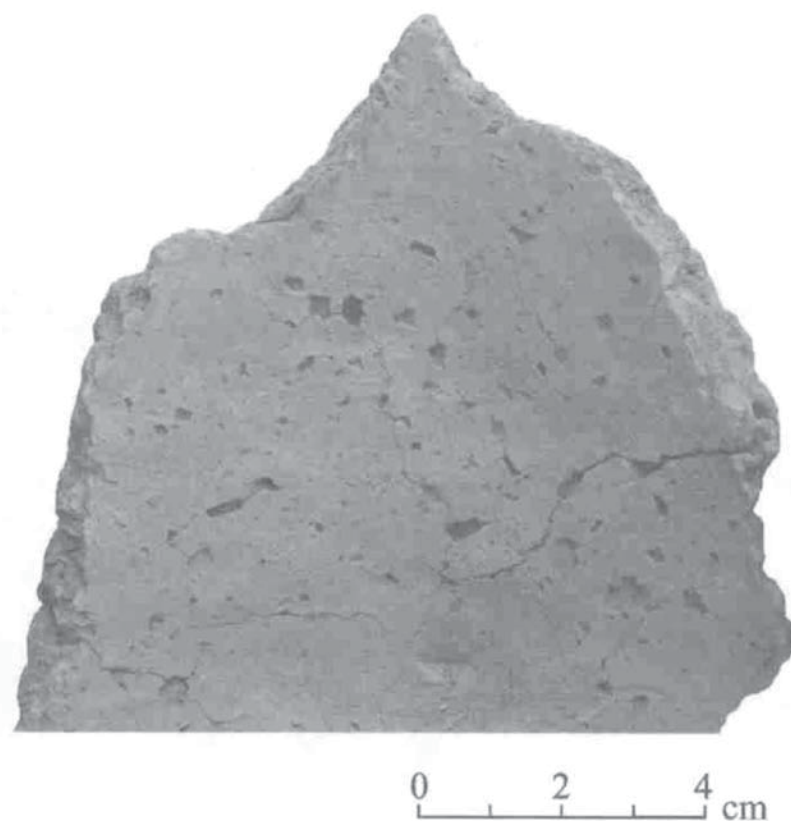


Figure 3. Potsherd of the South Sakhalin Neolithic culture, showing traces of burned-out organic temper.

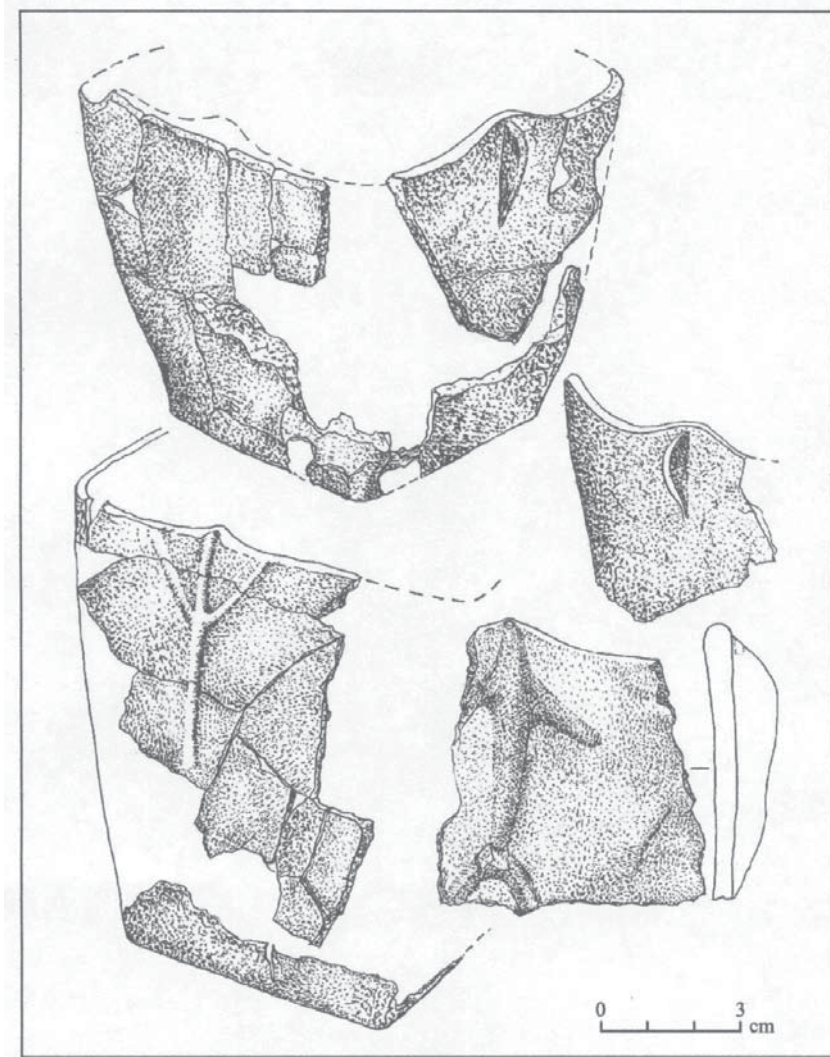


Figure 4. Rendering of vessels of South Sakhalin Neolithic culture.

often unequal in thickness, which was a consequence of both a coarse-textured modeling mass with inclusions of plant organics and the lack of special skills for evening out the walls during modeling. In some cases, furrowed traces of woody texture can be seen on the outside of vessel bottoms, pointing to the fact that the artifacts were placed on a wooden platform during modeling or drying.

Vessels of the South Sakhalin culture have a distinctive “box” form, with the base, horizontal cross-section, and opening or mouth all rectangular. The walls are straight and oriented vertically or expand slightly toward the mouth. The ratio of the height to the diameter of the mouth (along the long side) varies between 0.9 and 1.2. The dimensions of the artifacts are not great — in most cases the height is 10-20 cm (Fig. 4; see also Fig. 9, b).

The potters of the South Sakhalin culture did not use any special methods of working the surface. Judging by traces of the modeling noticeable to the naked eye, the walls of vessels were not carefully evened. It can be supposed by the character of the thin, close-set furrows on the surface that the damp artifacts were smoothed with the fingers.

The technical level of firing was primitive. Based on color analysis upon repeated firing, it can be concluded that the original firing temperature was about 550-600°C. In some cases the temperature was probably even lower — some fragments of burned plant fibers present in the break are not completely carbonized. Ceramic colors are characteristically of faded, muddy-yellowish, brownish, or dark-gray tones. The first of these were a consequence of a weak degree of oxidation of the iron compounds in the clay, the last the result of firing in a smoky atmosphere with the sherd saturated by carbon during the burning of the organics at 400-500°C. On the whole, it can be supposed that the firing of ceramic artifacts occurred in the common open fire.

Vessels of the South Sakhalin culture, with all their simplicity and technological primitiveness, are noted for their decorative features. On some sherds can be traced applied relief bands or ribs, which form horizontal and vertical lines, angles, semi-ovals, and other figures. The most complete compositions are represented on some artifacts from the Sadovniki 2 site (see Fig. 10, a, below).

The functions of vessels can be discussed only in general terms. The absence of morphological and technological differentiation and the limited variation in size prohibit distinguishing obvious groups of vessels by function. Judging by the presence in several cases of a layer of soot on the inner and outer surfaces, some pots were used for preparing food. However, the practical qualities of the vessels were low because of the very porous walls owing to the burning of the plant temper. The index of water-absorption, determined for several fragments of ceramics, is about 30-35%. Such vessels possessed high heat conductivity and water permeability, and consequently did not carry out the function of boiling or preserving liquid products well.

The characteristics of South Sakhalin ceramics indicate strongly the general level of pottery making, which corresponds on the whole to the early stage of ceramic production in other regions of the world. Such technological and morphological features as plant temper in the paste, “slab construction,” absence of special methods of working the surface, undeveloped form of the container, and firing at very low temperatures are analogous to those of ceramic complexes of initial Neolithic stages in the Near East, Central Asia, and North and Central America (Amiran 1965; Hoopes 1994; Reichel-Dolmatoff 1971; Saiko 1982:70-164). Although these complexes have different dates, they represent the first stages in the mastery of ceramic making.

Parallels between the ceramic traditions of the South Sakhalin culture and pottery making of Neolithic-level cultures of southeastern North America in the third millennium BC are especially curious (Griffin 1965; Hoopes 1994; Reid 1984). Common features are the use of grassy vegetation as temper for paste and the manufacture of “box-like” subrectangular vessels.

The uncommon “box” form of these vessels on southern Sakhalin and in the Southeast US could have resulted from similar principles during the course of formation of ceramic technology in regions distant from one another. The American researcher J. Griffin proposed that clay vessels — “boxes” — imitated the form of containers made of plant material, possibly wood (Griffin 1965:105). This point of view seems logical and agrees with observations and ideas about the probable relationship between early stages of pottery making and of plaiting technology (Zhushchikhovskaya 2004:15-59). The mastery of working plant materials, that is, the skill to make plaited, wooden, and other containers, appeared substantially earlier than the skill of working with clay and could have substantially influenced the new product.

On the whole, parallels in the ceramics of the South Sakhalin culture and the Neolithic sites of the Southeast US suggest a mutual stage in development and may in some degree be connected with similar ecological conditions, which prompted potters of different cultures toward similar technological solutions.

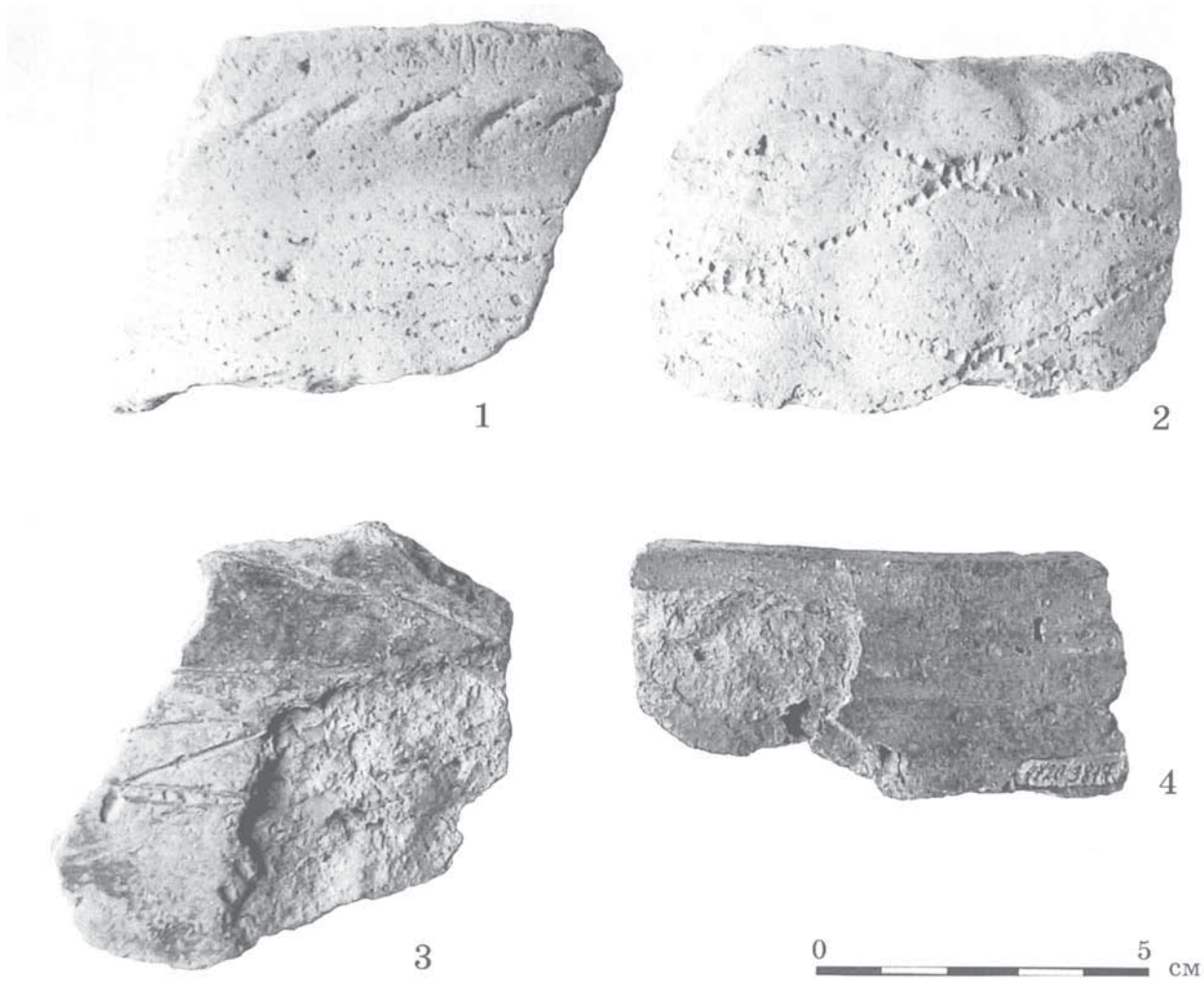


Figure 5. Potsherds of Imchin Neolithic culture.

The Pottery-Making Tradition of the Imchin Culture

The early pottery making of northern Sakhalin is most clearly seen in materials from sites of the Neolithic Imchin culture. At the sites of Imchin 12, Imchin 2, and Nogliki 1 all the ceramics collected were fragmentary; with the exception of one tiny example, no whole vessels were found.

At first glance the ceramics from the several Imchin sites seem similar to the material of the South Sakhalin culture, given their light porous sherds. But the origin of the pits in the surface and in the break edges of the sherds in this case is different, although they were also caused by peculiarities in the technology. Based on binocular and petrographic analyses, two variants in the composition of the clay body can be distinguished. The first variant is “clay plus mollusk-shell temper”; the second is “clay with natural or artificial sandy inclusions.” We examine these variants in more detail.

The formula for the paste with mollusk temper, judging by the number of specimens representing it in the ceramic collection, played the leading role in the pottery making of the Imchin culture. At the Imchin 12 site practically all ceramics found have traces of mollusk temper (Fig. 5). At the Imchin 2 site ceramics with mollusk temper make up a substantial part of the collection and are

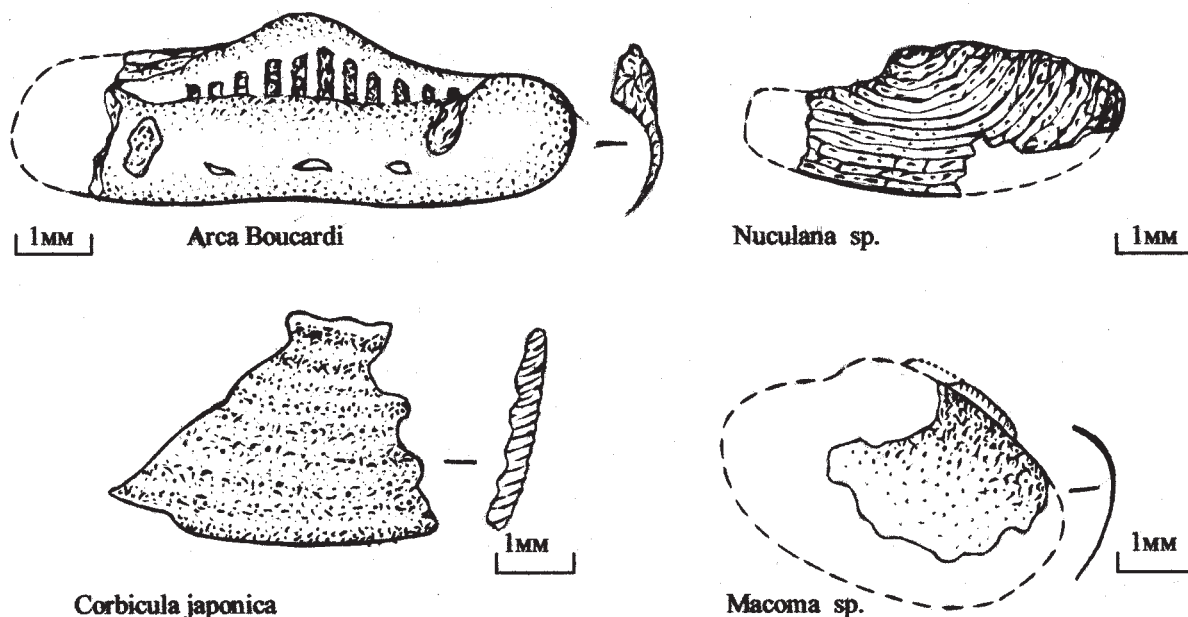


Figure 7. Rendering of shell fragments from Imchin potsherds: a, *Arca boucardi*; b, *Nuculana spisula*; c, *Corbicula japonica*; d, *Macoma sp.*

represented most in Houses 6 and 23. This paste variant is also characteristic of ceramics from some other sites. A distinctive external feature of these ceramics is large pits, evident on the surface and in sherd breaks, often having an angular contour and flattened “bottom.” In a petrographic thin-section, representing a vertical cut of the ceramic wall, the pits look like an elongated lens (Fig. 6). With binocular investigation, impressions corresponding to the surface texture of mollusk shells are often noted on the “bottoms” of the pits. Several species of mollusks have been identified — both freshwater and saltwater. These are *Corbicula japonica*, *Macoma*, *Arca boucardi*, and *Nuculana spisula* (Fig. 7), with shells of *Corbicula japonica* most often identified (Zhushchikhovskaya and Rakov 1994). In very rare cases small fragments of shell can be seen in freshly broken sherds. The reason calcareous material is lacking in most specimens is because it decomposes through the action of acidic soil during the course of thousands of years. The pits cannot be explained as the result of particles of shell burning during firing, since calcium is stable at low temperatures, its gradual decomposition under the influence of temperature beginning only at about 650-750° C (Rice 1987:97-98).

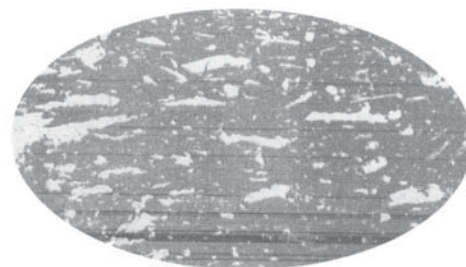


Figure 6. Thin-section of pottery of the Imchin Neolithic culture, showing traces of shell temper.

All of the species of identified mollusks now occupy — and occupied formerly — the rivers, estuaries, and coastal waters of northern Sakhalin. The most frequently used, *Corbicula japonica*, is widespread and has a fragile, easily crumbled shell. We emphasize that fragments of both the shell and soft body of the mollusk served as additives in the clay. This conclusion was arrived at as a result of phosphate analysis of the ceramics, which showed a consistently high content of phosphorus (Ph). As is well known, combinations of phosphorus are indicators of the one-time presence of organics of animal origin (Miklyaev and Gerasimova 1968). An additive of mollusk in the clay has a well-determined technological use — fragments of shell serve as a “coarse structure — a filler,”

which preserves the clay body from cracking during drying and firing, while the sticky soft body increases plasticity and viscosity, improving the working properties. Based on the data of special investigations, this kind of artificial temper was rather widely known in early pottery making, chiefly in the Neolithic (Bobrinskii 1978:104; Nishida 1987a; Tsetlin 1982, 1998; Varndell and Freestone 1997). During firing the particles of the mollusk's soft body (the organic tissue) burned and left pits.

The second variant of ceramic paste in the Imchin culture is clay with a temper of sand particles 0.2 to 1-2 mm in size. The total quantity in the temper is ten to twenty percent. Paste with such composition is noted in a small number of ceramic specimens from several houses (Nos. 1, 20, and 21) at Imchin 2. The type of sand temper — whether naturally occurring or artificially added — has not been reliably determined. However, it is important to note that these specimens represent a formula for the paste that is essentially different from the formula “clay plus mollusk temper.”

The method of modeling vessels in the Imchin culture is identified as coiling. Clay bands or ropes served as structural elements used to form rings that successively build on each other. In several cases the “seams” are evident on the inner and outer surfaces of vessels. Sometimes fragments with characteristic beveled edges are encountered — traces of connections between the ropes flattened during modeling. The thickness of the walls of the ceramic containers varies basically between 0.5 and 0.8 cm.

The morphology of Imchin ceramic vessels is simple and uniform (Fig. 9, d). The vessels, as a rule, have a squat body, rounded horizontal cross-section, and a wide, flat bottom and wide mouth. The neck, as a special structural part of the container, is in most cases weakly defined by an insubstantial narrowing of the walls at the neck. The index of basic width-height proportions (the relationship of the diameter to the height of the vessel) approaches 1. A distinct morphological feature of the vessels is the rim, which forms a kind of wide flattened external cornice that as a rule has two or three horizontal grooves or flutes. The dimensions of the containers are on the whole small, rarely of medium size. The height is 15-25 cm. Rare specimens are vessels with straight walls, slightly expanding toward the mouth, and up to 10 cm in height.

The vessel is worked by post-construction smoothing and evening of the damp surface, or by covering it with a clay-water suspension. This layer of plaster or slip, if used, was thin and not always durable. It must be emphasized that slipping is noted only on specimens that do not have mollusk temper in the paste, but rather are of clay with sandy inclusions.

The technical level of firing Imchin vessels was rather primitive. Based on color analysis, with secondary firing and petrographic determinations, the temperature at firing did not exceed 600-650° C. The color range of the ceramics — orange-brown and yellowish — attests firing in an oxidizing regime. Sometimes the surfaces of the artifacts are covered with dark-gray stains, the result of accidentally subjecting them to smoke either during firing or when in use.

Ceramic vessels in most cases were decorated by simple design (Fig. 10, b). These are impressions of a fine-toothed comb forming a pattern of vertical zigzag on the body. As a rule the zone of decoration occupied the upper and middle parts of the vessel. Impressions were often applied to the cornice on the outside of the rim: including dentate stamp; series of short, sloping, parallel grooves; or a variety of punctations.

Ceramics of the Imchin culture are not clearly to be differentiated by function; that is, it is not possible to identify storage, cooking, or dining vessels by technological and morphological characteristics. The small dimensions of the ceramic containers make it unlikely that they would be assigned to preserve large volumes of provisions, water, and the like. In the ceramic collection of each site there are specimens with traces of a carbonized deposit or soot on the surface — evidence of their use in preparing food. Probably, from the practical point of view, containers made with mollusk temper were principally no different from the vessels of the South Sakhalin culture, since the latter also included sherds made porous by the burning of organic tissue during firing. However, ceramics with sandy inclusions — those not containing mollusk temper — must have been superior for cooking, since they had a smaller index of water permeability and heat transfer.

The Pottery-Making Tradition of the Sedykh Culture

The most representative collection of ceramics permitting a general description of this pottery-making tradition comes from the sites of Okhotskoe 3 and Sedykh 1 (Vasilevsky 2003a).

Based on features of the paste, the ceramics of the Sedykh culture have some similarity to materials of the northern Sakhalin Imchin culture. Binocular and petrographic studies of the ceramics from Okhotskoe 3 show that the early potters employed various formulas in preparing the ceramic paste. One of the variants was clay with additives of mollusk (fragments of shell and soft body). This temper made up about 10 to 20% of the mass by volume. The ceramics with mollusk temper have quite visible pits in the surface and in sherd breaks. Based on preliminary determination, the mollusk *Corbicula japonica* was used as additive — impressions of its shell texture can be seen in several specimens. Another variant of the modeling mass is clay without mollusk temper, with a variable quantity of sand inclusions. Sand temper, with particle dimensions varying from 0.2 to 2.0 mm, may make up 5 to 25% of the paste. The absence of a consistent size and quantity in the temper and the irregularity of its distribution in the paste probably indicate that the sandy inclusions are natural. However, just as in the case with the Imchin ceramics with sand temper, this conclusion is tentative since there are no indisputable indicators of an artificial origin for the mineral temper. Numerically, specimens with sand inclusions predominate. As with Okhotskoe 3, in the ceramic complex at Sedykh 1 both types of paste can be presumed — that with mollusk temper and that with sand inclusions (Vasilevsky 2003a:39).

Vessels were modeled by hand through coiling. Traces of seams (joints) of the narrow bands can be easily seen on several specimens. The thickness of the walls in most cases varies from 0.3 to 0.6 cm. Several specimens with a flat bottom are interesting, in that on the outside bottom are impressions of wood texture. The vessels probably stood on a wooden platform during modeling or drying; this simple method was also used in the pottery making of the South Sakhalin culture.

The morphology of the containers is simple and very uniform (Fig. 9, c). The leading form at Okhotskoe 3 was a vessel without a pronounced neck and with convex walls and flat bottom. The maximum expansion of the walls, approximately at mid-height of the vessel, gives the impression of a biconical form. The average height was approximately equal to the vessel's maximum diameter. The broad mouth was formed with a rim — straight or turned slightly inward, though occasionally turned outward. A characteristic feature of the straight rims or those



Figure 8. Potsberds of the Sedykh Neolithic culture, showing shell-impressed designs.

turned inward is a weak projection — a “flange” along the inner circumference. The dimensions of the container are small; the height generally being 15-20 cm.

Work on the surface included smoothing and slipping with a water-clay composition. This slip layer is of rather low quality, very thin and fragile.

Firing of vessels was done under primitive technical conditions, which is corroborated by the temperature index (600-650°C), by the faded uneven color of the surface and in breaks, and by signs of having been irregularly subjected to smoke.

The ceramic collection from Okhotskoe 3 contains primarily undecorated vessel fragments. Those with decoration are few but very interesting (Figs. 8; 10, c). These sherds display decorative compositions applied by the dentate edge of a valve of the sea mollusk *Keenacardium californiense*, which lives on the coast of the Okhotsk Sea in the vicinity of the site. The arc-shaped edge of the valve caused the decoration to be curvilinear — several rows of smooth arcs or semi-ovals. The decoration probably was arranged in a narrow banded zone on the body of the vessel. Another detail also deserves attention: specimens of ceramics with decoration are different from the remaining bulk of fragments in the somewhat better quality of surface work, as well as in having an even, dark-gray color, possibly the result of purposeful smudging during firing. Decoration, executed using a shell edge and having curved and straight lines, was also noted by researchers on ceramics from Sedykh 1 (Vasilevsky 2003a:40).

On the whole, despite the presence of two different formulas for the paste, the ceramics of the Sedykh culture obviously represent a single pottery-making tradition. This is supported by the morphological uniqueness of the vessels. Vessels with identical proportions, contour, and mouth form could be made from a clay with either mollusk temper or sand inclusions. Thus, it can be suggested that these two directions in the technology of making ceramic paste by the potters of the Sedykh culture coexisted.

The functional assignment of several vessels, based on the presence of soot on the walls, is almost certainly to the cooking sphere.

The Pottery-Making Tradition of the Aniva Culture

The ceramics from Aniva sites are relatively homogeneous and form a unique pottery-making tradition.

Based on petrographic analysis, the composition of the paste corresponds to the formula “clay plus sandy mineral inclusions (of artificial origin).” Sand from alluvial coastal deposits served as temper, the grains well rolled and rather large — to 2-3 mm — making up 20 to 30 percent of the volume of the modeling mass.

Modeling of clay containers was by hand, through coiling. Narrow bands might have served as structural elements or, more probably, ropes that were flattened during the process of modeling. Wall thickness varied from 0.5 to 0.8 cm. A characteristic feature is a small projecting “flange” along the outer circumference of the vessel bottom. The modeling of the vessel’s mouth was simple and finished by giving the necessary orientation to the upper band (rope) of the body and, in some cases, narrowing the mouth and defining the neck. The rims are simple and smooth, with rounded or flattened lip.

A consistent method of working the surface was slipping with a layer of clay without temper, probably a direct result of potters working with a coarse-textured clay body. The sherds, which contain a large quantity of coarse, non-plastic temper, suggest that if vessels were composed of the basic paste alone, they would have been very porous and water-permeable, and consequently of little value for practical use. A special cover of a finely dispersed clayey layer, therefore, would create a post-fired film to protect the walls from excessive absorption of moisture, and in addition, would improve the external appearance of the artifacts. It should be noted that the slip on Aniva ceramics, however, is generally thin and fragile, which attests to inadequate development of this technology.

The firing of ceramic vessels took place in the simplest thermal structures, probably in an open fire. This is indicated by the low temperature index (600-650°C), the low coefficient of hardness (2 on the Mohs’ Scale), the irregularity of coloring on the surface and in breaks, and the frequent presence of black smoky areas on the walls.

The morphology of Aniva vessels was simple — most containers were without a pronounced neck or with a weakly defined neck, with weak profile of the walls, and a flat base (Fig. 9, e). Depending on how much can be concluded from preserved fragments, the height of the vessels was either equal to the maximum diameter or exceeded it a little. A special but numerically small group is made up of upper sherds of vessels with a pronounced neck, which was formed by a distinct narrowing of the walls below the mouth, separating the rim from the body. In essence, vessels with a clearly pronounced neck appear through structural development of vessels without a neck or with a weakly defined neck. It should especially be noted that fragments of vessels with clearly distinct necks were found at the Kedrinka (Predreflyanka) site but are absent from the Yuzhnaya 2 site.

The pots are not clearly differentiated by size. Judging by the preserved fragments, vessels 15-25 cm high, that is, relatively small, predominate in the collection from the Yuzhnaya 2 and Kedrinka (Predreflyanka) sites.

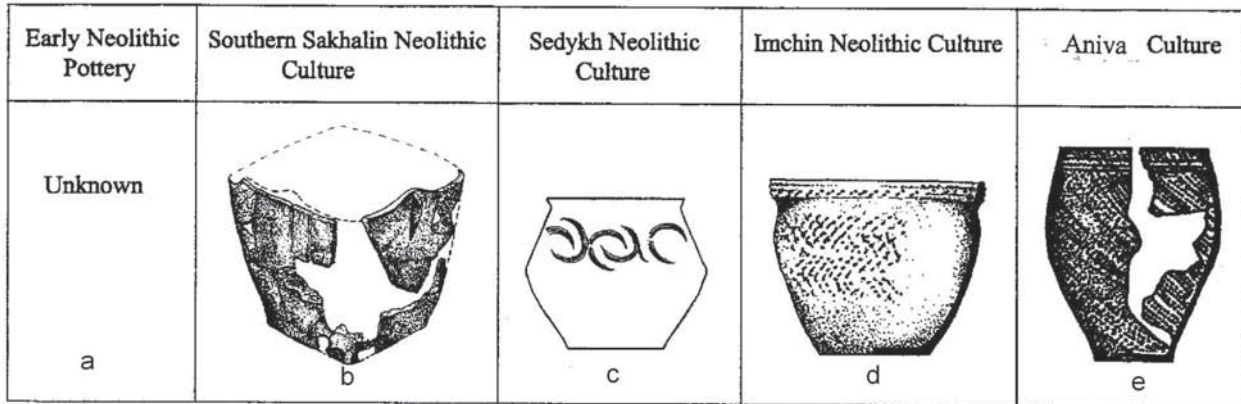


Figure 9. Common forms of pottery varieties described in the text.

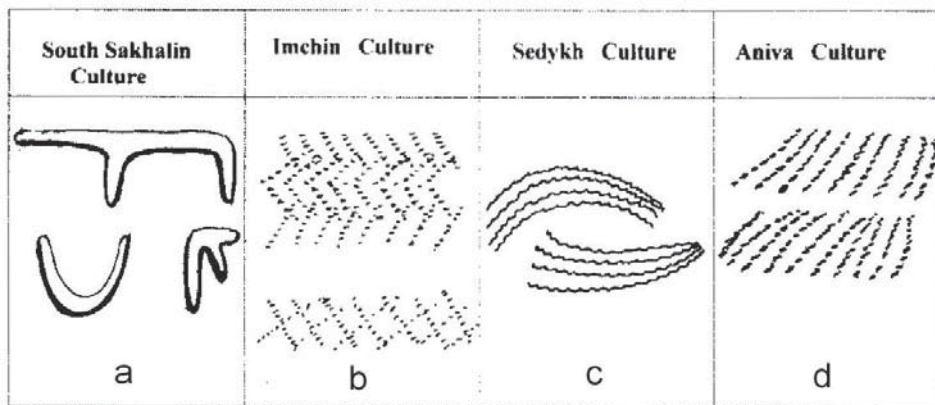


Figure 10. Common devices in the decoration of pottery varieties described in the text.

Vessels of the Aniva culture have a characteristic decoration that is applied by rope and cord impressions (Fig. 10, d). The fibrous structure of the cord is easily identified with binocular investigation. These cord impressions were apparently applied in two ways. In the first, cord was wound around the vessel body in several rows, leaving horizontal unbroken impressions on the plastic clay. This decoration is characteristic of the upper part of the vessels. The second variant of decoration was probably applied with a rope or cord wrapped around a hard item with a narrow working area. Such an item could have been the potter's palm, with the edge of which the vessel walls were "tapped," resulting in rope impressions 4-5 cm long, arranged slopingly or almost vertically. A large part of the body, almost to the very bottom, was covered by these impressions. The possibility of applying cord impressions by such a method is corroborated experimentally.

Rather widespread as a decorative element were rounded, prominent "pearls" or perforating punctures impressed from the inside of the vessel. A narrow zone along the rim was decorated with them. Pit impressions of triangular or rectangular form, arranged in two or three horizontal rows on the upper part of the body, were also used for decoration.

Aniva ceramic vessels, like ceramics of the South Sakhalin, Imchin, and Sedykh cultures, give no sign of functional differentiation. From the presence of soot on the walls they can only be said to have been used in cooking.

Possible Earliest Ceramics of Sakhalin

In concluding this section, following the examination of complexes with a clear cultural and temporal placement, materials with an interpretation of more conjectural character should be touched upon. This is related to the problem of recognizing the earliest appearance of ceramics on Sakhalin. Such materials come from the sites of Ado Tymovo 2, Nyivo 2, Starodubskoe 3, Malyi Ruchei, and Porech'e 4, as well as several other points where objects of Early Neolithic appearance (about 9,000-8,000 years old) have been discovered (Gorbunov 2000; Vasilevsky 2003a; Vasilevsky and Grishchenko 2002). Insofar as studies of Early Neolithic horizons at most sites are presently limited, the ceramic collections obtained are very small and fragmentary. But based on publications and familiarity with ceramics in the Laboratory of Archaeology museum at Sakhalin State University, some general remarks can be made concerning the technology and morphology of presumably early vessels.

A feature that is common to the ceramics of the Ado Tymovo 2, Malyi Ruchei, and Nyivo 2 sites is a clay mass with traces of mollusk temper. This temper is easily identified by the characteristic pits in the surface and on breaks of the ceramic fragments. Meanwhile, however, it has not been established whether the whole mollusk (shell and body) was used as occurred in the pottery making of the Imchin culture or whether only the crushed shell was added to the clay. Mollusk temper was possibly added to the modeling mass of the ceramics from Porech'e 4, but this has not yet been definitely established.

The method of modeling vessels has not yet been positively determined because of the fragmentary nature of the material and the absence of specimens with diagnostic features. Wall thickness is substantial — up to 1 cm — which can be explained by the initial presence in the paste of a certain volume of organic temper. The forms of the vessels can be judged only tentatively. Such features are noted as the undeveloped morpho-structure, absence of pronounced neck, weak profile of the walls, and flat bottom. Thus, at Ado Tymovo 2 several fragments of vessels were found with weakly convex walls and lip bent slightly inward. At Nyivo 2 fragments of a small vessel without a neck, with flat bottom, and also with weakly convex walls were found. Concerning working the surface, specimens from Ado Tymovo 2 and Porech'e 4, showing traces of smoothing by a tool with an uneven dentate edge, possibly a wood chip or mollusk valve, are interesting (Vasilevsky 2003a:31). The firing of the ceramics, judging by their color and brittleness, was in an oxidizing atmosphere at low temperatures.

On the whole, this ceramic material that has been viewed by researchers as belonging to the earliest stage of pottery making on Sakhalin is insufficiently diagnostic or specific in its characteristics. Reliable data regarding the method of modeling and the morphology of vessels are practically absent. A curious feature — noted for almost all ceramic collections that are defined as “early” — is the composition of the paste, which contains a temper of mollusk shell (and possibly also the soft body). This feature is characteristic of ceramics of the Imchin and Sedykh cultures, and is thus assigned to the Late Neolithic. Also deserving attention is the presence of strongly pronounced traces of smoothing on the walls of vessels by a tool with dentate edges; this feature has no analogs in the ceramic complexes of the Neolithic cultures of Sakhalin. However, it is presently difficult to tell to what degree this technological feature is typical and diagnostic of early ceramics. It is noted for a small number of specimens and occurs at only two sites.

We find parallels to this surface treatment in the earliest ceramics of the Japanese Islands — at sites dating between 13,000 and 9,000 years ago. Of greatest interest in this comparison are ceramics from the Takagi 1 site located on Hokkaido closest to Sakhalin and dating to a time of 8,500 to 9,000 years ago (Takagi 1. . . 1985). Ceramics from the Ustinovka 3 site in eastern Primor'e, with an age of 9,000 years, also have characteristic traces of smoothing or evening of the (internal) surface by a tool with an uneven dentate edge (Garkovik and Zhushchikhovskaya 1997). But evidence of this technology can also be found in materials belonging to much later periods. For example, furrowed traces of marks made while evening the walls of vessels are noted on ceramics of the Chertovy Vorota site of the Rudnaya culture in Neolithic Primor'e of the mid-fifth millennium BC (Andreeva 1991). A similar method of working the surface was noted on the ceramics of the Sini Gai site in western Primor'e, which belongs to the end of the second millennium BC, the time of the appearance of bronze in the region. Thus, there are no finally convincing grounds for considering the technology of smoothing or evening the surface of vessels with a tool having dentate edges as a feature exclusively peculiar to the earliest stage of pottery making.

The characteristics of ceramics connected with firing levels have very wide regional and temporal parallels. This is associated with the technical level of heat treatment common for the early stages of pottery making, which was determined by the use of the simplest structures, open fires or pits (Bares et al. 1982:191-197). The traits of low-temperature oxidizing firing also characterize the earliest ceramics of the Japanese Islands, China, and the Russian Far East (Zhushchikhovskaya 2004:24-46), as well as vessels of many Neolithic cultures of these regions (Myl'nikova 1999; Zhushchikhovskaya 2004:147-148). As can be seen from a description of pottery-making traditions of Sakhalin, a primitive technique of firing vessels was practiced everywhere here during the Neolithic.

THE CULTURE-HISTORICAL CONTEXT

In this section and in the course of reconstructing some aspects of the culture history of Sakhalin's early population in the Neolithic, we analyze the pottery-making traditions described above. In doing this, the production of ceramic vessels is viewed as an element in the culture-historical process. We first touch on the initial appearance of ceramics on Sakhalin and the identification of the earliest traces of pottery making.

The Earliest Potters?

The data available today are not simple to deal with. On the one hand, archaeological contexts are recorded that are defined as Early Neolithic and contain ceramic material along with an archaic stone inventory. In some cases radiocarbon ages of about 9,000 to 8,000 years have been obtained for these contexts. On the other hand, an archaeological basis for setting the Early Neolithic in Sakhalin within these temporal boundaries is presently in its initial stages and requires further extensive excavations. The ceramic material obtained is without doubt interesting and, in some features, original. However, it does not contain information that would allow it to be interpreted with a high degree of probability as the earliest on the island in comparison with the Neolithic pottery-making traditions that are already known and studied. The discovery of ceramic complexes at the sites of Ado Tymovo 2, Starodubskoe 3, Porech'e 4, and others

raises the question of the possibility of a ceramic-making technology appearing in Sakhalin at a time earlier than the South Sakhalin (Soni) culture, the earliest of the presently known Neolithic cultures. But the question at this time remains open.

As to the probability of the island's inhabitants being familiar with pottery making 9,000 to 8,000 years ago, special attention must be directed to technological traits of the ceramics found in Early Neolithic sites, traits such as the presence of shell temper (possibly including the soft body of the mollusk) in the clay mass. The tradition of adding mollusk temper is characteristic of Imchin pottery making, and was also known to people of the Sedykh culture. But chronologically these cultures are substantially later than Early Neolithic complexes with ceramics. The use of mollusk temper in the modeling mass is widely known from Neolithic and Bronze Age pottery in various parts of the world (Bobrinskii 1978:104; Varndell and Freestone 1997; Nishida 1987b), but no cases of this technology are recorded for ceramics belonging to the very beginning stage of pottery making. One of the earliest dates for the use of a mollusk temper — 6,500 years ago — was obtained at Neolithic sites in broad river valleys of northern China (Nishida 1987b), and yet the probability is low that the use of mollusks as an additive to the clay mass could appear in pottery making at its very beginning stage. The mollusk — of freshwater, brackish water, or sea water — is a rather specific raw material for early potters, and a definite period of evolution of ceramic-making skills was probably necessary in order to bring an understanding of the quality of this raw material and an ability to adapt this information to pottery technology. It is no accident that the earliest ceramics in various parts of the world were made either from natural clay without temper or with additives of plant organics that were an accessible, well-known, and widely used material in other spheres of life (Amiran 1965; Hoopes 1994; Moore 1995; Zhushchikhovskaya 1997, 2004:15-51).

However, the reasons cited do not absolutely preclude the possibility of mollusk temper's appearance in the beginning stage of pottery making. That is, the probability of such development of technological skills, while small, cannot be completely excluded. In a certain region favorable conditions could have developed that presupposed the corresponding ecological situation (the presence of easily attained mollusks) plus the factor of chance, which together permitted the earliest potters to recognize the value of this organic raw material in making ceramics. If in the future researchers reliably confirm the supposed age of the ceramics at Early Neolithic sites on Sakhalin, this island could be viewed as the region of the world's earliest appearance of mollusk additives in ceramic clays. It is interesting to note that there is no evidence of the use of mollusk as a temper in the early ceramic complexes of the neighboring Japanese Islands, which date to 13,000 to 10,000 years ago. Nor was this technology known to potters of the Neolithic Jomon culture between 10,000 and 2,500 years ago (Aikens and Higuchi 1982:95-182; Harris 1997; Kobayashi 1989). This fact might be treated as evidence for independence from traditions of southern neighbors — independence of mollusk tempering technology in the early pottery of Sakhalin.

The Neolithic Pottery Traditions

Each of the ceramic traditions examined here reveals features brought about in step-wise levels in the progressive development of pottery making, and also suggests specific relationships to the various cultures. They thus permit a definite view of the temporal dynamic of early pottery making on Sakhalin, and allow a correlation of this dynamic with the periodization of

the Neolithic and the rates of the cultural-historical development both on the island and in other regions of the Japan Sea basin.

Based on the study of ceramic materials from early sites of the Far East, the characteristics corresponding to pottery making in the Neolithic are, on the whole, rather clearly outlined. These characteristics are recorded primarily as the leading tendencies in most Neolithic sites of Primor'e, Priamur'e, and Sakhalin (Zhushchikhovskaya 2004:245-267). The formula for a modeling mass of clay using artificial additives both of mineral and of organic origin, the gradual evolution of methods of working the surface from simple smoothing to slipping with watery clay, low-temperature firing in primitive heating arrangements, weak development of container morpho-structure (absence of differentiation of body and neck) together with morphological uniformity and an insignificant degree of variation in size — these features of the ceramics of the South Sakhalin, Imchin, Sedykh, and Aniva cultures are also common in pottery traditions in the southern Far East 8,000 to 4,000 years ago. In Primor'e these are the Boimana and Rudnaya cultures between 5000 and 4000 BC, and some of the sites of the Zaisanovko culture of the third millennium and first half of the second millennium BC (Zhushchikhovskaya 2004:250-254); in Priamur'e they are the Malyshevo and Kondon cultures in the general time range of 7,000 to 4,000 years ago (Medvedev 2003; Myl'nikova 1999). The enumerated signs of the developmental stages of ceramics in Sakhalin cultures also agree with the characteristic ceramics of cultures of the Japanese Archipelago and Korea that belong to early and well-developed stages of the Neolithic. In Korea this is the cultural community of the Chul'mun of 6000-3000 BC (Nelson 1993:58-97), and in the Japanese Islands, sites of the Initial, Early, and Middle Jomon culture in the common chronological framework of about 8000 to 3000 BC (Aikens and Higuchi 1982:95-163).

Thus, the results of studying Neolithic ceramic complexes permit us to speak of a certain dynamic in pottery-making traditions connected with temporal evolution. It is hence possible to see signs of both intercultural and intracultural dynamics.

The earliest stage of development of technological and morphological standards among the cultures examined is represented by materials of the South Sakhalin (Soni) culture. The clay mass with vegetable temper, the method of "slab" construction, and the "box" form of containers mark especially clearly the archaic nature of the pottery-making standards of this culture. It should be noted that the formula for preparing clay with a temper of grassy vegetation has analogs in the earliest ceramic complexes of Priamur'e and Primor'e, which belong to the beginning stage of pottery making and date to 13,000-9,000 years ago (Zhushchikhovskaya 2004:15-59). Another curious parallel between pottery making of the residents of southern Sakhalin and early ceramic technology of the Far East lies in the structural form of the vessels. Above, the opinion was expressed that containers of organic materials — wood and so on — could have served as prototypes for ceramic vessels in the South Sakhalin culture. In this we follow J. B. Griffin (1965) and R. Suda (1995), who treat early North American and Japanese ceramic "box"-shaped vessels as deriving from the technology of making wooden and birch bark boxes, baskets, and so on. The earliest ceramics of Priamur'e and Primor'e, from the sites of Khummi, Gasya, and Chernigovka 1, were formed using plaited devices — most probably vessel molds (Medvedev 2003; Zhushchikhovskaya 1997, 2004:24-46). Thus, in both cases it is likely a matter of intersection of different technologies connected with the making of containers, and with the influence of the earlier — the work with plant materials — on the

later development of ceramic production. This observation can be viewed as an additional argument in support of the archaic nature of pottery making of the South Sakhalin culture.

The pottery-making traditions of the Imchin and Sedykh cultures look more “mature” and developed. These were at a higher level in the evolution of ceramic making in comparison with that of the South Sakhalin culture. Signs of progress were the use of mollusk temper with shell for making the modeling mass, which surpasses grassy organics in its working quality; the transition to the use of a clay mass with naturally occurring or artificially added sand temper; the mastery of coiling as a method of modeling vessels; the absolute supremacy of the “classic” container model with a body round in cross-section and a flat base; the tendency in the Imchin culture toward setting off the neck as a structural part of the container and toward biconical profiling of the walls in the Sedykh culture; and the appearance of slipping the walls of vessels with watery clay. From the position of developmental evaluation of pottery-making traditions, the Imchin and Sedykh cultures represent a later stage of the Neolithic than does the South Sakhalin culture. This conclusion agrees with the scheme of Neolithic periodization on Sakhalin that was cited above.

The ceramic complexes of the Imchin and Aniva cultures reveal signs of internal progressive changes, which tentatively permit distinguishing in both cases two stages in the development of pottery technology. For the Imchin culture, the first stage corresponds with ceramics with mollusk temper (the Imchin 12 site and several houses at Imchin 2), the second stage with ceramics that contain natural or artificially added sand in the paste and a slip of watery clay. For the Aniva culture, the evolution of the pottery-making tradition is manifested in vessel morphology: to the first stage can be assigned materials from Yuzhnaya 2, where only containers without necks or with weakly defined necks are present; to the second stage belong materials from the Kedrinka (Predreflyanka) site, where vessels with clearly defined necks are more developed morphologically.

If the pottery tradition of the Aniva culture on the whole is assessed, it seems to us that it represents the latest stage of ceramic production among all the cultures examined. This stage is marked by such features as having a clay mass with artificially added mineral temper, the stable practice of slipping the surface with watery clay, and the appearance of a container shape with clearly defined neck. These are the features that connect the pottery-making tradition of the Aniva culture with pottery making of the Susuya culture of the second half of the first millennium BC and the first half of the first millennium AD, and with the Okhotsk culture of the seventh to the twelfth century AD, which are now defined as cultures of the Paleometal period on Sakhalin (Vasilevsky 1995a, 2000b). The ceramic complexes of the Susuya and Okhotsk cultures indicate a stable technological standard including the modeling mass with temper of large-grained sand, the constant use and improved quality of slip on vessel walls, the continued development of the morpho-structure of ceramic containers, and the mastery of a vessel form with a clearly defined neck (Zhushchikhovskaya 2004:254-255).

We nevertheless emphasize that the standards of Aniva ceramics — the latest of the cultures examined and one representing a different period (the Paleometal, according to new data) — correspond to a Neolithic level of development in the pottery making of cultures in the Japan Sea basin. By their absolute dates, most of which fall in the first millennium BC, the Aniva culture or a certain stage of it in fact corresponds to the period when metals — bronze and iron — appear and become

widespread around the Japan Sea (Aikens and Higuchi 1982:187-243; Andreeva et al. 1986; Derevyanko 1973, 1976; Nelson 1993:110-163; Yanshina 2004). However, the end of the second millennium and the ensuing first millennium BC formed a time of great progressive change in the economy, material culture, way of life, and social structure of communities in the mainland of the southern Far East, in Korea, and in the Japanese Islands. The reasons for and the dynamics of these changes were individually specific to different regions. Not to view this question in detail here, we note that the archaeological reflection of important events in the history of the population of the Japan Sea basin during the designated period are the sites and cultures of the Final Neolithic and the Paleometal period.

At the end of the second millennium and in the first millennium BC, clear indicators of new tendencies among early cultures of Primor'e, Priamur'e, Korea, and the Japanese Archipelago are in the pottery-making traditions. Ceramic complexes of the Final Neolithic and Paleometal periods reveal a whole series of features attesting substantial progressive changes in comparison with preceding stages of the Neolithic. These are diversity and high-quality methods of working the vessel surface; perfection of the technique and technology of firing; a broad morphological spectrum of pots owing to variation in structure, proportion, and contour; the predominance of containers with a developed morpho-structure; variety in the sizes of vessels; and radical change in the principles of decoration (Aikens and Higuchi 1982:164-197; Grebenschikov and Derevyanko 2001; Nelson 1993:116-123; Pearson 1992:73-75, 137-141; Zhushchikhovskaya 1999, 2004:268-278).

Against this background, new features recorded in the pottery-making tradition of the Aniva culture of Sakhalin seem pale and insignificant. These are individual changes that do not go beyond the Neolithic level of pottery development. It thus appears that the character of Aniva pottery technology permits one to place it as a culture in the final stage of the Neolithic, but it does not provide a basis for assigning it to the more developed Paleometal period. The problem of distinguishing the Paleometal period in Sakhalin by archaeological resources has only recently been considered (Vasilevsky 1995a, 2000b; Zhushchikhovskaya 2002, 2004:261-267) and many questions connected with it meanwhile remain open. The signs of positive change — the appearance and gradual spread of imported iron artifacts and the transition to a new productive form of exploitative economy (sea mammal hunting), demographic growth, and fortification of villages — begin to be noted clearly in the Susuya culture of the second half of the first millennium BC and first half of the first millennium AD, and reach their maximum during the period of the Okhotsk culture of the seventh-twelfth centuries (Vasilevsky 2000a). Pottery making in the Okhotsk culture also provides evidence of the highest development of this production on Sakhalin, but it nevertheless lags noticeably behind the pottery making of the Paleometal cultures of Primor'e, Priamur'e, the Japanese Islands, and Korea during the first millennium BC and early first millennium AD. One of the basic reasons for this lag was unfavorable climatic conditions on the island for pottery making and the absence in the economy of a specialized productive arm, which would have stimulated development of some spheres of the material culture (Zhushchikhovskaya 2004:266-267).

Returning to the developmental placement of the Aniva culture, we note that it is hardly possible to solve the problem simply through the study of ceramic complexes and pottery-making traditions. However, data obtained on the dynamics of early pottery making point to the complexity and ambiguity of the investigative situation and must be considered within cultural-historical constructs.

External Contacts

In the pottery-making traditions of Neolithic Sakhalin (the South Sakhalin, Imchin, and Sedykh cultures and the presumed Neolithic Aniva culture), we can distinguish signs pointing to probable cultural communications with the island's early population from two basic geographic directions.

One of the directions, to the south, connects the aboriginal residents of Sakhalin with the inhabitants of the Japanese Archipelago. This direction is represented by materials of the South Sakhalin (Soni) and Aniva cultures. Some features of ceramic technology, morphology, and decoration of the South Sakhalin sites have parallels in traditions of pottery making present in the Japanese Islands between about 10,000 and 5,000 years ago — that is, in the Initial, Early, and Middle Jomon. It is important to note that these parallels are recognizable in the ceramic collections from various sites.

Above, we cited the opinion of the American researcher P. Vandiver, that in the earliest stage of pottery making in the Japanese Archipelago, ceramic containers were made by “slab construction.” This conclusion refers to materials from sites of the transitional period between the Paleolithic and Neolithic and of the Initial Jomon (Vandiver 1991).

The use of organic plant tempers for making the paste is known in several complexes of Initial Jomon. For example, traces of fibrous grassy organics are present in specimens from the sites of Kuzukharazava Dai 4 and Tsuidzibanakita on Honshu Island (*Sbornik materialov* . . . 1996:63). In several cases plant temper is also noted in pottery of the Early and Middle Jomon periods (Nishida 1987a).

The unusual “box-shaped” vessels of the South Sakhalin culture and the curvilinear decoration, executed with small applied bands, are more specific features than the structural technology. Therefore, analogs of these characteristics found in Japanese ceramic complexes are especially interesting. Vessels with rectangular cross section of the mouth, body, and base are found on Honshu and Hokkaido in sites 12,000 to 9,000 years old (Suda 1995) and on Kyushu in sites of the Initial Jomon (Kobayashi 1989:72-73, 106-107). However, there are no data concerning the presence on these vessels of relief decoration of applied bands. Decoration, similar to the decorative compositions on South Sakhalin “box” vessels, is present on ceramics from some sites of the Initial Jomon excavated on Honshu and Kyushu — Karasawa, Kadziyazono, Senpukudzi Doketsu, and others. But based on published materials the forms of the vessels cannot be precisely determined, that is, whether they have a rectangular or the usual round cross-section (*Sbornik materialov* . . . 1996:59, 73, 81, 144).

Although several features indicate the ceramics of the South Sakhalin culture to be generally similar to those of the Japanese Islands, the chronological correlation of comparative archaeological materials from Sakhalin and Japan points to a later age of the first and permits viewing them presumably as derivative of traditions of the earliest pottery making in Japan. However, it is presently impossible to establish a direct connection between sites of the South Sakhalin culture and any particular archaeological complex in the Japanese Islands. This will possibly be done in the future if sites are found in Japan with ceramics having a combination of the designated features.

Materials from the Aniva culture are also interesting in revealing parallels to the Japanese Islands. First, attention should be turned to the decoration of the ceramics — rope and cord impressions in which rows almost completely cover the walls of the vessels. It is well known that different variations in decoration executed by cord stamp are a kind of “calling card” of Jomon ceramics (Aikens and Higuchi 1982:95-182; Kobayashi 1989). The most widespread variant, beginning with the Early Jomon, were rope impressions completely covering the vessel body. They often formed the background for other decorative elements and compositions, applied or sketched. Rope or cord decoration underwent substantial modifications during the Late and Final Jomon. However, filling the decorative field with such impressions continued in this or another form. As was noted in the introductory section, ceramic discoveries with rope decoration in the Jomon traditions were made in the Kurile Islands in the 1960s. Over the decades since then, a rich collection of ceramic vessels has been made there, the forms and designs of which in most cases correspond to the features of pottery making of the Middle and Late Jomon.

Thus, sites of the Aniva culture are included in the area of distribution of rope or cord decoration characteristic of the Jomon culture.

Another feature of the Aniva ceramics may be mentioned in connection with the search for possible analogs in the early pottery making of Japan. This is the technological feature of forming the bottom with a projection or “flange” along the external circumference. The basal “flange” is a permanent feature of Jomon ceramics in some regions of Japan. For example, at the Okubo site in Aomori Province on northern Honshu, various periods of the Jomon culture are represented — Early, Middle, and Late — but the method of forming the bottom with a “flange” is continued in the ceramics of each time horizon. At first, the round bottom slab was made, then bands of clay 1.5-2.5 cm wide were joined to it around the circumference. These bands were attached, using the fingers, along the outer circumference of the bottom, from which a small projection or “flange” was formed.

Thus, two diachronic pottery-making traditions of southern Sakhalin during the general time interval of 7,500-2,500 years ago have several features in common with early pottery making of the Japanese Islands. But it is difficult to say whether there were continuous or episodic cultural impulses from the south, and what their specific origins and forms were. These questions could be advanced for further investigation.

The second direction of cultural connections of the Neolithic population of early Sakhalin was into the mainland of the Far East adjacent to the island and to the Amur River basin. Archaeological reflections of these connections are found in materials of the Imchin and Sedykh cultures. The problem of cultural contacts between Sakhalin and Priamur'e, posed for the first time in the works of R. V. Kozyreva (Chubarova) in the 1950s and 1960s, has been elaborated in various perspectives by several researchers during the course of the past three decades (Myl'nikova 1999; Shewkomud 1999; Shubina 1986, 1987, 1990; Vasilevsky 2003a; Zhushchikhovskaya and Shubina 1987). The primary source for forming these perspectives is collections of ceramics, a material that most fully reflects the individuality of cultural traditions.

The complex of features of ceramic technology, morphology, and decoration of the Imchin culture is closely similar to traditions of pottery making on the lower Amur of 3,000-2,000 BC. The ceramics of Imchin 12 and several houses at Imchin 2, corresponding, in our opinion, to the early

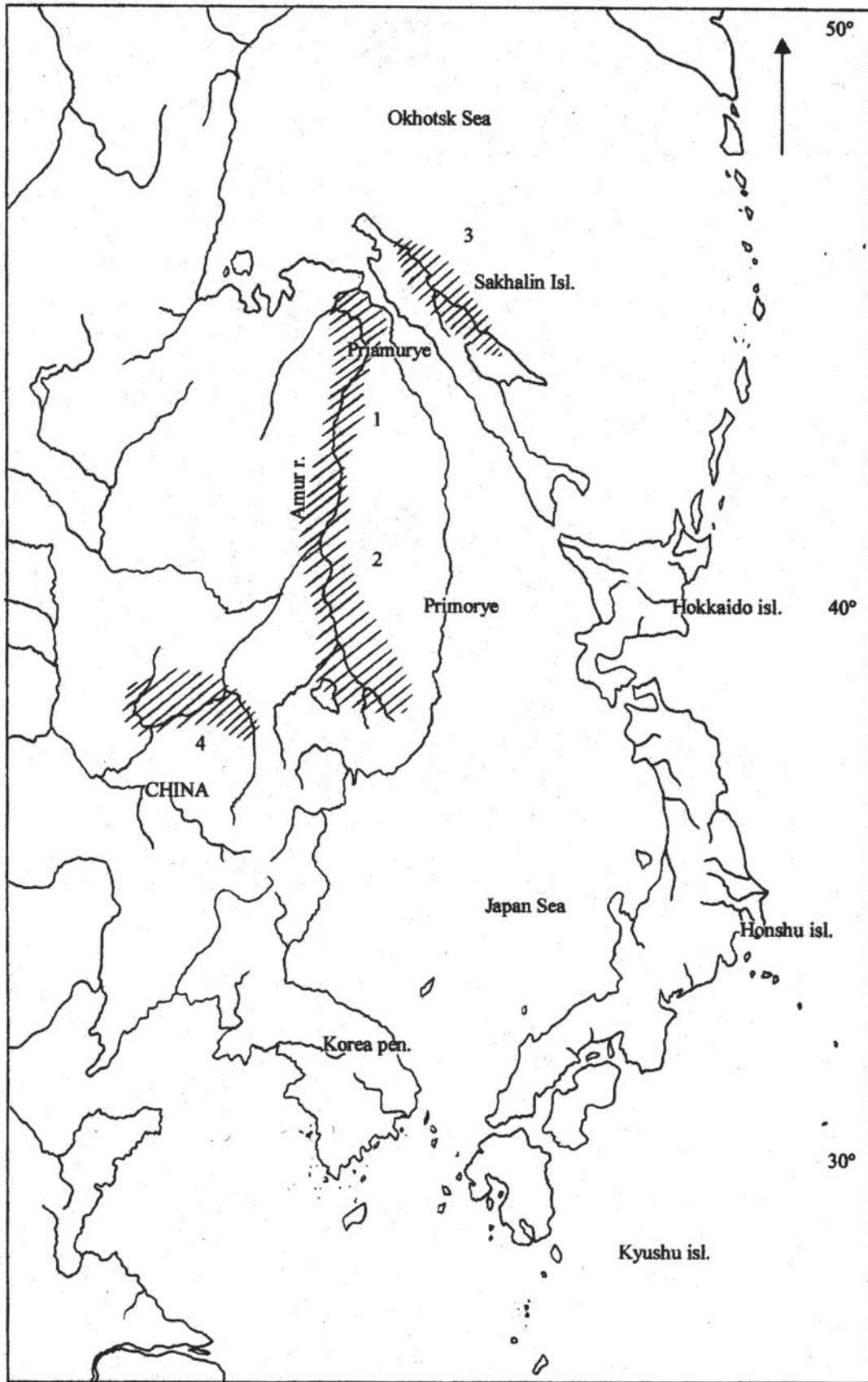


Figure 11. Regions with reported molusk-tempering (hatched areas) during the Neolithic period in the Far East.

stage of Imchin pottery making, are almost perfect analogs of vessels from sites discovered on the Amur in the 1980s and 1990s, which so far do not have a definite cultural attribution. Some researchers combine them in a special proto-Voznesenovska culture (Myl'nikova 1992, 1999); others see in these complexes special local-chronological variants of the Voznesenovska culture of the Late Neolithic (Shewkomud 1999). Within the context of this chapter it is significant that there are archaeological sites on the lower Amur containing ceramics with many features that are “doubles” of Imchin ceramics. To these sites belong Kol'chem 3 and certain horizons of Kondon, Suchu, and others. Neolithic complexes with analogous materials have been discovered as well in the Ussuri River basin of neighboring northern Primor'e (Zhushchikhovskaya 1990) (Fig. 11).

The clearest signs determining similarity of the Imchin, lower Amur, and northern Primor'e ceramics are traces of mollusk temper in the clay body; the weakly profiled, squat, broad-bottomed shape of vessels; the rim formed with a broad applied cornice with longitudinal grooves or flutes; and decoration in the form of vertical zigzag applied by a small-toothed stamp or “comb.” Based on preliminary determinations, the impressions of mollusk shells that are recorded in the ceramics of the lower Amur and northern Primor'e belong to the freshwater family *Unionidae*.

Today, researchers propose two separate scenarios to account for parallel cultural traditions close in time in both northern Sakhalin and the lower Amur basin.

According to the first of these, the tradition of making ceramics with mollusk temper and decoration of vertical zigzag, impressed with a small-toothed “comb,” arrived on the lower Amur from the neighboring plains of northern China. In northern China there are Neolithic sites containing ceramics with traces of temper of the freshwater mollusk *Unionidae*, with a characteristic thickening of the rim, and decorated by impressions of dentate stamp. These are the Elasu site, with a radiocarbon age of 6510 ± 90 years, and the Anansi site (Nelson 1995:132-133; Nishida 1987b). In support of foreign, “imported,” mollusk-tempered ceramics on the lower Amur is the fact that in earlier local cultures — Malyshevo and Kondon — the tradition of making the paste from clay with natural or artificial mineral temper had taken root. In addition, neither morphology nor decoration of lower Amur ceramics with mollusk temper shows any signs of connections with preceding Neolithic cultures. In later complexes and cultures of the lower Amur of the second and first millennia BC, the tradition of tempering the clay with sand, grus (pulverized rock), and grog (crushed potsherds) clearly predominated, while mollusk material was episodically used as an additive — a distinctive technological atavism (Grebenshchikov and Derevyanko 2001:13-20).

The bearers of the mollusk-temper tradition in ceramics, advancing along the Amur River to the east, must have relatively quickly reached the sea coast and had the possibility of crossing the narrow Tatar Strait to northern Sakhalin. The Imchin culture appears before us in a fully developed form, having no direct predecessors on the island. This circumstance can be viewed as an argument in support of the scenario. However, the weak point is in the chronological data. The lower Amur Neolithic sites with mollusk-thinned ceramics are tentatively dated to approximately the third millennium and the first half of the second millennium BC (Shewkomud 1999). For sites of the Imchin culture a series of absolute dates has been obtained, the earliest of which corresponds to the fifth and fourth millennia BC, although most of the dates fall between 3000 and 2000 BC (Shubina 1987, 1990). It is clear that an indisputable explanatory account requires a chronological correlation that will have the lower Amur sites earlier in age than the Imchin cultural complexes.

The second scenario assigns the origin of the tradition of mollusk-tempered ceramics to the mouth of the Amur River and northern Sakhalin itself. From here, the bearers of this tradition spread to the west along the Amur, leaving their sites. This version suggests in some degree a local origin on Sakhalin for the technology of thinning ceramic clay with mollusks. The previously discussed ceramics with traces of shell temper in proposed Early Neolithic sites of Sakhalin with an age of 9,000 to 8,000 years serve to corroborate this proposition in a certain way. However, conclusions about the earliest ceramics on the island are not yet final.

Future investigations will show which scenario is more viable. But in both cases the idea of contacts during the period 3000-2000 BC between bearers of the Imchin culture of northern Sakhalin and inhabitants of the lower Amur stands out.

Materials of the Sedykh culture are also seen by researchers to indicate cultural connections between Sakhalin and Priamur'e (Vasilevsky 2003a:40). Such ceramic features as curvilinear decoration and a container form with walls that expand in the middle of the body have analogs in the pottery-making traditions of the Voznesenovska culture on the lower Amur during the second half of the third and the second millennia BC. The most characteristic traits of ceramic artifacts from sites of this Amur culture (Suchu, Voznesenovskoe, and Kondon) are complex curvilinear decoration and the very diagnostic biconical contour of the walls of vessels (Medvedev 2003; Okladnikov 1984). It is possible that the pottery-making tradition of the Sedykh culture was formed under the influence of developed ceramic production among a group of the lower Amur population corresponding to the archaeological Voznesenovskaya culture. Whether this influence was direct or mediated, whether as a result of movement of some groups from Priamur'e to Sakhalin or of only temporary contacts between residents of neighboring territories, further investigations and the accumulation of new materials are necessary for answers to these questions.

CONCLUSION

The study of archaeological ceramics and early pottery-making traditions provide us with information in relation to several problems in the history of Neolithic Sakhalin.

The question of the appearance of ceramics and the origin of pottery making in the island region merits special attention. The information we now have raises the question, Were skills in making ceramic vessels an independent attainment of the early residents of Sakhalin, or were they brought here from neighboring areas, in particular, from the Japanese Islands? When did ceramic making first begin on the island? If further studies corroborate that the ceramics found in presumed Early Neolithic sites are in fact 9,000 to 8,000 years old, we have reason to conclude that Sakhalin was in the circle of Early Neolithic cultures around the Japan Sea, cultures which between 13,000 and 9,000 years ago mastered the technology of producing a new artificial material from clay (Vandiver 1991, 1999; Zhushchikhovskaya 2004:15-59). In the opposite case, the earliest pottery making will be associated with the South Sakhalin culture at an age of about 7,500 to 6,000 years, and can be viewed as a result in all probability of influence derived from the neighboring Japanese Islands.

The dynamics of early pottery making in Sakhalin was part of a general cultural-historical process. Changes in the technological and morphological standards of ceramic vessels reflected to a certain degree temporal changes in the development of aboriginal culture. Those stages of evolution

that can be ascertained from the materials of concrete archaeological complexes correspond well with today's scheme of Neolithic periodization. At the same time, the data obtained permit us to compare the rate of development of early pottery making in Sakhalin with the dynamics of this production in other regions near the Japan Sea. Within the framework of the Neolithic — in both its early and developed stages — the general level of pottery making in cultures of the southern mainland of the Far East, Korea, the Japanese Islands, and Sakhalin was approximately equal. However, in all of these regions with the exception of Sakhalin, at the end of the Neolithic there occur large and noticeable changes in the various spheres of material culture, including pottery making. The boundary between the Neolithic and the new Paleometal period is marked pronouncedly in the ceramic traditions. Ceramics become more complex and developed, answering at a new level the socio-economic requirements of society.

But in archaeological complexes of Neolithic Sakhalin, even those of the latest age, it is difficult to see definite features of an advance to a new cultural-historical epoch. More noticeable were differences in the pottery making of island cultures belonging to the Paleometal period proper (Susuya and Okhotsk cultures of the second half of the first millennium BC to the twelfth century AD) and pottery making of Paleometal cultures in the other regions of the Japan Sea basin. It can be supposed that this unevenness in the development of ceramic production had both socioeconomic and ecological causes (Zhushchikhovskaya 2004:261-267). It is the vagueness, the weak expression of evolutionary features in the pottery-making traditions of the island's Late Neolithic cultures that to a certain extent hinders a simple determination in archaeological complexes of the boundary between "Neolithic" and "Paleometal." This particularly relates to materials of the Aniva culture.

Traditions of pottery making in the Neolithic cultures of Sakhalin reflect conditions related to cultural contacts in the Japan Sea basin in antiquity. From the 1930s to the 1960s, the ideas expressed regarded penetration into Sakhalin and development there of cultural impulses from the south, from the Japanese Islands, as well as from the mainland, from Priamur'e (Vasilevsky 2003b). The geographic position of the island is extremely favorable for cultural contacts from these directions, which could have been carried out either by migrations or by short-term interactions. Ceramic complexes of the South Sakhalin and Aniva cultures preserve convincing evidence of penetration into southern regions of the island of influence from traditions of the Jomon Neolithic culture of Japan, while materials of the Imchin and Sedykh cultures point to contacts with the early population of the Amur basin — the largest river of the northwestern Pacific.

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Chapter 7

Pottery Industries in the North of the Russian Far East

Irina Ponkratova

INTRODUCTION

The history of early societies in the northern portion of the Russian Far East — one of the northernmost regions of the world — is unique and interesting, and also complex. Its study began in the seventeenth century with the arrival of Russian explorers who left valuable information about the local economy, way of life, and culture (Dikov 1977 [2003]); it continues to the present.

When speaking of peoples who lived under the extreme conditions of the north, one must remember the self-sacrifices of researchers who have worked under the same extreme conditions, often exposing themselves to danger. Surveys and excavations have been carried out under the most variable weather conditions in places beyond the reach of modern civilization, often without adequate means of communication or even of firearms, where danger may lurk at any turn of the trail — in fording mountain streams, or landing on the sea shore, with the wallowing all-terrain vehicle often the only resort. According to northern archaeologists “these are some of the complexities that become a habitual part of field life” (Ponomarenko 2000).

In the north of the Russian Far East a number of manufactures — those of metallurgy, glass-making, spinning, weaving — were absent in antiquity, although they existed in more southern and western regions. But among those that could be mastered under severe northern conditions was pottery making.

Not long ago regional studies treated ceramics chiefly as a means of classifying and periodizing archaeological cultures and sites. Treatments of ceramic complexes were limited to descriptions of superficial features, while early pottery making of the northern Russian Far East was not the object of specialized investigation as a production activity. That is, when considering the appearance and spread of traditions of ceramic production, researchers did not make interpretations within a cultural-historical context.

Examining human adaptation to severe northern conditions, investigators have devoted primary attention to the appearance of special devices for hunting on land, for sea mammal hunting, and for fishing. Traditions of ceramic production have been traced in their distribution, in only isolated cases with the functions of ceramics viewed in economic context. Thus, for a long time the history of ceramic production in the subarctic and arctic zones — the northernmost pottery-making region in the world — was left blank.



Figure 1. The region of concern (shaded area).

The aims of this paper are: 1) to provide a short summary of pottery-making traditions of Neolithic and Paleometal cultures in the north of the Russian Far East; 2) to present the place of ceramic vessels in the everyday life and economy of northern peoples; 3) to show the place of northern pottery making in the overall history of ceramic production through consideration of universal principles of the technological cycle and its development; 4) to determine possible directions of cultural contacts by comparing intra-regional cultural features of pottery making of the northern Russian Far East and adjacent territories; 5) to show the influence of environment and weather conditions on the development of pottery making; and 6) to outline several problems in the history of the region that relate to the investigation of early pottery making.

The geographic framework includes the continental regions of the Kolyma River basin, Chukotka, the coastal zone and islands of the Okhotsk and Bering seas, and Kamchatka (Fig. 1). This is a coherent region with common archaeological problems that also “served as a natural bridge to America, along which its population passed from Asia” (Dikov 1977:5 [2003:1]). The distance from the central regions of Eurasia, the lack of land and river “highways,” and the general severity of natural conditions have brought on the uniqueness of the region’s development. The varied natural and climatic conditions of the huge area of 1.7 million square kilometers (*Sever. . .* 1970:9), served to differentiate ways of life and specifics of economic activity, as well as developments of the earliest manufacturing industries. The continental and maritime regions differ both in natural and climatic conditions and in the character of the cultural-historical processes of antiquity. The territorial boundaries with Yakutia, Priamur’e, and the northwestern coast of the American continent, plus the proximity of Primor’e, Sakhalin, and the Japanese Islands, provided a variety of cultural influences and connections.

The chronological framework is defined by ceramic collections from archaeological cultures and sites of the northern Russian Far East during the Neolithic and Paleometal periods. The lower chro-

nological boundary for coastal and continental sites is placed at different times, presumably related to the rates of overall cultural development in the various areas. The earliest investigated continental site with ceramics is a “Middle Neolithic” site on the upper course of the Kolyma River — Agrobaza IV — where material is dated to the fourth and third millennia BC (Slobodin 1995:15), around a measured age of 4790 ± 50 years (Beta-140689) (Slobodin 2001:130). On the coast of the Okhotsk and Bering Seas the lower chronological boundary is with Neolithic sites of the Tokareva and Lakhtina cultures of the second millennium BC (Lebedintsev 1990 [2000]; Orekhov 1987 [1999]). The upper chronological boundary is approximately the same for the continental and the coastal areas and is marked at Paleometal sites some 300–500 years ago (Dikov 1977 [2003], 1979 [2004]; Vasil’evskii 1971).

The method of investigation of archaeological ceramic complexes from the huge area has involved a single analytical scheme. This permits identification of the traditions of early northern pottery making in terms of technique, technology, morphology, and decoration, with recognition of distinguishing traits of the ceramics from individual cultures and sites. The reconstruction of traditions of ceramic production relies on visual observation and description, natural science methods of analysis, plus experimental modeling for each of the basic stages of the entire technological cycle, and classification of forms of vessels and their decoration.

Sources employed are varied. They include collections of ceramics from sites and cultures of the region, as well as those representing more widely spread coastal and continental archaeological complexes; field reports and more general publications on the region itself, as well as publications regarding contiguous areas; and data of related disciplines — geology, paleogeography, and ethnography.

Investigation of specifically archaeological cultures and sites of the northern Russian Far East began at the end of the nineteenth century, in Kamchatka (Dikov 1977 [2003]). Systematic archaeological surveys in the region as a whole, followed by excavations, began at the end of the 1920s and beginning of the 1930s. Since that time hundreds of archaeological sites have been discovered and studied, and several archaeological cultures have been characterized in the continental part of the Kolyma River basin, the Chukchi Peninsula, along the coasts of the Bering and Okhotsk Seas, and in Kamchatka. The cultures identified were systematized by N. N. Dikov (1977 [2003]; 1979 [2004]), whom we follow in the description of ceramic traditions of the various cultures, and the assignment to those traditions of newer discoveries

NEOLITHIC CULTURES AND SITES

Tokareva Culture

On the Okhotsk Sea coast one of the earliest cultures is the Tokareva, which was initially dated to the the mid-second millennium and the first millennium BC (Lebedintsev 1990:240 [2000:239]). Today its upper boundary corresponds with the appearance of the Old Koryak culture in the first half of the first millennium AD, while its lower boundary is not yet determined. Its known and dated sites fall more specifically from the seventh century BC to the second century AD (Lebedentsev 1999:46). The area of distribution is northern Priokhot’e from the Kamchatka Peninsula westward,

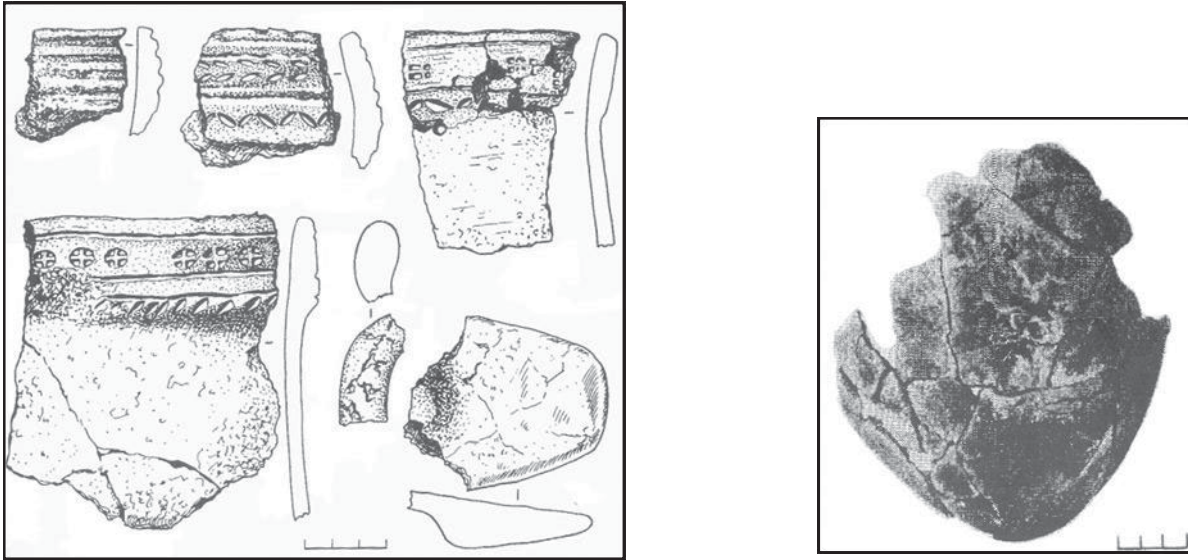


Figure 2. Pottery of the Neolithic Tokareva culture (after Lebedintsev 1990); scale in centimeters.

while A. I. Lebedintsev (1990:66–71 [2000:71–78]; 1999:45) also suggests that several sites along the Kukhtui River (in the Okhotsk region) also belong to the Tokareva culture. Tokareva economy was both continental and maritime in orientation, characterized by seasonal hunting of land and sea mammals, fishing, and mollusk collecting (Lebedintsev 1990:241 [2000:240]). The assemblage from the Okhotsk coast is Neolithic in appearance, but the late stage of the culture (at the end of the first millennium BC) belongs to the Paleometal period (Lebedintsev 1990:241 [2000:240]).

Ceramics are absent in the earliest stage, with age-range determined by measurements from the Batareinaya site of 2640 ± 50 years (MAG-1007), from the Oksa I site of 2400 ± 200 (MAG-697) and 1950 ± 100 years (MAG-696).

The second period, with pottery, is concluded to be later, although radiocarbon ages from the Tokareva site at 2300 ± 100 (MAG-762), 2170 ± 45 (MAG-1099), and 3540 ± 60 years (MAG-554) are less than satisfactorily definitive of themselves. This stage is characterized by pottery-making practices that included the use of local raw materials, of clay without temper, of a rudimentary level of modeling vessels on a base or foundation (i.e., a partial mold) that resulted in vessels with a rounded bottom and a weakly defined neck (Fig. 2). The primary surface finish of vessels was by smoothing. Firing was in an open fire with a mean temperature of 650° to 700° C and an oxidizing atmosphere. Such surface decoration as at present borders the rim, the motifs defined as geometric, which also is characteristic of decoration executed on bone and stone artifacts of this culture. In composition the motifs on pots include straight, horizontal, and wavy lines, rectangles, squares, circles, semicircles, and crosses. Such compositions occur as combinations of slanting and horizontal lines, rounded punctations with a crosspiece, and combinations of slanting lines. The most widespread compositions are combinations of straight lines sloping at an angle to each other (Tokareva, Spafar'ev, and Berezovaya complexes). See Figure 2.

North Chukotkan and Ust'-Belaya Cultures

In Dikov's opinion, ceramic traditions began to penetrate the Chukchi Peninsula in the third millennium BC. A small number of fragments of net-marked, thin-walled ceramics were found in early complexes of the Ust'-Belaya site in the Anadyr River basin, and ceramics with cord-marked decoration were encountered in the Kameshki site (Dikov 1979:133 [2004:104]). Dikov also thought that a definite influence on the Neolithic of Chukotka during this period was from the Neolithic traditions of Yakutia. In the second millennium and the beginning of the first millennium BC, cultures with a similar economic base were developed in Chukotka — the North Chukotkan and the Ust'-Belaya (Dikov 1979:133 [2004:104]).

The North Chukotkan was a culture of sedentary hunters and fishermen of the Late Neolithic — at the end of the second and the beginning of the first millennia BC. The first of these sites were found in the tundra of northern Chukotka near the Arctic Ocean (Dikov 1979 [2004]). A characteristic feature is arrow heads in the form of massive and long points worked on both ends, often three-sided in cross section. Sites of the culture are primarily oriented along migration routes of the reindeer, with related cemeteries situated on rocky hilltops in crevices filled with rubble and slabs. Some parallels to the North Chukotkan culture can be seen in the roughly synchronic Norton complex of western Alaska (Dikov 1979 [2004]).

We approached the ceramic traditions of the North Chukotkan culture through Dikov's (1979 [2004]) descriptions. Organic temper is of deer hair. Vessels are of medium and small size, with mouths either larger or smaller than the body, although with lips always flaring outward, and with rounded bottoms. A large proportion of the ceramic vessels were not decorated, but others were marked by stamping during modeling by means of paddles grooved with rectangular or square patterns. Decorative motifs are thus geometric, with networks of square and rectangular impressions [i.e., check-stamped - eds.]. This decoration, the simple by-product of pottery construction, is commonly arranged in the middle and lower parts of the body of the vessels (Fig. 3).

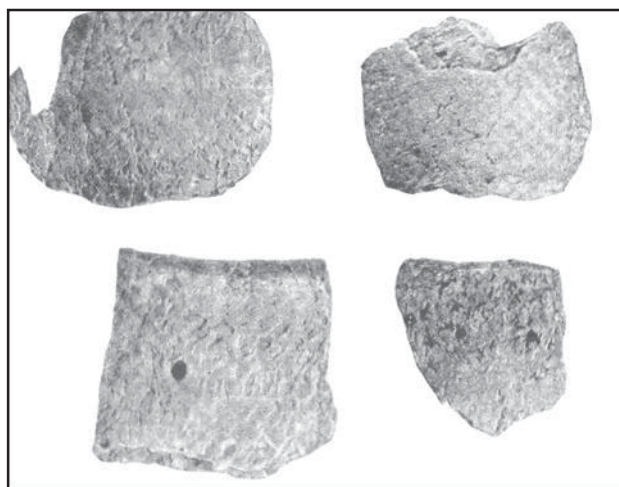


Figure 3. Pottery of the North Chukotka culture (after Dikov 1979).

The Ust'-Belaya culture was formed and spread in the forest-tundras of Chukotka from the beginning of the second millennium to the end of that millennium and the beginning of the first millennium BC, with sites situated along the middle course of the Anadyr River at the seasonal river crossings of the reindeer. The basis of existence of these tribes was deer hunting, fishing, and the gathering of plant food. The complex of stone artifacts is large and consists of various cores, flakes and knife-like blades, projectile points, knives, scrapers, burins, punches, axes, and adzes (Dikov 1979:141 [2003:110]).

According to Dikov (1979:141–142 [2004:110–111]), ceramic vessels of the Ust'-Belaya culture are characterized by either restricted or unrestricted opening or mouth; oval form; medium size; straight, hardly distinguishable, slightly out-turned or in-turned lips; and round bottom. Vessels were primarily smooth-walled or were decorated during manufacture by beating by a paddle with a ribbed surface. Where present, decoration was carried out over the whole bodies of vessels (Fig. 4).

Kolyma River Region

The first archaeological data from the Kolyma were obtained by A. P. Okladnikov (1955) in 1946. In 1971 Dikov (1977 [2003]) discovered and examined the sites of Siberdik, Kongo, and Maltan, in the upper layers of which Neolithic materials with scattered fragments of ceramics were discovered (Dikov 1977:215, 223 [2003:209]). Then, on the upper course of the Kolyma an archaeological expedition from the City Center of Tourism (led by S. B. Slobodin) “discovered several sites, which expanded ideas about the Neolithic of the upper Kolyma” (Slobodin 1988:152). But as before, the ceramics here were rare. Restoring the form or the size of containers from the few fragments is difficult, but data on the production of these ceramics and their possible origin are accessible through special methods of investigation. Thus, we studied ceramics from several sites of the upper course of the Kolyma River — Khetagchan, Zapyataya, and Agrobaza IV (Fig. 5).

The Khetagchan site is located in the valley of the Khetagchan River (a right-bank tributary of the Sugoi River) in the Omsukchan Region of the Magadan District. Material from the site is dated to the Late Neolithic, at the end of the second millennium BC (Slobodin 2001:114). The collection of ceramics consists of 14 isolated fragments “with an undecipherable, smoothed-over constructional stamp in the form of impressed squares on the surface” (Kushnir 1996:152; see also Slobodin 2001:102). Among the ceramic traits from the Khetagchan site we recorded organic temper in the paste, rounded vessel form, and construction decoration in the form of rectangles — the result of modeling the vessels on a base or foundation by tapping with a paddle having a network of grooves intersecting to form rectangles [check-stamped - eds.]. Firing was in an open fire with a temperature of 500–600° C. A thin layer of soot can be seen on the outer surface of the sherds.

The Agrobaza IV site is located on the right bank of the Kolyma River opposite the mouth of the Tenke River. Material from the site was dated by Slobodin (1995:15; 2001:130) to the fourth and third millennia BC. The small collection of ceramics consists of 40 specimens with vertical cord marks and dentate impressions.

Observations regarding the ceramics from the Agrobaza IV site are: paste with organic temper of conifer needles and possibly deer hair, and construction decoration from use of a cord-wrapped

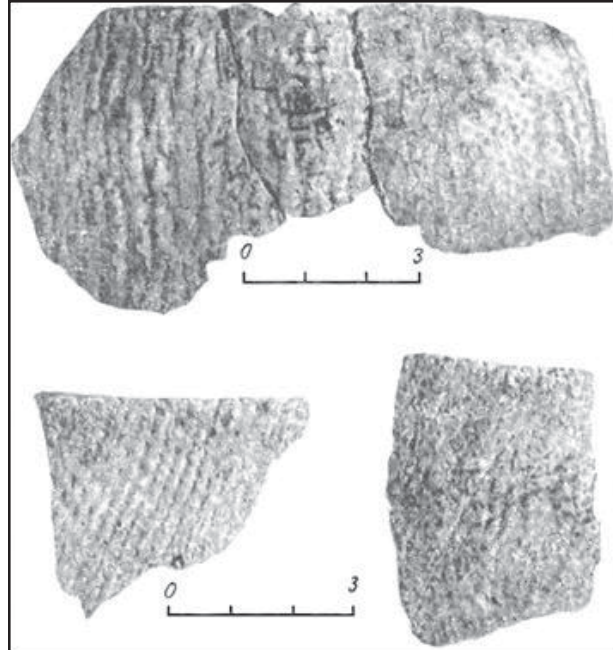


Figure 4. Pottery of the Ust'Belaia culture (after Dikov 1979); scale in centimeters.

paddle. Firing was in a low-temperature open fire. Vessels probably had closed or restricted mouths, the walls and bottom were rounded, and the rims were applied as a separate step. The decoration was the result of paddling during modeling.

The Zapyataya site is located on a point of land on the right bank of the Zapyataya River — a right-bank tributary of the Kolyma (Yagodnin Region of the Magadan District). The material was dated by Slobodin (2001:136) to the second millennium BC, or the Late Neolithic. Here a total of four fragments 0.4 to 0.5 cm thick were found, probably from one vessel (Slobodin 2001:136). The meaningful features of the ceramics from the Zapyataya site are added organic and inorganic tempers (conifer needles as the organic and small pebbles as the inorganic), the modeling of vessels on a base or foundation, ornamentation resulting from modeling with a paddle grooved in rectangles, and low-temperature open firing.

On the whole, it can be seen that ceramics appear in the northern Russian Far East during the Neolithic. Late Paleolithic sites with early ceramics, as occur in more southern regions — Primor'ye and Priamur'ye — are thus far unknown. Ceramics during this period of the Neolithic are still few and are characterized by relatively archaic traditions (organic temper, modeling on a base or foundation, and simple or “undeveloped” shapes).

Pottery in the Paleometal Period

At the beginning of our era iron penetrated into the north of the Russian Far East in insignificant amounts, while tools of stone, bone, and wood predominated. In the view of researchers, the Neolithic now had a remnant character and entered into its last phase with a very long period of development, which continued to the arrival of the Russians in the seventeenth century. During the course of time several ethnocultural

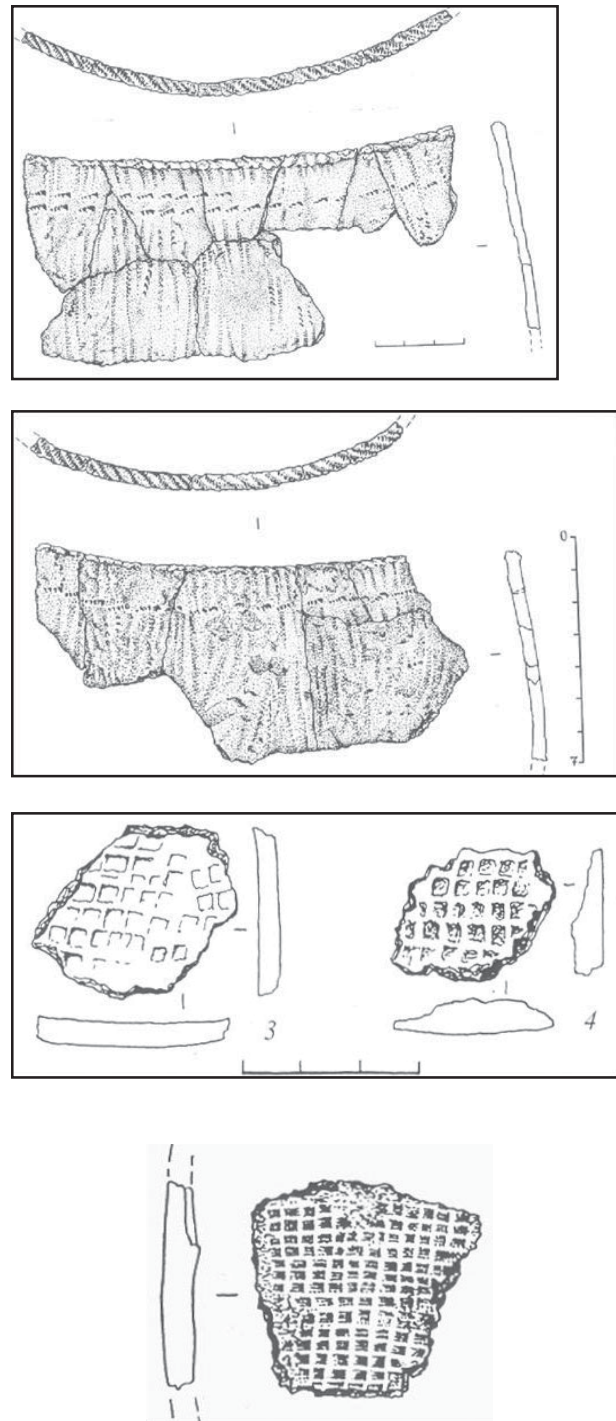


Figure 5. Neolithic ceramics of the Kolyma River basin (after Slobodin 2001); scale in centimeters.

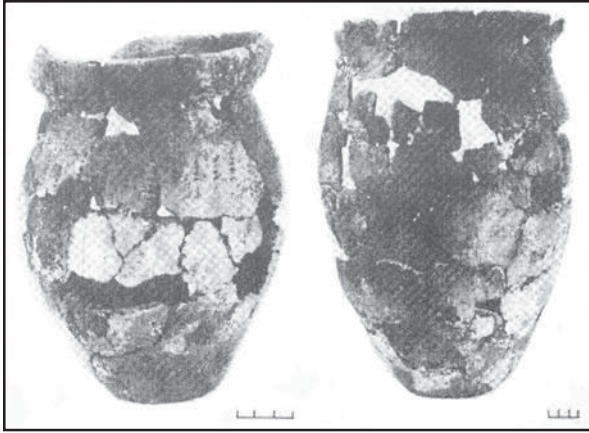


Figure 6. Paleometal-period pottery of the Tokareva culture (after Lebedintsev 1990); scale in centimeters.

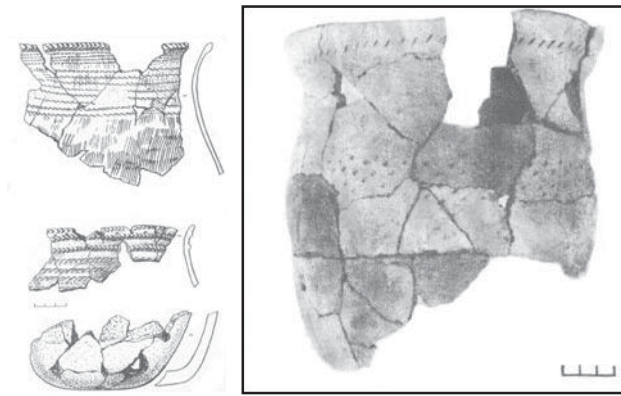


Figure 7. Paleometal-period pottery from the Kukhtui 7 site (after Lebedintsev 1990); scale in centimeters.

communities would be formed: On the coast of Chukotka at this time we find the culture of the ancestors of the Eskimos and Coastal Chukchi. In the interior regions of Chukotka, in the valleys of the Anadyr, Main, and Kolyma rivers, is the Old Yukagir culture. On the northern coast of the Sea of Okhotsk and the Bering Sea coast of northern Kamchatka was the Old Koryak culture; in the valley of the Kamchatka River was the Old Itel'men culture; and on the southern Kamchatka Peninsula was the South Kamchatkan variant of the Itel'men culture, which underwent Ainu influence (Dikov 1979:169 [2004:135]). For the Tokareva culture of the Okhotsk coast, its last stage approached; in Lebedintsev's (1990 [2000]; 1999) opinion, this latest stage, at the end of the first millennium BC, pertains to the Paleometal period.

Tokareva Culture and Its Neighbors

In this stage (Spafar'evo site, dated 2060 ± 100 BP [MAG-997]), ceramic vessel forms became complex, an occurrence connected to the change in technology, probably as a result of cultural influences (Fig. 6). Characteristic of pottery making at this stage is a more progressive scheme for forming the paste, in which fine-grained mineral temper is now found, as well as the coiling method of modeling vessels, the working of the surface of the artifacts by slipping, and an increase in the size of containers. Imported raw materials are used (Spafar'evo site).

Immediately south of the Tokareva culture area along the north coast of the Okhotsk Sea, flat-bottomed vessels with a distinct neck and a round cross section in the horizontal plane, similar to pots of the Tokarava late stage, were found at the sites of Kukhtui VII (2350 ± 200 [MAG-699] and 1550 ± 100 [MAG-703]) (Fig. 7) and Kukhtui VIII (1900 ± 100 [MAG-700] and 1440 ± 100 [MAG-701]) (Fig. 8). A vessel similar in form was also found at the Uika site (of the first half of the first millennium AD), and in the same place was a small jar-like vessel with a flat bottom (Fig. 9). The technique used at these sites of modeling vessels by coiling is similar to that indicated at the Tokareva site of Spafar'eva. The variety of techniques in ceramic decoration in the way of application (by stamping, rouletting, applique), of motifs (vertical zigzag), and of design elements (straight and wavy lines, circles, and others) of this Okhotsk coastal cultural sites are similar to those in the Tokareva culture.

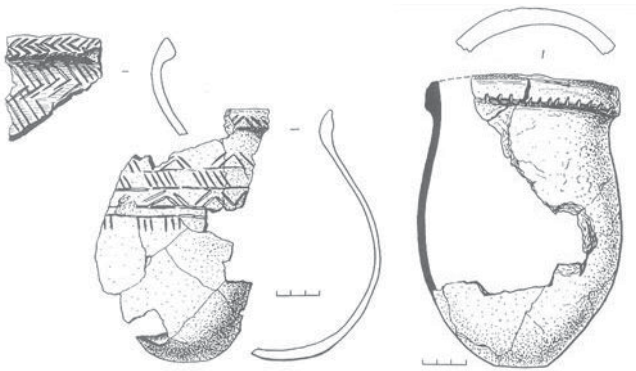


Figure 8. Paleometal-period pottery from the Kukhtui 8 site (after Lebedintsev 1990); scale in centimeters.

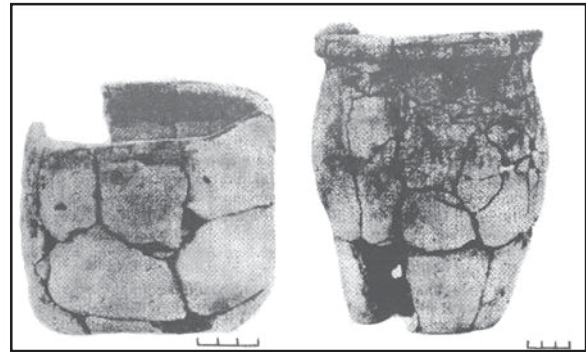


Figure 9. Paleometal-period pottery from the Uika site (after Lebedintsev 1990); scale in centimeters.

Old Eskimo Culture

The Old Eskimo culture is that of people involved in maritime hunting. According to Dikov (1979 [2004]), in Chukotka this culture exhibited several phases in its development, phases known as Okvik, Old Bering Sea, Birnirk, and Punuk. These were not recurrent stages common to all Old Eskimo culture of Chukotka, but rather were local variants, partially sequential but also partially coexistent.

The Okvik culture in Chukotka developed from the end of the first millennium BC to the middle of the first millennium AD, its distribution limited to the coast of Bering Strait from Uelen to Chaplino, with some features in Nunligran. The ceramics of this culture have what Dikov refers to as small pseudo-textile impressions.

Again according to Dikov (1979 [2004]), the Old Bering Sea culture emerged after Okvik and then coexisted with it for a long time, its period the first half of the first millennium AD; chronologically a connection can be traced with the early Iron Age of more western and southern territories of north and east Asia. The extreme western sites are on Shalaurov Island and at the Pegtymel' petroglyphs. S. I. Rudenko first found sites of this culture near Cape Dezhneva, at Yandogai, the Sirenikis, Enmylen, on Cape Chukotskii and other places (Dikov 1979:183 [2004:146]). Clay vessels were decorated by a furrowed design of straight lines or curvilinear concentric marks (Dikov 1979:190 [2004:151]). These were deep bowls or cups with a nearly conical bottom.

The Birnirk culture existed from the fifth to ninth centuries AD on the northern coast and in some places on the eastern coast of Chukotka (Dikov 1979:215 [2004:170]), its sites found on Chetyrekhstolbovyi Island, Cape Baranov, at Chegitun, and other places. Judging by ceramic stamps found, the vessels were ornamented by a "rich decoration of concentric circles" (Dikov 1979:217 [2004:172]). This culture coexisted in northern Chukotka and Alaska with the late Old Bering Sea and early Punuk cultures.

The Punuk and Thule are Old Eskimo cultures of the eastern and southeastern coast of Chukotka. It is known that the Old Bering Sea culture evolved directly into Punuk in the sixth to eighth centuries. By the ninth century Punuk had finally forced out Birnirk and remained to the beginning of the sixteenth century. Sites of this culture are known at Uelen, on Cape Dezhneva, at Naukan, on Cape Chaplino, at Yandogai, Avan', in Plover Bay, at the Sirenikis, Nunligran, Enmylen (Rudenko 1947 [1972]), Sed'moi Prichal, Chegitun, Vankarem, and other places (Dikov 1979 [2004]). At this time (during the eighth to twelfth centuries) a warming occurred in the waters of the Arctic Ocean and along its shores. The average temperature rose by 2 degrees centigrade in winter; in summer the ice in the polar basin melted (Dikov 1979 [2004]). The number of sites grew, the population increased — and along with it came greater economic complexity. Pottery vessels became more numerous, differing by the large variety of materials of which they were made and by their functions. Pots were predominantly smooth-walled, and lugs for suspending vessels over the fire appeared (Dikov 1979:220 [2004:174]). These vessels continued to the seventeenth and eighteenth centuries, when the northern territories came under the authority of the Russian state (Gurvich 1966).

The passing of N. N. Dikov, the noted researcher into the earliest history of northern peoples, has served to increase the difficulty of working with the collections of ceramics from the early stages of Old Eskimo cultures. Today the earliest part of the history of the Eskimos of Chukotka is probed by Moscow archaeologists, conducting excavations at Cape Dezhneva. On the other hand the Eskimo collections of Rudenko, M. G. Levin, and others are preserved in St. Petersburg in the Peter the Great Museum of Anthropology and Ethnography (MAE), but they represent only the late stages of Old Eskimo culture, Punuk and Thule.

Data on the technical and technological peculiarities of pottery making in early Old Eskimo cultures were obtained through special methods of investigation applied to ceramics from Cape Dezhneva (Gusev and Zhushchikhovskaya 1998:56-59). Our own studies of the Old Eskimo ceramics from the Chukchi Peninsula that are preserved in Rudenko's and Levin's collections allow us to understand the production of Eskimo vessels in the later period.

Eskimo vessels of this late period were made from very sandy clay without added temper or with tempers of mineral origin, formed on a base or by the method of joining the walls from different slabs of clay. The walls of the vessels were smoothed or coated with a water-clay solution or slip. The temperature of the open firing was no more than 500–600° C. The vessels are from 13 to 20 cm high with a mouth from 15 to 30 cm in diameter. These were squat vessels with flattened or rounded bottom, with lugs applied to the outside for suspension over the fire (Fig. 10). Through the lugs were probably passed sinews, and to the sinews in turn were fastened special handles of bone, walrus tusk, or baleen. Decoration of vessel walls is virtually absent. A dense layer of soot is noted on both the inner and outer walls of all pots.

Late-period Eskimo oil lamps are of special interest, made of both stone and clay. Clay lamps are flat oval dishes with high walls and partitions on the inside. Stone lamps are large, more rounded, but also with a deepened inner cavity for the oil and inner partitions for attaching a wick (Fig. 11).

In addition, the archaeological and ethnographic collections of the Old Eskimo culture attest to a rather well-developed economic life. Besides stone and ceramic vessels, plaited vessels were also widely used, as well as vessels of baleen, wood, bone, and sea mammal tusks. For storing food the

early Eskimos used animal skins and internal organs. Also widespread were cooking implements such as small bone spoons, small cups for removing fat from the intestines, hooks for suspending vessels above the fire, scoops, and so on (repository of the MAE; Rudenko 1947 [1972]).

Lakhtina Culture

An important place among the cultures of the North Pacific Ocean is occupied by that called Lakhtina, described by A. A. Orekhov (1987 [1999]). He suggests that in the second millennium BC the early inhabitants of the continental part of Chukotka, moving along river channels, came down to the coast of the Bering Sea and began to settle intensively. As a result, on the northwestern Bering Sea a very distinctive, independent maritime culture was formed, which became the foundation of an independent group, the Kerek. The Lakhtina culture, that is, is interpreted as Old Kerek (Orekhov 1988:39).

Distribution is on the coast of the northwestern Bering Sea from the Anadyr Estuary in the north to Cape Olyutorskii in the south (Orekhov 1986:113), with type sites at Lakhtina, Oryanda, and Opukha Lagoons and at Geka Land (Orekhov 1987:10 [1999:9]). The characteristic features are an economy based on well-developed sea mammal hunting without the use of the harpoon, the presence of long-term multi-chambered dwellings, the widespread use of walrus tusk and bone for making tools, and unifacially (70%) and bifacially worked stone tools on flakes and spalls with modified working edges (Orekhov 1986:113). In its development the Lakhtina culture passed through two stages. The first (second millennium to the middle of the first millennium BC) is characterized by the absence of ceramics. Pottery appears only in the second stage (middle of the first millennium BC to the eighteenth century AD) (Orekhov 1987:138 [1999:167]).

Clay vessels of the Lakhtina culture are characterized by the use of local raw materials and by the particular manufacturing sequence: using clay with added but unworked mineral temper, slipping the surface of vessels, forming vessels on a semi-rigid base and from one piece of clay with the subsequent joining of portions, burning in an open fire with temperature from 500 to 850° C. Vessels had a restricted mouth, rounded bottom and walls, and oval cross section in the horizontal plane. At the Geka 1 site vessels included those with

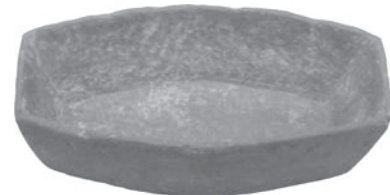
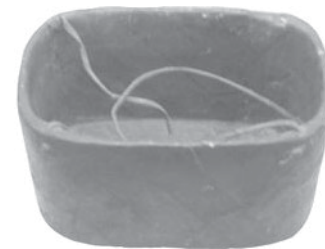
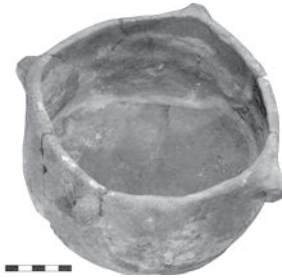


Figure 10. Late-period pottery of the Old Eskimo culture (from MAE repository); scale in centimeters.



Figure 11. Late-period Eskimo clay lamp (from MAE repository); scale in centimeters.

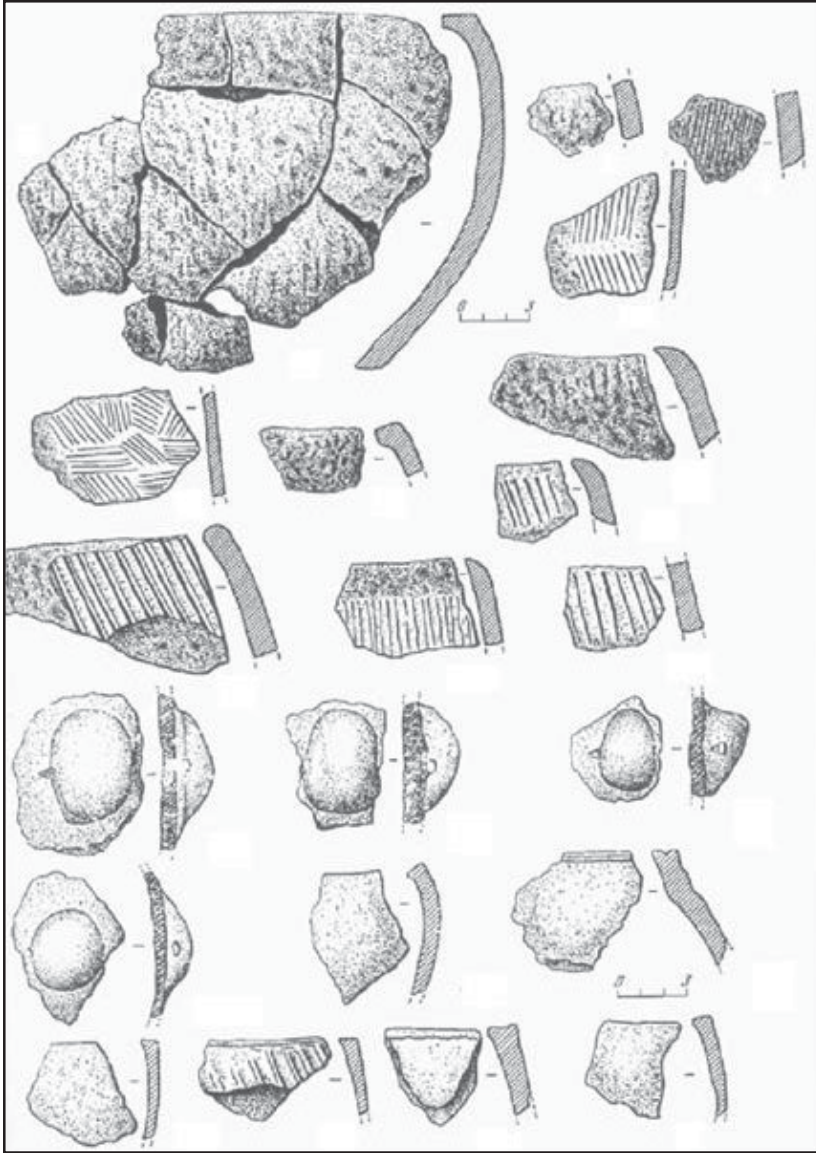


Figure 12. *Ceramics of the Lakhtina culture (after Orekhov 1987); scale in centimeters.*

base, they were coated with a slip, and fired at a relatively low temperature to 500° C. Pots were of medium size with open mouth, flattened bottom, slightly rounded rim, and externally applied lugs. In the complex are low dishes for serving food, small vessels, and lamps. Decoration is in relief, with geometric motifs, concentric rim-bordering composition executed by rectangular-dentate stamp. On some pieces decoration is executed by cord rolling. All vessels have a dense layer of soot.

restricted mouth, rounded bottom, and external, applied lugs as well as dishes (Fig. 12). Decoration as a byproduct of the forming process is absent, with relief decoration added purposefully by cord rolling, stamping, and comb dragging. Motifs are geometric, including straight and sloping lines, rectangles, and on one specimen square impressions (Opukha 1 site).

Orekhov supposes that the bearers of the Lakhtina culture (Geka 1 site) had broad cultural connections with the Russkaya Koshka 1 site, which is located in the center of a wave-washed, sand-gravel spit of the same name 80 km east of the city of Anadyr. Situated on a terrace 3 m high, the site consists of 13 semisubterranean houses. It was investigated by Orekhov with the participation of this author, and is dated to the second half of the seventeenth century (Orekhov 1989:29). Vessels were made of local raw materials with the addition of mineral temper of small unmodified pebbles. Formed on a semi-rigid

Late Cultures of the Chukotkan Interior

In the mid-second millennium AD of the Paleometal period, the traditional way of fishing and hunting wild reindeer was preserved in some interior regions of Chukotka. In the nineteenth and beginning of the twentieth centuries the descendants of the early tundra tribes — the Yukagir — still lived there. The characteristics of this Chukotka population at this time were presented by Dikov

(1979 [2004]), who found their sites — those of Vakernaya, lower Ust'-Belaya, left-bank Ust'-Mainskaya, and Chikaevskaya — in the valleys of the Anadyr and Main rivers. The type sites for distinguishing the Vakareva (Anadyr-Main) culture are the un-mixed Vakernaya and lower Ust'-Belaya sites. The stone assemblage of the culture is represented by ground axes, “splitting” adzes, retouched and ground knives, leaf-shaped arrow points, and skreblos. Artifacts of bone — adzes, mattocks, knives for cutting up fish, and needles for stringing fish — are typical of the Yukagir. The ceramic collection from the Vakareva culture numbers about a thousand fragments and one partially restored vessel.

The ceramic vessels of the Vakareva culture are characterized by a variety of pastes (clay without artificial temper, with added organic temper, or with added inorganic temper). The mineral temper was crushed quartz-feldspar, the organics chopped grass. Vessels were formed on a base with the use of paddles. Surface modification was by smoothing, and by coating with a slip. The temperature at firing vessels did not exceed 500 or 550° C.

Among the vessels were those with restricted mouth, rounded base, round cross section in the horizontal plane, and spherical walls. The decoration — both purposefully applied and as a byproduct of modeling — was in relief (stamping and cord rolling). The former, or artistic, decoration was arranged in the upper zone of the body, that from forming was over the whole body except the rim and base. On the base the forming impressions were probably wiped out, blurred during the process of modeling the artifact; otherwise, these included impressions of ribbed paddles and paddles with square and rectangular lands between networks of intersecting grooves (Fig. 13).

Krasneno

One of the sites of eastern continental Chukotka is the Krasneno site, examined by Orekhov. Located on the first flood-plain terrace of Lake Krasnoe, 85 km from the mouth of the Anadyr River and 4 km from Krasneno village, materials are dated to 780 ± 20 BP (MAG-1523). A partially preserved, medium-sized vessel was discovered here. Study shows that it was made of local clay with added mineral tempers by being squeezed from one piece of clay and the walls gradually joined. The form is characterized by an open mouth, flat bottom, cross section that is round in the horizontal plane, with absence of a neck and decoration. The surface of the vessel was worked by smoothing and slipping. Firing was in an open hearth with a low temperature (to 500° C).

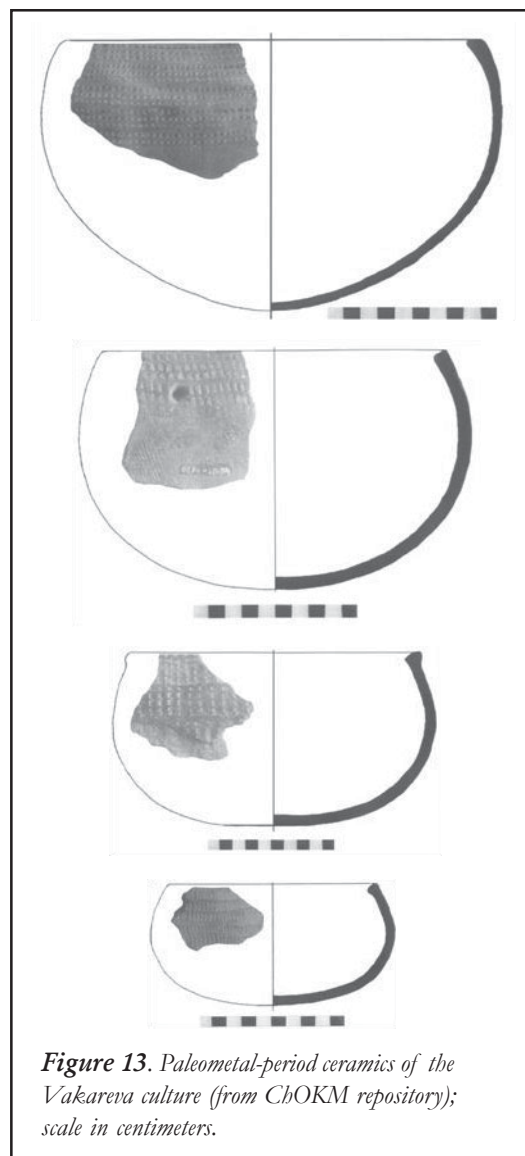


Figure 13. Paleometal-period ceramics of the Vakareva culture (from ChOKM repository); scale in centimeters.

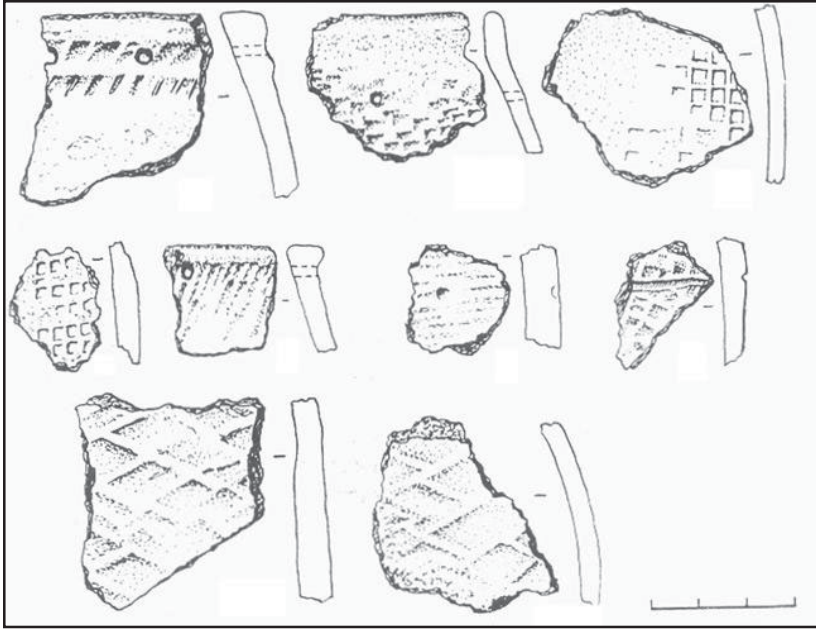


Figure 14. Potsberds from the Tytyl' V site (after Ponkratova and Kiriyak 1999); scale in centimeters.

Tytyl' V

Materials from the Tytyl' V site, which is located on the upper reaches of the Malyi Anyui River at Lake Tytyl', give an idea of the ceramics of western Chukotka. The site is confined to the very narrow neck that forms the lake's southern part and is situated on a flat morainal knoll of the 8- to 10-m terrace. A reindeer trail that is still used crosses this narrow section of the lake 30 m from the knoll containing the site. Components of both Late Neolithic and Iron Age cultures of Yakutia can be traced in the Tytyl' complex (Kiriyak 1999).

The ceramic collection consists of 1,236 sherds (Ponkratova and Kiriyak 1999). Based on the surface form of the vessels, Kiriyak distinguishes the following groups: 1) waffle or check stamp, 2) large-cell rhomboid stamp, 3) smooth-walled with decoration under the rim "in the form of stripes" of sloping grooves or two rows of nail impressions, and 4) smooth-walled or plain (Ponkratova and Kiriyak 1999). An object of our investigation was the study of specimens from all groups of ceramics.

Vessels were formed on a semi-rigid base and fired in an open fire with a low temperature (to 600° C), although individual pieces showed that the firing of some vessels achieved temperatures of 870 to 900° C. Raw materials were varied, both local and non-local in origin. The paste also varied: clay without added temper, and clay with added temper — organic, inorganic, or both together. The organics included grass and needles, and both organic and inorganic tempers were modified before being added, the latter including crushed fragments and tiny microflakes of obsidian. The use of obsidian as a mineral temper is encountered not only in the northern Russian Far East but also in adjacent regions; according to our experiments, the modeling of vessels with added obsidian is safest if a solid base is used. The vessels had both restricted and unrestricted mouths, and consistently rounded bottoms. Decorative motifs varied. The technological features (qualitative composition of raw material, paste types, decoration, and firing temperatures) allow one to speak with confidence of a mixing of cultural traditions apparent in the exotic character of the ceramics (Fig. 14).

Okhotsk Sea Coast

In the middle of the first millennium AD the Old Koryak culture developed around the northern part of the Sea of Okhotsk (Vasil'evskii 1971). The reports of Russian explorers, civil servants, and

hunters of the seventeenth century, who left the first written reports on the Koryak, form the beginning of the study of this culture (Vasil'evskii 1971:10). Materials of great ethnographic significance were collected in the seventeenth to nineteenth centuries by S. P. Krasheninnikov (1949 [1972]), K. Ditmar (1901), N. V. Slyunin (1900), V. N. Tyushov (1906), W. G. Bogoras (1991), W. I. Jochelson (1930), and Ya. Lindenau (1983). Archaeological investigation began in the 1920s and has continued to the present, with A. P. Okladnikov (1955), R. S. Vasil'evskii (1971), A. I. Lebedintsev (1990 [2000]), and A. A. Orekhov (1984, 1997) playing special roles.

Sites of the Old Koryak culture occur in a broad area from the eastern shore of the Kamchatka Peninsula to the Khmitevskii Peninsula in the west (Vasil'evskii 1971), and Dikov supposed that sites of the culture were also to be found along the coast of the Bering Sea (Dikov 1979 [2004]). The first two stages of development of the Old Koryak culture belong to the Neolithic, subsequent ones to the Paleometal period (Dikov 1979:238–239 [2004:189–190]).

The economic bases of all Old Koryak sites were the hunting of sea and land mammals and the collecting of mollusks and seaweed. Topographically, the sites were located on the sea coast in sheltered bays or on small capes, with the exception of seasonal summer sites located on lower terraces near the mouths of rivers. Semi-subterranean dwellings were rounded with square, rectangular, and oval hearths in the center constructed of vertically set slabs (Vasil'evskii 1971:131; Orekhov 1997:93–94).

Based on our research, the potters of the Old Koryak culture of the Okhotsk coast used predominantly local raw material without any kind of additives. In only one of the sites of the Old Koryak culture (Kip Kich) did we ascertain a variety of raw materials. Vessels were formed using a solid or semi-rigid base, and without the potter's wheel. Surfaces were smoothed. Pots were fired in an open fire predominantly at a medium temperature (from 650 to 700° C), although at the Alevino 1 site our analysis indicates that the temperature reached 850 to 900° C. Vessels are primarily of medium dimension with rounded bottom and unrestricted mouth, the rims often applied and turned outward (Fig. 15). Decoration is both artistic and technical. Artistic decoration is located in the rim zone and upper part of the body of vessels. Technical decoration may cover the whole body with the exception of the rim. Decoration is characterized by a concentric structure, bordering compositional types of artistic decorative motifs,

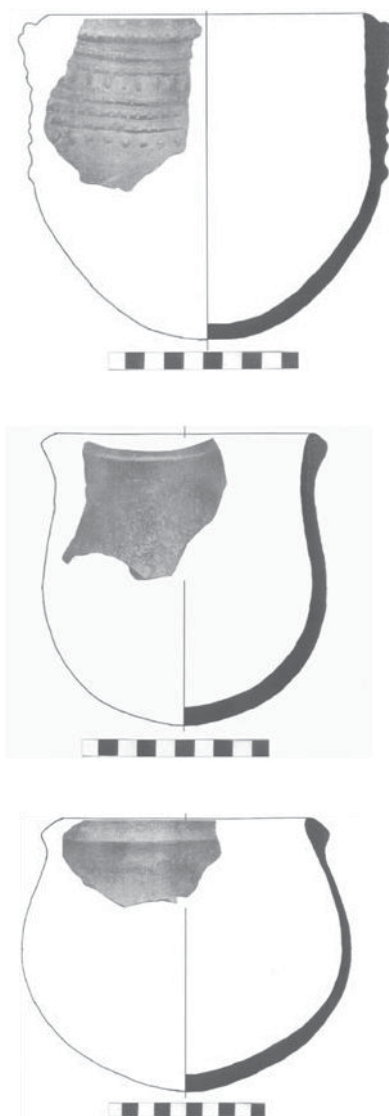


Figure 15. Paleometal-period Old Koryak ceramics from the Okhotsk coast (from SMU repository); scale in centimeters.

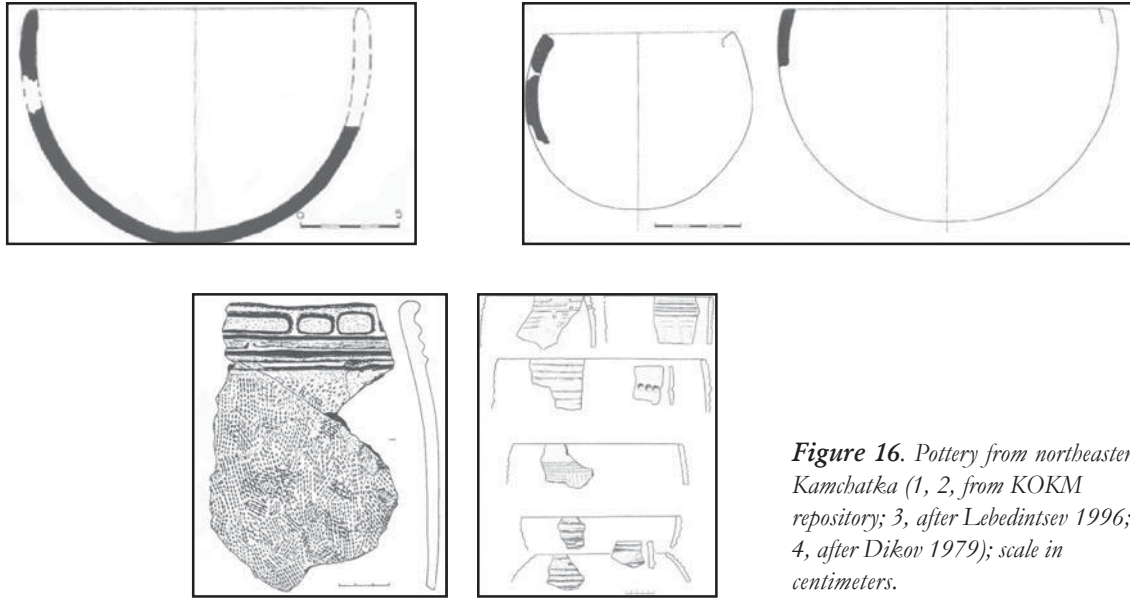


Figure 16. Pottery from northeastern Kamchatka (1, 2, from KOKM repository; 3, after Lebedintsev 1996; 4, after Dikov 1979); scale in centimeters.

net-type impressions of technical decoration, geometric style of all decorative motifs, and the technique of relief decoration, including stamping and applique and the presence in the compositions of elements in the form of applied parallel horizontal hatched and unhatched ribs. An interesting feature is decoration of vessels' rims with applied elements. Occasionally encountered are applied squares and triangles, straight punctations sloped at an angle to each other, and impressions of crosscut, parallel, and horizontal figure eights, in combination with vertical ribs.

Northern Kamchatka

As pointed out above, researchers have supposed that sites of the Old Koryak culture were present on the northeastern coast of Kamchatka. A study of collections made by A. K. Ponomarenko, in a survey of the area from Ossora village southward to the mouth of the Rusakova River, gives an idea of pottery making in northeastern Kamchatka during the Paleometal period. Ceramic technology in this region was as follows: local sources of raw materials were used, with coarsely chopped grass as the principal organic temper; vessels were modeled on a semi-rigid base without the use of the potter's wheel; surfaces were worked by smoothing and slipping; and vessels were fired in an open fire with oxidizing regime at a temperature of 600 to 650° C. Surviving forms are rounded, often spherical, with closed or restricted mouth, a rounded bottom, and without a distinct neck. Rim form is predominantly straight, slightly rounded, and beveled inward (Fig. 16).

Decoration is characterized by a concentric structure of bordering designs with geometric motifs. Technical decoration was predominantly executed by rolling cord over the whole body of the vessel, including the bottom (it is possible a fabric base was used with this); flat decoration — painting, polishing, and others — is absent. Occasionally encountered is a combination of two types of technical decoration: cord rolling and striking with a paddle having square checks (Ivashka 6 site); cord rolling of the upper surface of the rim (Ivashka 6 site); cord rolling and then application of a slip or artistic decoration with subsequent slipping (Ivashka 1, Ivashka 26, and Karaga 2 sites). In addi-

tion is the presence of a few ceramic fragments different from the general mass and having analogies in Old Eskimo cultures (Ivashka 20, Ivashka 26 sites).

Comparison of ceramics from northeastern Kamchatka with those of the surrounding regions indicates that the technology of a paste with organic temper has parallels in southern cultures and sites in the earliest stages of pottery making (Priamur'e 13,000 to 10,000 years ago, Sakhalin fifth and fourth millennia BC) and rather late cultures in the northern portion of the Russian Far East (Vakareva culture in the eighth to tenth centuries AD, Tytyl' V in the Late Neolithic, and the Old Eskimo cultures). Basically, pottery-making traditions in northeastern Kamchatka are similar to those of the late cultures of the Chukchi Peninsula. It is interesting that the ceramics of the sites studied differ in most features from the ceramics of the Old Koryak culture of the Okhotsk coast. In the second half of the first millennium AD the northern part of the Kamchatka Peninsula was a region of wide ethnic contacts with different tribes, and by the middle of the second millennium AD this situation had spread into all of northeastern Kamchatka (Ogryzko 1973:34; Ponomarenko 2000:6), the ceramics of which we studied. In our opinion, therefore, the question of the origin and major cultural affiliations of northern Kamchatkan ceramics remains without answer thus far.

On the northwestern coast of Kamchatka, as a result of recently conducted archaeological investigations, sherds and a whole vessel were discovered (Fig. 17) that provide an expansion of ideas about the ceramics of the Kamchatka Peninsula, which the excavators suggest should be assigned to the eighth to eleventh centuries (Chernai and Krenke 2002; Krenke 2002). And this period, in which there were fortified settlements with large dwellings, is significant in the history of Kamchatka (Krenke 2002:94). The whole vessel (Fig. 17), from the Kovran X site, has a rounded but asymmetrical bottom and open mouth. The vessel surface is covered with textile impressions resulting, according to the researchers, from use of a fabric base (Chernai and Krenke 2002). It is possible that the vessel is close in attributes to the ceramics of northeastern Kamchatka; the researchers refrain from designating a cultural affiliation but consider any identification as Koryak or Old Koryak "incorrect" (Krenke 2002:94).

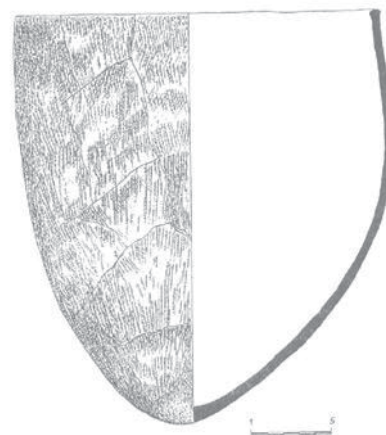


Figure 17. Paleometal-period ceramics from northeastern Kamchatka (after Krenke 2002); scale in centimeters.

Southward in Kamchatka

In the central and southern sections of the Kamchatka Peninsula, the Old Itel'men culture developed by the seventeenth century AD. In it can be distinguished local variants designated Middle Kamchatkan and South Kamchatkan (Dikov 1979:277 [2004:222]).

Middle Kamchatkan culture is characterized by the absence of ceramic artifacts, and there is no evidence in ethnographic sources for the presence or production of ceramics among the tribes who lived in the Kamchatka River valley (Krasheninnikov 1949 [1972]; Steller 1999). Middle Kamchatkan vessels, rather, consisted of troughs and cups of wood, and baskets of birch bark, and meat and fish

were cooked in such vessels by stone boiling (Krasheninnikov 1949:378–380 [1972:226–228]). This has been confirmed archaeologically (Ponomarenko 2000).

The Paleometal period saw the development of the South Kamchatkan or Nalychev variant of the Old Itel'men culture. It is here in the south that fragments of very distinctive clay vessels with so-called interior lugs are found, making it possible to distinguish the local variant of the culture (Dikov 1979 [2004]; Dikova 1983). T. M. Dikova considers Neizdi-type ceramic vessels to be one of the datable traits of the archaeological complexes of southern Kamchatka (Dikova 1983:48), the upper boundary of which has been assigned to the seventeenth century. This appearance of vessels with interior lugs is thought the result of borrowing from the Ainu of the neighboring islands farther south. Dikov suggests that it was not difficult to introduce Ainu ceramic production to the Itel'men of southern Kamchatka since, judging by the archaeological materials, a tradition of making clay vessels had been absent among them up to that time. Thus, useful Ainu vessels became rather quickly distributed very far north along the peninsula, beyond Avacha Bay, where, according to historical information, the Avacha Itel'men still lived in the seventeenth century (Dikov 1979:276 [2004:221]).

Based on Dikova's (1983) data, we thus distinguish the morphological and decorative features of the ceramic vessels of the South Kamchatkan culture: vessels were large and medium in size, and primarily had unrestricted mouths, flat bases, and interior lugs for suspension (the number of lugs varied from three to four per vessel). These vessels look broad and squat. Pots with restricted mouths and rounded walls and bottoms are encountered more rarely. There is no decoration on round-bottom vessels. On vessels with flat bottoms there are broad, two- or three-barbed or semicircular tongues applied over each lug.

All in all, we see that the Paleometal period was a time of relatively widespread use of ceramic vessels in daily life. The number of vessels produced in the coastal settlements increased substantially, becoming more varied in technological aspects, in form, and in evident function. Nature and climatic conditions, increase in population, and cultural borrowing played a large role in this. But, having reached in time a certain relative efflorescence, northern pottery making vanished very quickly in the concluding stage of the Paleometal period.

THE FUNCTIONS OF POTTERY

Having determined the place of ceramic vessels in the economy of the early population of the northern Russian Far East, it is possible to distinguish two categories of use: utilitarian (kitchen, storage, dining, and technical), and non-utilitarian (ritual). This division is tentative, since some vessels transitioned from the "utilitarian" to the "non-utilitarian" category.

The storage and dining functions of pots are poorly represented. It is known ethnographically that for preservation of water and other liquids bladders of seals and walruses, whale intestines, and wooden troughs and buckets were used (Bogoras 1991:121, 125 [1909:188, 191]). Recent Eskimos have made special containers of baleen for water (Rudenko 1947:93–94 [1972:148–149]; repository of the MAE) and vessels of wood for the preservation of prepared meat (Bogoras 1991:122 [1909:189]; repository of the MAE). A significant place in the daily life of the Koryak of the Okhotsk coast and the Eskimos of Chukotka was taken by artifacts woven from nettles, grass, and baleen, and the remains of such artifacts have been found in Old Koryak and Eskimo houses (Lindenau 1983:109;

Vasil'evskii 1971:113; repository of the MAE). Coastal residents made bags of whole seal skins, with the natural openings sewn up. The Reindeer Chukchi used old deer skins to make bags of oblong form with a cut in the middle (Bogoras 1991:125 [1909:192]).

No ethnographic information on the use of ceramic containers for preserving food and water has been found, although a pot for preserving food was recorded during archaeological investigations in a site at the mouth of the Ossorka River in northeastern Kamchatka (repository of the Northeast Interdisciplinary Scientific Research Institute).

Ceramic vessels for dining have very rarely been found in the region, represented only by dishes and miniature vessels in the archaeological complexes of the Bering Sea coast and continental Chukotka. According to ethnographic data, dishes, trays, cups, and scoops of wood were most often used for the purpose. Wooden vessels were also used for preparing food with the aid of hot stones (Bogoras 1991:121 [1909:188]; Krasheninnikov 1949:378-380 [1972:226-228]; Lindenau 1983:109).

Ceramic vessels were predominantly used for cooking over the fire, as is evidenced by soot on interior and exterior surfaces. The heavy traces of soot on most pots in the archaeological collections of the Okhotsk and Bering Sea coasts sharply distinguish the ceramics of the coasts from those of continental sites, as well as from ceramics of Primor'e and Priamur'e, but have analogies in the Okhotsk culture of Sakhalin (Zhushchikhovskaya 1996). It is possible that pottery was used especially for preparing fatty meat foods (whale, walrus, seal, bearded seal, and so on), supporting the idea of a similar orientation toward sea mammal hunting among the populations of the two coasts. Potsherds from continental sites are covered by a thinner layer of soot indicating the preparation of less oily food. Thus, although vessels from continental sites and coastal sites probably had similar functions, the food prepared was different, which is also confirmed in ethnographic sources (Bogoras 1991 [1909]; Gurvich 1983:109; Lindenau 1983).

Ritual use of vessels is indicated by ceramic fragments, and sometimes whole vessels, found in cemeteries at Ust'-Belaya (Dikov 1977:137 [2003:126]; 1979:142 [2004:113]), in sites such as the first and third Enmyntynyn, the second Chigitun, Seshan Old Eskimo (Dikov 1977:168, 172, 184, 187 [2003:158, 162, 174, 176]), Chinii (Dikov 1974:91-93 [2002:87-89]), and on Cape Trekh Brat'ev (Belyaeva 1967:83). Vessels were most often situated "at the head" of burials (Dikov 1977:168, 187, [2003:158, 176]), "in the northwestern and southeastern corners of the grave" (Dikov 1977:172 [2003:162]), and "near the eastern corner" (Dikov 1977:184 [2003:174]).

In the Chinii cemetery, clay vessel remains were found in burials irrespective of their arrangement and orientation and either with ocher or without it (Dikov 1974:103 [2002:98-99]). Furthermore, traces of soot on the outer surface of potsherds (Dikov 1974:93 [2002:87]) suggest long use of the vessels in daily life. Otherwise, sherds without soot suggest that some pots were made especially for ritual purposes. It is possible that sometimes such vessels were not fired, since it is noted that "upon contact with the air" they crumble (Dikov 1974:14 [2002:12]; 1977:168 [2003:158]).

According to Dikov, clay vessels along with other "typically women's artifacts [such] as slate knives without holes, scrapers for working skins, mattocks" are associated with female burials (Dikov 1974:104 [2002:99]), and possibly also children's interments (Dikov 1977:187 [2003:176]). He suggests that the presence of pottery in burials is connected with keeping food for the spirit of the deceased.

The instrumental category of ceramics is represented by lamps, which served both for lighting and heating of houses, and sometimes for cooking (Bogoras 1991[1909]; Dzeniskevich 1976:94). The use of oil lamps of stone, as well as of wood, is also known (Dikov 1977 [2003]; Dikova 1983; Orekhov 1987 [1999]; repository of MAE).

Thus, recognition of the place of ceramic vessels in daily life and the economy of the early population of the northern Russian Far East, leads to understanding its limited functional role, which probably came about for several reasons:

First, the severity of the climate made survival under extreme conditions the chief task of the population. The chief occupations of the inhabitants of the region were land and sea hunting, and the processing of the resulting products necessitated some special containers such as clay pots. But the limited possibility of producing ceramics in a region of high precipitation and summer humidity, and the short season for manufacture, demanded that this industry be expedient. Ceramic vessels were thus prepared only for the most necessary functions — food preparation over the fire and, in later times, lighting and heating houses.

The small quantity, absence of variety, and low quality of raw materials also tended to limit possibilities for producing ceramic vessels.

Another possible reason for the restricted functional range of vessels was the comparatively small variety of forms, which in turn was promoted by tradition. As research has shown, in this region pots were predominantly modeled on a base or partial mold. This is the simplest means of forming the clay and does not require substantial time, but it also is a method that does not contribute to morphological variety (Zhushchikhovskaya 1998).

HISTORICAL EVENTS

The seventeenth-century addition of the northern territories to the Russian state might conceivably have entailed changes that would permit “the population to overcome the Remnant Neolithic heritage” (Gurvich 1966:62). However, it is known that the new Russian rulers had almost no contact with the bulk of the Chukchi and Eskimo people on the Chukchi Peninsula, with primary attention of civil servants and Russian hunters attracted to the more southerly regions occupied by the Koryak (although there is also little information about them, for even in the second half of the seventeenth century Russian contacts with Chukchi, Koryak, and Eskimos were rare (Gurvich 1966:47, 50). On the other hand, according to ethnography the “Yukagir had metal utensils — copper and iron kettles and frying pans — in the middle of the seventeenth century, probably traded from the Russians” (Gurvich 1957). Iron kettles were of great value; for example, during hostile clashes between the Koryak and the Even at the end of the eighteenth century, metal kettles were objects desired on a level with axes, spears, and bows (Gurvich 1966:81).

In the eighteenth century a chain of isolated Russian Old Dweller settlements was formed in the north from the Lena River to Kamchatka, and from this time Russians lived continuously in the north. Having taken up the economy and methods of hunting of the native population, this group exerted the strongest influence on the Yakut, Even, Yukagir, Itel'men, Chukchi, and Koryak (Gurvich

1966:132). Widespread marriage between Russians and the local population (Gurvich 1966:82) contributed to changes in the economy and everyday life, including the nature of containers.

From the middle of the eighteenth century, after the cessation of hostile clashes, substantial changes did occur in the economy of the northern native peoples as they obtained iron tools, copper kettles, and fabrics (Gurvich 1966:64). In the second half of the century especially, in connection with lively movement along the Okhotsk route, Russian wares — fabrics, clothing, and containers — began to penetrate throughout the north (Gurvich 1966:83). “Copper in kettles,” along with beads, knives, and so on, were brought by civil servants and boyars.

In the eighteenth century Kamchatka was included in the Russian state. The primary population was Kamchadal and Itel'men, but by 1730 a stratum of permanent Russian population formed. The local authority prohibited the construction of earthen yurts, and mixed marriages were widespread. Thus, by the end of the century the Kamchadal way of life approached that of the Russian peasant and the Cossack (Gurvich 1966:63, 94, 130, 102).

It is well known that at the beginning of the eighteenth century the route to Kamchatka taken by groups of civil servants passed through Koryak lands. The Russians' cruelty and crude authoritarianism quickly set the Koryak against them and brought on responses. Robbery of Cossack detachments was one means of acquiring Russian wares, which were very tempting to the Koryak (Gurvich 1966:103). Yet other groups of Koryak traded with the Russians and even protected them from the attacks of their fellow tribesmen. With the establishment of peaceful relations at the end of that century, the development of the Kamchatka Koryak and Kamchadal took the same course — everyday life became like the everyday life of the Russian Old Dwellers. Kettles, tobacco, and fabrics appeared in Kamchatka in exchange for furs, although it is well known that imported wares were very expensive in Kamchatka, and even the Russians purchased only an insignificant amount of them (Gurvich 1966:109, 131).

From 1788 a fair was held annually in the spring to the east of the Kolyma River on the bank of the Sukhoi Anyui. Although Chukchi visited the Yukagir fair on the Anadyr River, where they traded foxes for spears, knives, and kettles (Lindenau 1983), Chukotka was still of no interest to civil servants and Russian hunters, with the severe climate playing a definite role (Gurvich 1966:114).

At the beginning of the nineteenth century the economy of the Kamchatka Koryak still had a traditional and archaic appearance, though much had been adopted from the Russians. In the first quarter of that century severe famines occurred throughout the northeast — from northwestern Yakutia to Kamchatka — brought on by a shortage of fish, the loss of wild deer, and changes in deer migration routes. Government taxes, abuse by bureaucrats, illness, and epidemics increased (Gurvich 1966:134, 188).

In 1828 foreigners were permitted duty-free exchanges, with alcohol and trinkets used to purchase furs. American and Japanese firms began carrying out substantial trade. Finally, by the end of the nineteenth century the economy of the people had been modernized; fabric clothing and a variety of utensils appeared. Domestic life changed more and more, and as the twentieth century arrived the way of life and daily concerns were practically the same as those of the Russians (Gurvich 1966:135, 159, 209).

Thus, beginning in the seventeenth century, crude and frail clay vessels were gradually forced out by durable iron and copper artifacts (Bogoras 1991:119 [1909:187]; Gurvich 1966; Semenov 1964:38; Vasil'evskii 1971).

DISCUSSION

One of the aims of research into early pottery making in the northern Russian Far East is determination of the position of the region in the regular or universal stages of the development of ceramic production, through comparisons with developments in adjacent regions and the consideration of evidence from specific archaeological cultures and sites.

The study of ceramic complexes at both maritime and continental sites shows that northern pottery making functioned by means of the usual technological cycle, which included the collection of raw material, preparation of the paste, working of vessel surface, drying, and firing. These general requirements of ceramic production obviously unite the earliest pottery making both in the northern Russian Far East and in adjacent territories (Alekseev 1996a; D'yakova 1993; Dumond 1984, 1987; Fedoseeva 1980; Glushkov 1996; Grebenshchikov 1993; Myl'nikova 1989; Zhushchikhovskaya 1996), and in the world as a whole (Arnold 1989; Bobrinskii 1978; Gorodtsov 1923; Hulthen 1977; Matson 1965; May and Tuckson 1982; Saiko 1966; Vandiver 1987; Yaanussen 1981). The maintenance of the stages of the technological cycle of ceramic production permitted potters of the northern region as elsewhere to transform a natural material — clay — into an entirely new product favorable in the economy of daily life.

It has become possible to compare pottery making in the northern Russian Far East and surrounding regions with neighbors in the Arctic zone — Yakutia in the west and the northwestern extreme of North America in the east — as well as with the area to the south, the temperate Russian Far East, including Primor'e, Priamur'e, and Sakhalin. All in all, comparisons reveal that pottery making of the north during the Neolithic and Paleometal periods was characterized by a generally low developmental level, which corresponded to certain stages in the history of production of ceramics in adjacent territories.

The level of early pottery making in the northern Russian Far East corresponded primarily to the early stages of development of ceramic production in the more southern territories of the Asian North Pacific (during periods of the late Pleistocene and beginning of the Holocene and Early Neolithic). Common features that indicate a static character include the use of natural, badly cleaned clay without special tempers or with organic temper; a primitive technical method of modeling the container with the aid of a base; the relatively undeveloped morphology of the ceramic container; the absence of such methods of working the surface of vessels as polishing and painting; and the use of low-temperature open firing.

The absence of synchronicity in the dynamics of technique and technology was the basic difference between pottery making in the territory being examined and those of more southern regions of the North Pacific. Favorable climatic conditions, an adequate raw material base, and the specifics of economic activity determined the dynamics and innovative character of pottery making in the southern Far East, where by the final Neolithic and the Paleometal period it attained a high level

(Zhushchikhovskaya 1996), and in the period of the Middle Ages it reached an entirely new and higher one (D'yakova 1984, 1993; Gel'man 1990, 1996; Nesterov 1998; Tupikina 1996).

The far north did not partake of such advances, as a brief comparison will show.

On the Okhotsk coast, the pottery-making of archaeological cultures has greatest similarity with traditions of ceramic production of the southern Far East. This is especially clear in the late stage of the Tokareva culture (Spafar'eva site) and at the Kukhtui VII, Kukhtui VIII, and Uika sites. Common features include the use of fine-grained mineral temper in paste, modeling by coiling, vessel form, and the variety of means of applying decoration with its motifs and compositions.

Most technological, morphological, and decorative traditions of continental complexes in Chukotka and the Kolyma River basin, on the other hand, can be traced in the ceramic complexes of Yakutia. Similarities are the presence in paste of both organic and inorganic temper, the modeling of vessels on a base using a paddle, the use of low-temperature firing, production of vessels with both restricted and unrestricted mouths, rounded bottoms, and round in horizontal cross-section, and with the predominance of decoration produced as a byproduct of vessel shaping.

On the Asian coast of the Bering Sea (the Old Eskimo and Lakhtina cultures) pottery making is closest to that of the farthest northwest portion of North America. Similarities include the presence of large-grained mineral and varied organic tempers in the paste, the methods of modeling vessels on a base and forming flat dishes from one piece of clay, the occasional addition of a surface slip, the vessel shape, and the character of the technical or incidental decoration.

Thus, three basic geographic regions with pottery traditions are distinguished that show similarity to early ceramic traditions in certain regions of the northern Russian Far East. These regions are the southern Russian Far East (including Primor'e, Priamur'e, and Sakhalin), Yakutia, and the Alaskan coast of far northwest North America.

When examining the degree of influence of environment and weather conditions on the development of northern pottery making, it is apparent that the natural factor was of fundamental limiting influence on the formation of ceramic traditions in the northern Russian Far East. Severe climate determined a very short working season and difficult drying conditions for ceramic production. Regional clay raw material is marked by its predominantly low quality.

Regional diversity in the raw material being used and the paste character of the ceramics was determined or influenced in significant degree by the natural factor. The specifics of the geological situation — the absence of rich supplies of easily obtained raw material that would answer the requirements of ceramic production — forced searches for variants among the available materials. Clays of the Okhotsk coast are very sandy and contain plant detritus, thus probably did not require an added temper; therefore, ceramic pastes at sites on the Okhotsk coast contained practically no artificial temper. On the Bering Sea coast the quality of the clays was different and required artificial additives. The specifics of common artificial tempers here is the large size of the mineral grains. Coarse-grained temper also protected artifacts from swelling during firing and increased the general fire resistance. The presence in the paste of a wealth of coarse-textured mineral temper can also be coupled with climate — ceramics with such temper dries much more quickly, which is extremely important under the severe conditions of the northern summer. Clay bodies of the continental

regions also contained artificial temper, but their character was different. Here organics — grass, needles, and deer hair — were widely used materials accessible under the natural conditions of northern continental regions. The use of organic temper in the paste not only quickened the drying process but decreased the firing time, and so increased the speed and effect of thermal modification in the primitive hearths of continental sites.

At both maritime and continental sites the common formation procedure was modeling vessels on a base (a mold). The advantage here is technological simplicity and economy in time, which was important in a region where climatic conditions essentially limited the duration of the working season for effective pottery making. Thus, climate and raw materials in the northern Russian Far East influenced the development of technological traditions in paste and modeling. In turn, modeling technology caused some basic peculiarities of the morphology of ceramic vessels — a small variety and simplicity of forms.

The nature of decorative traditions was also directly related to these conditions. That is, the predominance of technical or incidental variants in the decoration and the relatively poor local development of more conscious artistic design was a consequence of a generally efficient handling of the whole process of producing clay vessels as an adaptation toward conditions very unfavorable for this kind of activity in the north.

All together, the clearest feature was a striving to make the process of ceramic production maximally efficient, simple, and effective, with the least possible effort and expenditure of time. The limited role and restricted functional diversity of clay pots in daily life were also connected both to the character of the pottery making itself and to the peculiarities of the economy and daily life of the bearers of the northern cultures. Pottery chiefly satisfied only the most basic daily requirements, which included cooking hot food — so important for the functioning of the human organism in a northern climate.

The adaptive character of pottery making in the north is especially clear in comparison with traditions of ceramic production belonging to other geographic and climatic zones of the region. In the southern Russian Far East the history of early pottery making was dynamic, to which favorable natural conditions contributed in large degree. In the north, the severe natural environment and climate promoted conservatism and stability in pottery making, where over the course of centuries traditions remained unchanged. Pottery making as a kind of production activity ceased at the end of the eighteenth or beginning of the nineteenth century with the new possibility of replacing ceramic vessels with metal containers that were more durable, reliable, and effective. Also displayed in this was an overall adaptive consideration — in the severe conditions of the north, pottery making was labor intensive and “energy consuming,” so that it was of short duration.

Problems

Finally, several problems can be distinguished.

The time and place of appearance here of traditions of ceramic production remain arguable. When and from what areas was the knowledge derived? Did this occur from Yakutia or did ceramic

traditions penetrate from the south — from the Amur, Primor'e, or Sakhalin? This question is an object of continuing discussion.

The archaeological cultures and sites of the maritime parts of the region have been more widely studied than those of the continental areas. Ceramics in the continental regions are a rare find. M. A. Kiriyak proposes that it was the mobile way of life of the reindeer herders in western Chukotka during the Remnant Neolithic that dictated a more rigorous requirement toward vessels, with ceramic vessels in the continental regions of Chukotka forced out by wooden ones, and cooking being done with hot stones (Kiriyak 1993:70). Furthermore, the continental regions of the Magadan District, Chukotka, and Kamchatka are difficult of access for researchers even today.

The comparatively recent discovery of ceramics with mat impressions in the northern regions of western and eastern Kamchatka raises new questions in the study of traditions of ceramic production and cultural connections in this part of the peninsula. Researchers interested in northwestern Kamchatkan ceramics correctly note that the technology of making textile-decorated ceramics was widespread in both a significant part of Eurasia and on the North American continent (Krenke 2002:95). And we find closer analogies in the late cultures of the Chukchi Peninsula.

The problem of the origin of the Old Bering Sea culture remains unsolved (Dikov 1979 [2004]). In addition, the Old Eskimo culture is separated into several partially chronological periods, but tracing the division of these stages, and in this way possibly also the dynamics of development of the pottery-making tradition, has thus far remained unsuccessful.

Finally, the results of our investigations force us to doubt the possibility of using ceramic complexes from cultures in the northern Russian Far East as a definitive means for dating archaeological sites in this region. Rather, the virtual absence in the region of pronounced developments in production — in forming technique, in vessel form and decoration, indeed in the production process as a whole — militates against the use of ceramic complexes as reliable dating means. On the Kolyma, for instance, the comparison of ceramic complexes is widely used today for periodization of continental Neolithic sites, often without charcoal dating (Slobodin 2001) — the materials from Kolyma sites being compared with the archaeological complexes of Yakutia. Our investigations show that the ceramics of Yakutia and the continental sites of the Kolyma and Chukotka have some similarities, but using the method of analogy for dating is still problematic. The study of the dynamics in the early history of Yakutia has shown that traditions of pottery making in Yakutian cultures remained practically unchanged from the Neolithic to the Middle Ages (Alekseev 1996b:25).

Today the materials collected over many years through interdisciplinary archaeological research by leading scholars have not yet all been studied but are awaiting their hour in the repositories of laboratories and museums. Investigations focused on them can only throw additional light on northern pottery making.

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Abbreviations used:

MAE — muzei Antropologii i etnografii im. Petra Velikogo (kunstkamera, g. Sankt-Peterburg) [Peter the Great Museum of Anthropology and Ethnography].

KOKM — Kamchatskii okruzhnoi kraevedcheskii muzei, g. Petropavlovsk-Kamchatskii [Kamchatka District Regional Museum].

ChOKM — Chukotka okruzhnoi kraevedcheskii muzei, g. Anadyr [Chukotka District Regional Museum].

SMU — Severnyi mezhdunarodnyi universitet, g. Magadan [Northern International University].

SVKNII — Severo-vostochnyi kompleksnyi nauchno-issledovatel’skii institut, g. Magadan [Northeastern Interdisciplinary Science Investigative Institute].

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Chapter 8

Pottery from the Bluff at the Ekven Settlement

Agnès Gelbert Miermon

with an
introductory note by
Yvon Csonka

THE EROSION BLUFF AND TEST EXCAVATIONS

Yvon Csonka

The prehistoric settlement of Ekven (Chukotka, Russia) is situated on the coast of the Bering Sea about 18 km west of East Cape, the easternmost point of land in the Old World. This is a few hundred meters from the well-known cemetery of Ekven, which is attributed principally to the Neoeskimo people — that is, those pertaining to the “Northern Maritime” or “Thule” traditions, cultures of which the best known near Bering Strait is Old Bering Sea (in periods or design stages designated I, II, and III), but also include those called Okvik, Birnirk, and Punuk (Arutyunov and Sergeev 1975, 1983; Bronshtein and Plumet 1995; Leskov and Müller-Beck eds. 1991), as well as the later, expansive Thule culture proper.

In the settlement, the presence of house ruins is indicated by a series of mounds (Fig. 1), most of them aligned parallel to the beach along a stretch of some 250 m. One of these mounds was excavated during the seasons 1995 to 1998 by teams from Russia and several Western countries (EH-18, Fig. 1; see e.g., Dneprovsky 2002). One of the subprojects of the Ekven settlement excavations consisted of the stratigraphic and geoarchaeological study of the erosion front that transects the site, and to limited test-pit excavations (Blumer and Csonka 1998; Csonka et al. 1999; Moulin and Csonka 2002; Csonka 2003).¹

¹This project was generously funded by the Swiss National Science Foundation and by the Swiss-Liechtenstein Foundation for Archaeological Research Abroad.

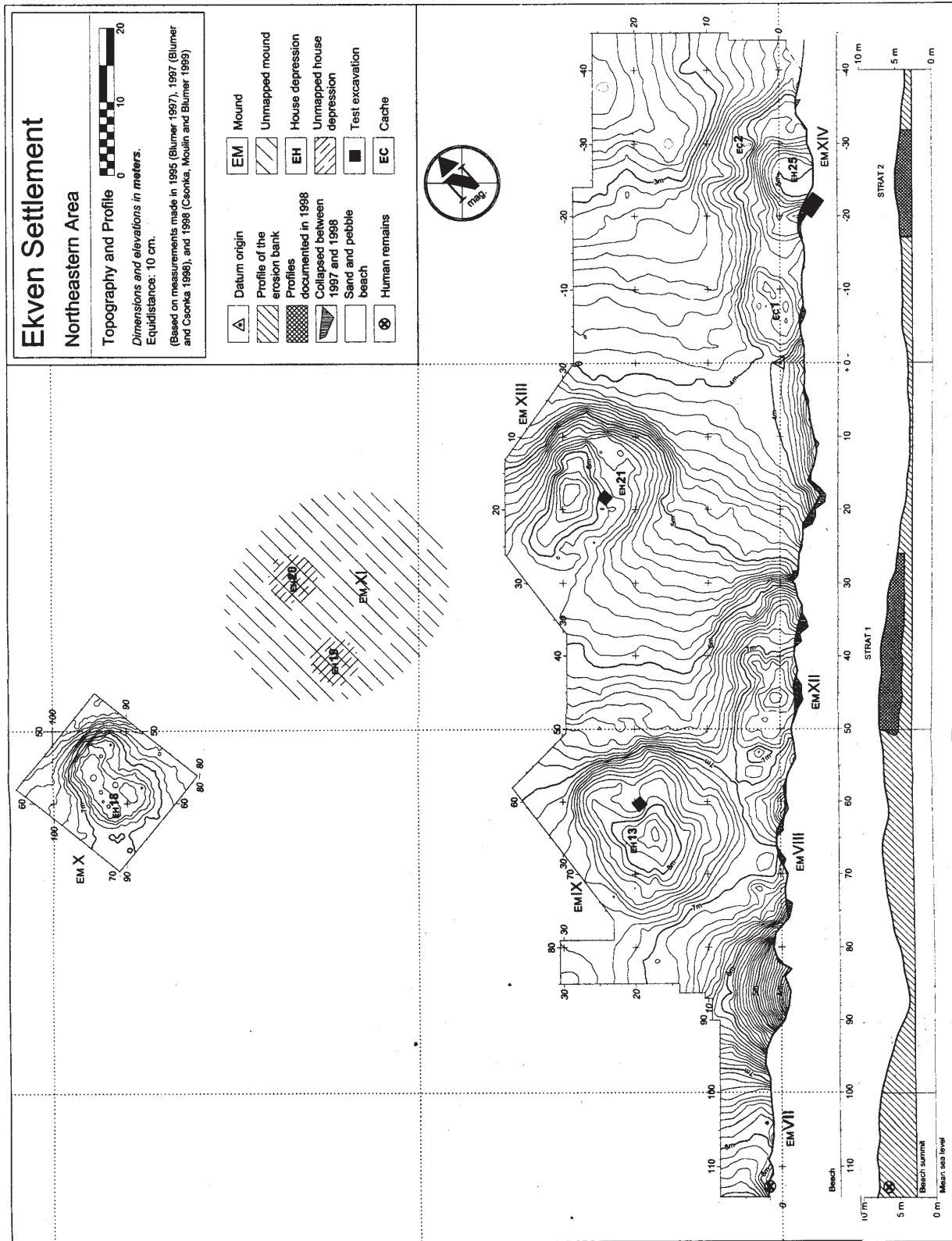


Figure 1. Topography near the Ekven erosion front, showing locations of cuts designated Strat 1 and Strat 2, and test pits EH13 and EH21 (map by Reto Blumer).

Storm-driven waves are rapidly eroding the seaward face of the settlement. From the crumbled sediments at the foot of the erosion bluff along its northwestern half — an extent of about 120 m — numerous artifacts were collected that could not be attributed to the layers from which they had eroded; these included many pottery sherds. As the profiles were cleaned, other artifacts were collected and documented in situ. The layers of anthropic remains are as much as 3 m in thickness. One of these in particular we documented more thoroughly, the area we designated “STRAT 1” (Fig. 1; see also Moulin and Csonka 2002), which corresponds to sections designated 15 to 27 in Gelbert’s present Figures 9, 12 and 17.² In this segment, 17 radiocarbon assays cluster neatly in the interval of 650-1300 calAD, bracketed by one older date (400 BC-10 AD) and one younger one (1480-1690 calAD; all at 2 sigma) (Moulin and Csonka 2002:240-242). Typologically diagnostic material was attributed to Old Bering Sea, Birnirk, Punuk, and Western Thule. A less complex mound, situated lowest above sea level at the northwestern edge of the erosion front (STRAT 2, of Figure 1, Gelbert’s sections 49-56), contained Punuk-type material; the period of occupation was estimated to be 1440-1490 calAD (Moulin and Csonka 2002:242-247).

In three selected locations behind the erosion front, test pits were excavated, none of which reached the sterile substrate. One of these, designated ER1, was placed within a ring of whale skulls apparent on the surface of the site near the edge of the erosion front, a position approximately 50 m southwest of the area shown in Figure 1. It provided no evidence of an underlying structure or of a well-defined occupation floor. Due to its superficial situation, the ring of skulls was judged relatively recent, probably late prehistoric — i.e., sixteenth to eighteenth centuries (see Blumer and Csonka 1998:102-106). The other two test pits were excavated in the center of two separate and well-defined mounds, interpreted as collapsed houses, which were situated close behind the erosion front (Fig. 1, EH13 and EH 21). In EH21 local wood twigs from the lowest layer were dated to 1030-1310 calAD and 1270-1400 calAD (B-7328; 2 sigma range). In EH13 a sample of decayed sod from the bottom of the test yielded a date of 1150-1220 calAD (B-7338; 66% probability at 2 sigma).

In 1999, Agnès Gelbert agreed to study the potsherds that had been collected in the circumstances mentioned here. These are deposited at the Museum of the Orient in Moscow, where access was granted to Ms. Gelbert by keepers Kirill Dneprovsky and Mikhail Bronshtein. Our expectation that she would successfully transfer some of her experience with ceramic traditions from the Senegal River region (see Gelbert 2003) to that of Bering Strait, was entirely fulfilled. Ms. Gelbert’s study was made possible by subsidy from the Swiss-Liechtenstein Foundation for Archaeological Research Abroad.

² The correspondence between Gelbert’s section numbers and linear meters from the datum, along the erosion front, appears in Csonka et al. 1999:116, graph 1. [In the present chapter, numbering of the 2-meter sections treated by Gelbert (now Agnès Gelbert Miermon) begins 80 m southwest of the horizontal beach datum (zero-point on Fig. 1) and proceeds northeast for 124 m (62 of her numbered sections) to the edge of the area mapped - eds.]

Pottery From The Bluff

Agnès Gelbert Miermon

I. INTRODUCTION

During excavation campaigns conducted in 1997 and 1998 at the Ekven site (in Chukotka), several hundred pottery sherds were recovered by the Swiss team. The material consists of 921 sherds, collected in four different parts of the settlement (Blumer and Csonka 1998, Csonka et al. 1999):

- (1) 739 sherds came from surface collections in the erosion front (EEF). This material, not found in situ, represents more than 80% of the studied corpus and on typological grounds appears to cover an extended time period, from 0 to 1700 calAD.

The rest of the material comes from three test pits:

- (2) 86 sherds from ER1, a whale skull structure assigned to the late prehistoric (1500-1700 AD);
- (3) 76 sherds from EH21, a semi-subterranean dwelling ruin attributed to Punuk and Thule;
- (4) 20 sherds from EH13, a semi-subterranean dwelling ruin probably more recent than EH21.

The material is fragmented and of varying quality. A large number of the sherds are very crumbly, and the inside or outside surfaces of numerous fragments are eroded or exfoliated and hence missing. Many sherds are completely covered with a carbonate incrustation, which renders observation of surface features very difficult.

II. AIMS AND METHODOLOGY

The study of ceramics has been widely neglected in Beringian prehistoric sites, especially in Siberia. This gap can be partly explained by the crude quality of the sherds (especially when compared to the other types of artifacts to be found there) and by their morphological and ornamental uniformity, which is ill-suited to classical typological methods used in the study of ceramics. For the Ekven pottery, therefore, I suggest a study based both on a typological analysis of the final products and on the reconstruction of the different steps of the “chaîne opératoire” or manufacturing sequence. This is a preliminary study, the main aim of which is to characterize the variability of the ceramic production found on the site.

After examining the 921 sherds from the units EEF, ER1, ER21, and EH13, I have selected all the elements that may yield information concerning morphology, decoration, and technology. I have not sorted the material according to measured dimensions and I have only omitted sherds which,

Table 1. Sherd Sample, Ekven Erosion Face

| | Collection Unit | | | | Total |
|------------------------|-----------------|------|------|-----|-------|
| | EEF | EH21 | EH13 | ER1 | |
| No. of sherds analyzed | 506 | 50 | 20 | 44 | 620 |
| No. of sherds omitted | 233 | 26 | 0 | 42 | 301 |

because of a bad state of conservation or because they were too small, were impossible to interpret. About 35% of the material was thus left aside, and the final corpus is made up of 620 sherds (Table 1).

The morphological, ornamental, and technological data collected on this material have allowed me to characterize different techno-morphological types of pottery. Related to this, in the absence of precise stratigraphic assignment the problem was to ascribe the artifacts to specific cultures and periods. I have attempted to deal with this by exploring several paths:

- (1) Analysis of the distribution of morphological, ornamental, and technological types on the erosion front. In this zone, the material was collected in two-meter-wide corridors, some of which corresponded to identified archaeological structures. Thus, corridors 51 to 56 match the erosion zone of a recent habitation. I try to determine whether this zone might offer certain ceramic characteristics.
- (2) Analysis of the distribution of morphological, ornamental, and technological types in the ER1, EH21, and EH13 test pits. Unfortunately, the small number of sherds found in these units affects the reliability of the results.
- (3) Comparison of the Ekven ceramics with material found in Alaska. This analysis has been conducted only on the basis of literature that provides typological and technological descriptions.

III. POTTERY MORPHOLOGY

It was possible to refit only a very small number of sherds, and no complete shapes were arrived at. In order to assess the morphological variability of the vessels, it was thus necessary to use isolated sherds from different parts of the pot. The typology was established mainly on the basis of rim sherds, which allow for a characterization of the upper profile of the vessel, the rim diameter, and the form of the rim and of the lip.

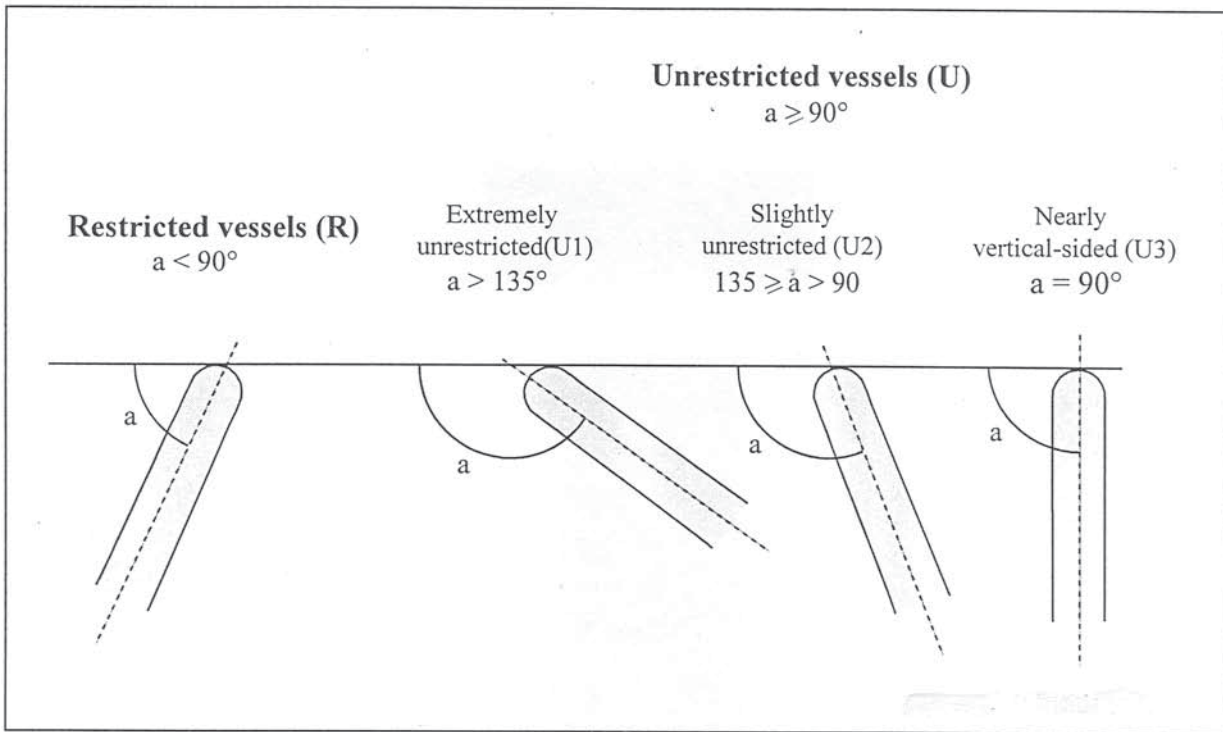


Figure 2. Schematic characterization of vessel upper profiles (insides of vessels to the right).

III.1. Descriptive System

- (1) *The orifice.* The characterization of the orifice of the vessel was determined from rim sherds, by evaluating the “a” angle, or that between the rim axis and a horizontal line (Fig. 2). I have thus distinguished two main categories of vessels:

R. Restricted vessel, where “a” < 90°

U. Unrestricted vessel, where “a” = 90° or greater

In the *unrestricted* vessels category, three types are revealed (Fig. 2):

U1. Extremely unrestricted vessel, where “a” > 135°

U2. Slightly unrestricted vessel, where “a” = 95° - 135°

U3. Nearly vertical-sided vessel, where “a” = ~90°

- (2) *The neck.* In the category of restricted vessels, two types are found:

R1. Vessel without a neck

R2. Vessel with a neck

- (3) *Dimensions.* The only dimensions possible to determine were the diameter of the rim and the thickness of the wall. However, the rim sherds were sometimes narrow and often irregular, so that the measures concerning the diameter are clearly approximations.

- (4) *The base.* No base sherd was clearly identified in this corpus. Quite frequently on very fragmented material, it is impossible to distinguish fragments of rounded bases from body fragments. As there were no flat or conical base sherds, and no foot fragments, we may infer that all of the vessels in the corpus had a rounded base.
- (5) *The body.* Only one sherd shows angled shoulders, while all the others have more or less convex, continuous profiles from globular to cylindrical.
- (6) *The rim.* All of the rims have parallel or slightly divergent sides. Two groups are distinguished, based on their angle from the wall of the vessel (Fig. 3):

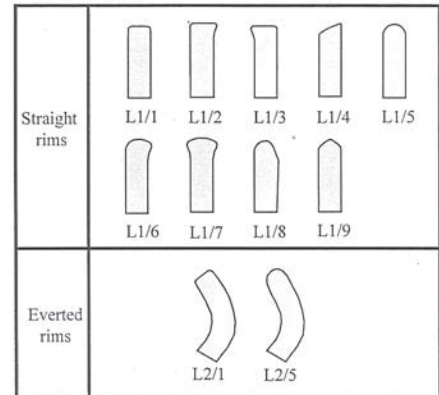


Figure 3. Morphological types of rims and lips.

Ri1. Straight rim

Ri2. Everted rim

- (7) *The lip.* Undecorated lips (L1) have various shapes (Fig. 3):

L1/1. Flattened

L1/2. Flattened with an inward bulge

L1/3. Flattened with an outward bulge

L1/4. Bevelled

L1/5. Rounded

L1/6. Rounded with an inward bulge

L1/7. Rounded with an inward and outward bulge

L1/8. Rounded with an inward bevel

L1/9. Gabled

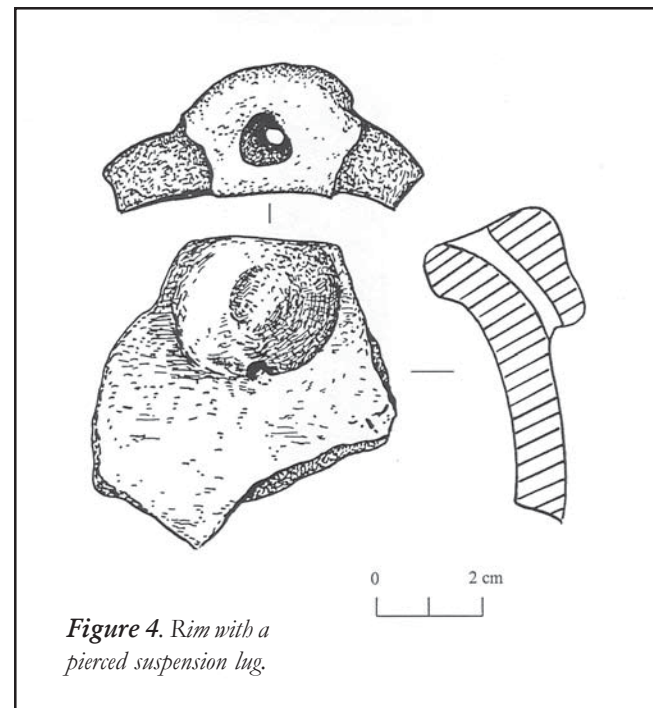


Figure 4. Rim with a pierced suspension lug.

- (8) *Appendages.* In the studied corpus, only two sherds have appendages. One has a pierced suspension lug on the rim (Fig. 4), the other bears the trace of a vertical handle on the upper part of the body.

III.2. Enumeration by Excavation Unit

III.2.1. EEF

The material found in the erosion front includes 99 rim sherds, but the typology (Fig. 5) was established on the basis of only 94 sherds that provided sufficient morphological information.

Two categories are found in EEF, restricted and unrestricted vessels:

Restricted vessels. These are less numerous in the studied corpus (22 out of 94) and are divided into three types (Fig. 6):

R1. Restricted vessels without a neck (Fig. 6, a-d). Of the rim sherds, 21 out of 22 fit this category. They are medium- to large-sized vessels, the rim diameters of which range continuously from 13 to 36 cm. Their average thickness is approximately 9 mm. The rim of 16 of these vessels is usually straight and more rarely 5 are everted. When the lip is not ornamented (10 sherds out of 16), it may have any of several forms: 5 are flattened, 4 are flattened with an inward bulge, 3 are rounded, 2 are rounded with an inward bulge and 1 is gabled.

R2. Restricted vessels with a neck. Only one neck sherd was identified in the erosion front. This fragment, 8-mm thick, belongs to a vessel whose rim diameter is approximately 7 cm. The undecorated lip is flattened.

R3. Restricted vessels with angled shoulders. Only one sherd of this type was identified in EEF (Fig. 7).

Unrestricted vessels. These forms are a majority of the studied corpus (72 sherds out of 94) and are divided into three types (Fig. 5):

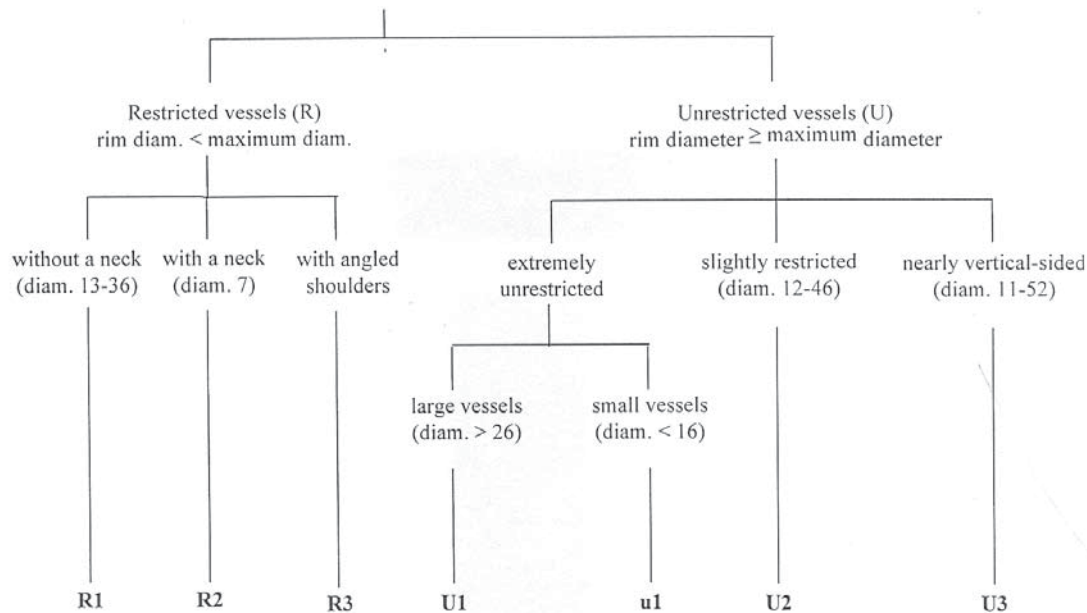


Figure 5. Typological tree of Ekeven ceramics.

U1. Extremely unrestricted vessels (Fig. 8, a-d). This type is made up of 13 rim sherds, which are divided into two clearly differentiated dimensional subtypes:

u1. Small vessels. Only 3 rim sherds belong to this subtype, the rim diameters of which range from 13 to 15 cm. Their average thickness is 12 mm. Their rims are always straight and their lips ornamented.

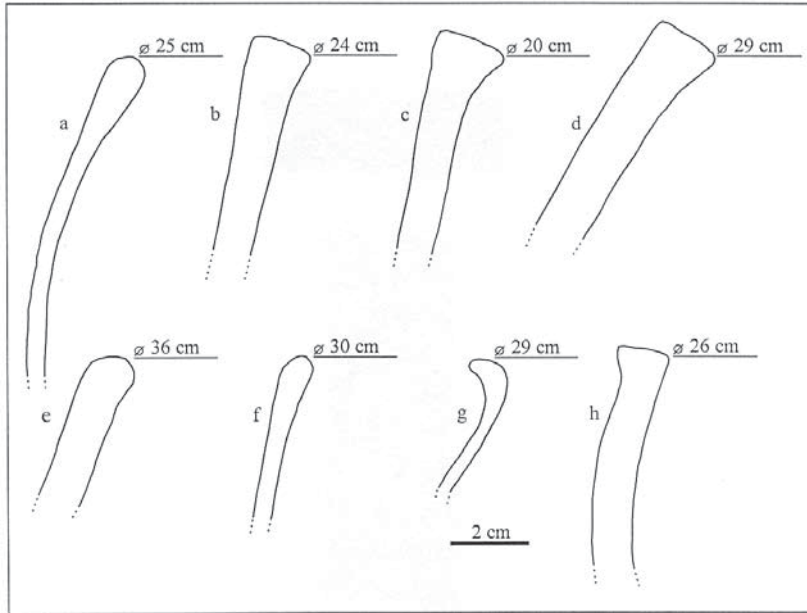


Figure 6. Rim profiles from restricted vessels (type R): a-f, straight rims; g-h, everted rims (inside of vessel to the right).

U1. Large vessels. This subtype includes 10 rim sherds, the rim diameters of which range from 27 to 38 cm. Their average thickness is 15.7 mm. Their rims are straight and their lips, undecorated, have varied morphologies: 3 are flattened, 5 are flattened with an inward bulge, 1 is bevelled, and 1 is gabled.

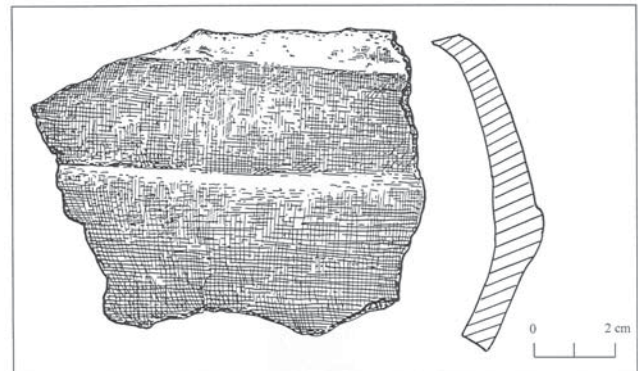


Figure 7. Sherd with an angled shoulder.

U2. Slightly unrestricted vessels (Fig. 8, e-g). Thirty-four rim sherds belong to this type. The rim diameters vary continuously from 13 to 46 cm. Their average thickness is 12.6 mm. Their rims are straight, 26 lips are undecorated and of varied morphologies: 4 are flattened, 11 are flattened with an inward bulge, 2 are bevelled, 4 are rounded, 3 are rounded with an inward bulge, and 2 are rounded with an inward and outward bulge.

U3. Nearly vertical-sided vessels (Fig. 8, l-p). Twenty-five rim sherds belong to this type. The rim diameters vary continuously from 11 to 52 cm. Their average thickness is 9.7 mm. The rims are always straight, and 20 undecorated lips have varied morphologies: 5 are flattened, 10 are flattened with an inward bulge, 1 is flattened with an outward bulge, 1 is rounded, 2 are rounded with an inward edge, and 1 is gabled.

Judging from these data, there is no exclusive correlation between the overall morphology of a vessel and that of the lip, and each type of vessel has varied lip shapes (Table 2). However, the flattened lips with an inward bulge are more frequent on restricted vessels, and flattened and rounded lips are proportionally better represented on restricted ones.

Table 2. Relationship of Vessel Type and Lip Shape, Unit EEF

| Vessel Type | Lip Shape | | | | | | | | | Sherd Total |
|-------------|-----------|------|------|------|------|------|------|------|------|-------------|
| | L1/1 | L1/2 | L1/3 | L1/4 | L1/5 | L1/6 | L1/7 | L1/8 | L1/9 | |
| R1 | 5 | 4 | - | - | 3 | 2 | - | - | 1 | 15 |
| R2 | 1 | - | - | - | - | - | - | - | - | 1 |
| U1 | 3 | 5 | - | 1 | - | - | - | - | 1 | 10 |
| U2 | 4 | 11 | - | 2 | 4 | 3 | 2 | - | - | 26 |
| U3 | 5 | 10 | 1 | - | 1 | - | - | 2 | 1 | 20 |

The thickness of the rim is more clearly related to the morphological type of the vessel (Table 3). We can thus distinguish between the restricted and the nearly vertical-sided vessels, which have thin rims (average thickness below 10 mm), and the extremely or slightly unrestricted pots, which have thicker rims (average thickness between 12 and 16 mm).

Table 3. Vessel Type and Sherd Thickness, Unit EEF

| Vessel Type | Number | Sherd Thickness | | |
|-------------|--------|-----------------|------|--------------------|
| | | Range | Mean | Standard Deviation |
| R1 | 21 | 4-18 | 9.3 | 3.27 |
| R2 | 1 | 8 | - | - |
| u1 | 3 | 8-17 | 12.0 | 3.74 |
| U1 | 10 | 10-24 | 15.7 | 4.57 |
| U2 | 27 | 7-27 | 12.6 | 4.18 |
| U3 | 22 | 5-14 | 9.7 | 2.14 |

III.2.2. EH21

Out of the 8 rim sherds found in test pit EH 21, only 6 deserve morphological classification. They all come from unrestricted vessels, types U2 or U3.

U2. Slightly unrestricted vessels (Fig. 8, h-i). Five sherds found in EH21 belong to this type. The rim diameters vary from 16 to 45 cm and their thickness from 5 to 11 mm. The rims are always straight, and 4 undecorated lips have varied morphologies: 2 are flattened and 2 are flattened with an inward bulge.

U3. Nearly vertical-sided vessels (Fig. 8, q). In EH21, only one sherd belongs to this type. Its rim diameter is 32 cm and it is 8-mm thick. The rim is straight and the lip, undecorated, is flattened with an inward bulge.

III.2.3. EH13

Only 3 rim sherds were found in this test pit. They all come from unrestricted vessels, belonging to types *U2* or *U3*.

U2. Slightly unrestricted vessels (Fig. 8, j). This type includes two rim sherds from vessels whose diameters are 12 and 17 cm, and thicknesses 4 and 7 mm. The rims are straight; one lip is flattened and the other flattened with an inward bulge.

U3. Nearly vertical-sided vessels (Fig. 8, r). Only one sherd belongs to this type. Its vessel rim diameter is 17 cm and its thickness 12 mm. The rim is straight and the undecorated lip is flattened with an inward bulge.

III.2.4. ER1

Only 10 rim sherds were collected in this test pit, among which 8 fragments enabled me to distinguish three morphological types, *R1*, *U2*, and *U3*.

R1. Restricted vessels without a neck (Fig. 6, e-f). This type includes 3 sherds from vessels whose rim diameters vary from 30 to 36 cm and thicknesses from 6 to 11 mm. Their rims are straight and 2 lips are undecorated: one is flattened and the other is flattened with an inward bulge.

U2. Slightly unrestricted vessels (Fig. 8, k). This type includes 2 sherds whose respective rim diameters are 21 and 22 cm and thicknesses 7 and 9 mm. The rims are straight; one has a flattened lip and the other a rounded lip with an inward bulge.

U3. Nearly vertical-sided vessels (Fig. 8, s). Three sherds belong to this type. Their rim diameters vary from 23 to 29 cm and their thicknesses from 12 to 13 mm. Their rims are straight, 2 of the undecorated lips are flattened, and 1 is rounded.

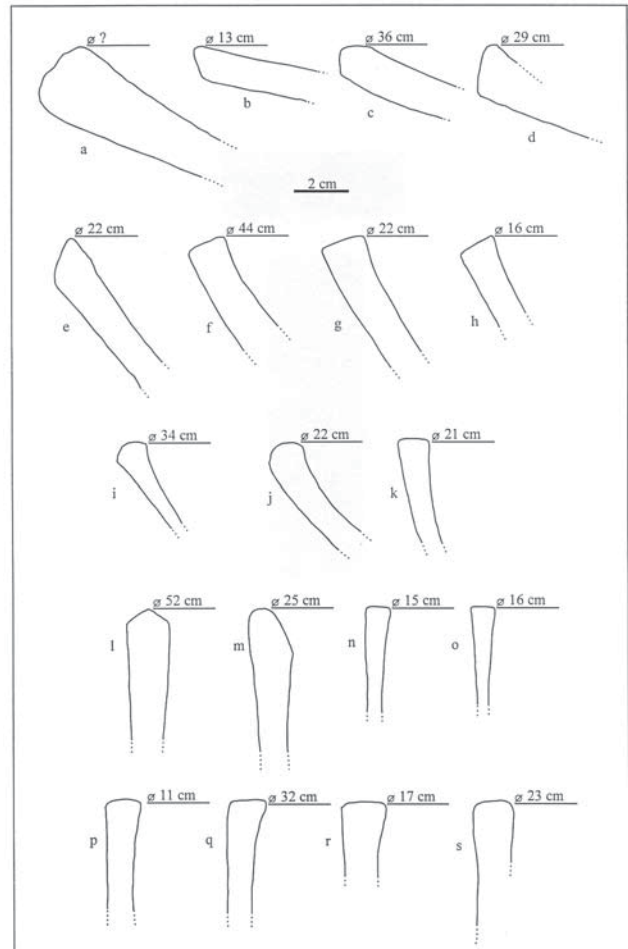


Figure 8. Rim profiles from unrestricted vessels: a-d, extremely unrestricted (type *U1*); e-k, slightly unrestricted (type *U2*); l-s, nearly vertical-sided (type *U3*) (inside of vessel to the right).

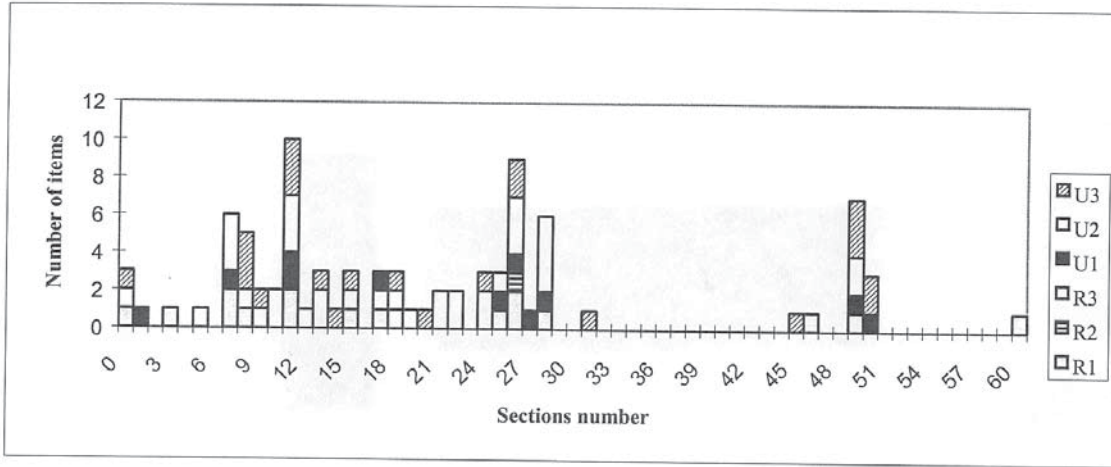


Figure 9. Distribution of morphological types along the erosion front.

III.3 Distribution of Morphological Types

No particular scheme of grouping is revealed by an analysis of the distribution of the various morphological types along the erosion front (Fig. 9). Most types of vessel are to be found in any part of EEF. Unfortunately, no rim sherds were collected in corridors 51 to 56, which are thought to contain more recent artifacts.

Due to the very small number of rim sherds collected in the test pits, it is also difficult to compare them fruitfully with those found in the erosion front (Table 4). One can nevertheless note that all the vessel shapes analyzed in the test pits fit into the typology devised from the EEF sherds. Also, no restricted shapes are to be found in EH21 and EH13, and no extremely unrestricted vessel was identified in the test pits. Nevertheless, as these shapes were present in very small numbers in EEF, their absence in the test pits may not reflect a real lack but might be explained by the limited quantity of sherds of any type collected there.

Table 4. Distribution of Vessel Types by Collection Unit

| Vessel Type | Collection Unit | | | | Total Sherds |
|--------------|-----------------|------|------|-----|--------------|
| | EEF | EH21 | EH13 | ER1 | |
| R1 | 21 | - | - | 3 | 24 |
| R2 | 1 | - | - | - | 1 |
| U1 | 13 | - | - | - | 13 |
| U2 | 34 | 5 | 2 | 2 | 43 |
| U3 | 25 | 1 | 1 | 3 | 30 |
| Total | 94 | 6 | 3 | 8 | 111 |

IV. POTTERY DECORATION

IV.1. Descriptive System

Decorations are all impressed on soft clay and located only on the external wall³ and on the top of the lip.

On the external surface of the body, the decorations are all curvilinear, composed of concentric circles or spirals (Fig. 10). The designs all fit into the same general pattern and the variations observed do not allow for any classification. The occurrence of these body decorations depends on the fashioning technique used and will thus be analyzed in the next part of the study, dedicated to technological traits.

On the lip, different decoration types are distinguished according to the tool used and the design. Four (AG has five*?) different stamped decorations were identified in ekven (Fig. 11):

- D1. Diagonal lines, impressed with an edged tool on the outward side
- D2. Herringbone pattern, impressed with an edged tool
- D3. Herringbone pattern, fingertip impressed
- D4. Diagonal lines, impressed across the top with an edged tool
- D5. Curvilinear designs, paddle impressed

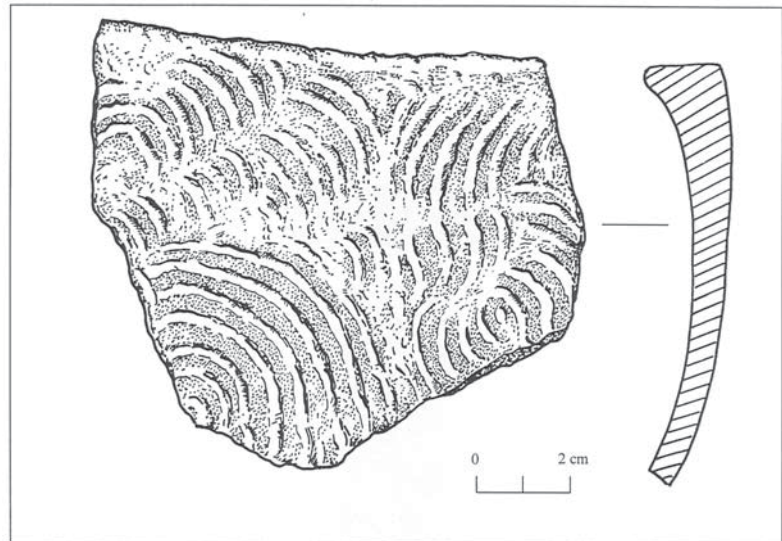


Figure 10. Curvilinear decoration on the external face of a sherd.

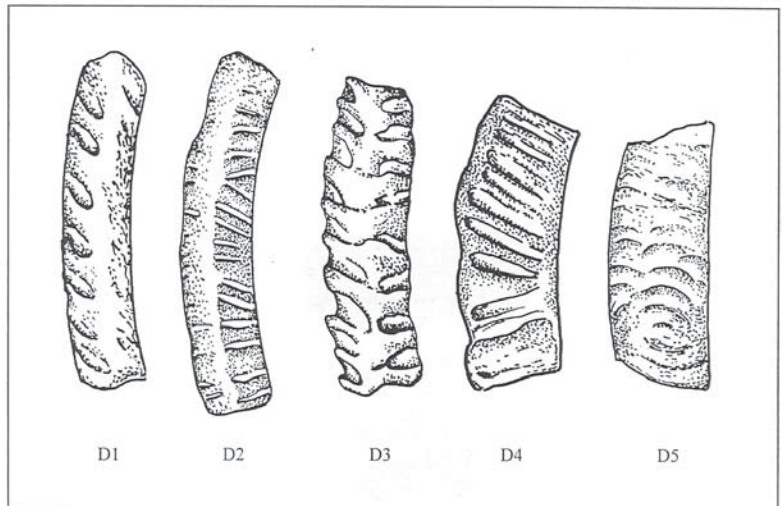


Figure 11. Types of stamped decoration on the tops of vessel lips.

³ As I couldn't make a distinction between base sherds and body sherds, it was not possible to determine exactly what surface the decorations covered.

IV.2. Description by Collection Unit

IV.2.1. EEF

There is a far smaller number of decorated lips on all the pottery types (Table 5) except the extremely unrestricted small pots (U1), represented by three items, all with stamped lip.

Table 5. Vessel Type and Presence of Lip Decoration, Unit EEF

| Vessel Type | Lip Decoration | | Total Sherds |
|-------------|----------------|--------|--------------|
| | Present | Absent | |
| R1 | 6 | 15 | 21 |
| R2 | - | 1 | 1 |
| u1 | 3 | - | 3 |
| U1 | - | 10 | 10 |
| U2 | 8 | 26 | 34 |
| U3 | 5 | 20 | 25 |

Each type of vessel bears a variety of designs (Table 6), and no correlation is observed between the morphology of the pot and its lip decorative motif. For all vessel types, the most common decoration is the curvilinear stamped decoration (D5).

Table 6. Vessel Type and Decorative Motif, Unit EEF

| Vessel Type | Decorative Motif | | | | | Total Sherds |
|-------------|------------------|----|----|----|----|--------------|
| | D1 | D2 | D3 | D4 | D5 | |
| R1 | 2 | - | 2 | - | 2 | 6 |
| u1 | - | 1 | - | - | 2 | 3 |
| U2 | 3 | 1 | - | 2 | 2 | 8 |
| U3 | 6 | 4 | 2 | 2 | 8 | 22 |

IV.2.2. The Test Pits

Only two decorated rim sherds were found in the test pits, one in EH21 and one in ER1. The rim from EH21 belongs to a slightly unrestricted vessel and has a herringbone lip decoration, impressed with an edged tool (D2). The rim sherd from ER1 is assigned to a restricted vessel (R1) and displays diagonal lines, impressed with an edged tool on the outward side of the lip (D1).

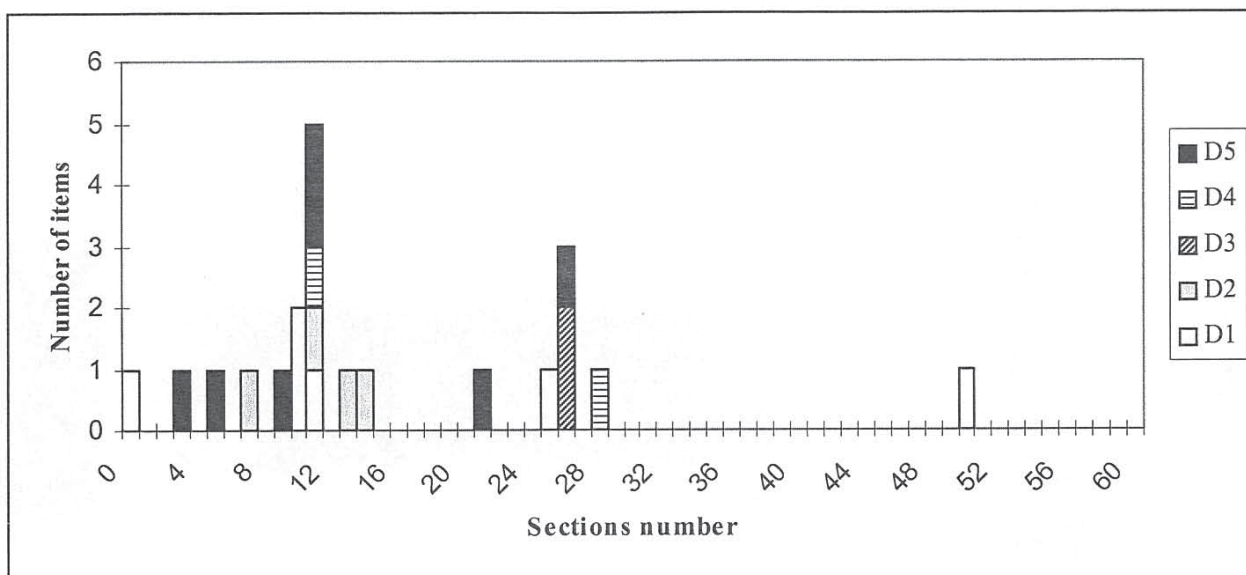


Figure 12. Distribution of lip decorations along the erosion front.

IV.2.3. Distribution of Decorative Types

As far as I can judge from the small corpus, there is no particular pattern of distribution of decorative motifs along the erosion front (Fig. 12).

The sample is too limited to allow a comparison between the erosion front and the test pits. It is only possible to note that the two decorated sherds found in ER1 and EH21 do not have different designs but are included in the general decorative typology observed in EEF.

V. POTTERY MANUFACTURE

The study of the pottery sherds allowed me to reconstruct three main steps of the production system: the preparation of the clay body, the forming techniques, and the finishing techniques. It also provided some clues concerning the firing of the vessels.

V.1. Clay Preparation

V.1.1. Descriptive System

I first proceeded to a simple visual examination of the corpus and then selected samples to examine with a binocular microscope.

Two main types of inclusions are distinguished in the sherds: mineral and organic temper. Minerals are differentiated according to morphology and size. It is thus possible to distinguish subangular from subrounded mineral inclusions and coarse inclusions (≥ 2 mm) from fine inclusions (< 2 mm). For the organic temper one can distinguish between, on the one hand, non-identified fibers that look like grass, hair, or baleen and, on the other hand, easily identified feathers.

From a visual evaluation it is also possible to separate pastes with a very high density of non-plastic inclusions from pastes with a low density of such materials. Seven different types of paste can be observed in Ekven, with the following characteristics:

P1. Low density of subangular coarse minerals and unidentified fibers (grass, hair, or baleen)

P2. Low density of subangular coarse minerals and feathers

P3. Low density of unidentified fibers

P4. Low density of feathers

P5. High density of subrounded coarse minerals

P6. High density of subangular coarse minerals

P7. High density of subangular fine minerals

V.1.2. Paste Types in Collection Units

P1 paste, with a low density of subangular coarse minerals and unidentified fibers, is found most frequently in the erosion front, where around 74% of the studied sherds belong to this group (Table 7). P2 paste, with a low density of subangular coarse minerals and feathers, and P6, with a high density of subangular coarse minerals, are relatively common, each observed on more than 6% of the fragments. Other paste groups, P3, P4, and P7, are rare and represent less than 5% of the material from EEF.

The same pattern is observed in test pits EH21, EH13, and ER1, where paste P1 is also the most common (Table 7) and where the other groups are underrepresented.

Table 7. Distribution of Paste Types by Collection Unit

| Collection Unit | Paste Type | | | | | | | Total Sherds |
|-----------------|------------|----|----|----|----|----|----|--------------|
| | P1 | P2 | P3 | P4 | P5 | P6 | P7 | |
| EEF | 334 | 30 | 18 | 22 | 12 | 29 | 7 | 452 |
| EH21 | 31 | 7 | 2 | 1 | - | 1 | - | 42 |
| EH13 | 9 | - | - | - | - | 1 | - | 10 |
| ER1 | 27 | 2 | - | 1 | 5 | 2 | 1 | 38 |

V.1.3. Petrographic Characterization

M. A. Courty has analyzed 12 thin-sections from ceramic samples collected in EEF. Several petrographic types were distinguished that give a better idea of the nature of the mineral inclusions, whether initially present in the clay or added intentionally (Table 8).

Table 8. Petrography of Pottery Thin-Sections, Unit EEF

| Petrographic Type | Coarse Fraction | Fine Fraction |
|-------------------|---|--|
| I.1a | Two modes: (1) very fine quartz sands (80–100 μm) (2) subangular mica schist and granito-gneiss sands (15%; 4–8 mm) | Ferruginous clay (morainal?) |
| I.1b | Two modes: (1) very fine quartz sands (80–100 μm) (2) subangular mica schist and granito-gneiss sands (15%; 4–8 mm) | Schistose clay (morainal?) |
| I.2a | Two modes: (1) very fine quartz sands (80–100 μm) (2) quartz sands (30%; 4–8 mm) | Ferruginous clay (morainal?) |
| I.2b | Two modes: (1) very fine quartz sands (80–100 μm) (2) quartz sands (20%; 2–8 mm) | Ferruginous clay (morainal?) |
| II.1 | 40% subangular quartz ferruginous sands 80 μm –4 mm | Ferruginous clay (morainal?) |
| II.2 | 40% subangular quartz sands 80 μm –8 mm | Coarse ferruginous clay (morainal?) |
| II.3 | 40% subangular quartz sands 80 μm –8 mm | Coarse clay (morainal?) |
| III | Two modes: (1) fine metamorphic quartz sands (80–500 μm) (2) metamorphic quartz sands and ferruginous sandstone (20%; 2–8 mm) | Brown-red silty clay (morainal) |
| IV | 30% quartzite and subrounded to subangular 3–8 mm (beach or alluvial sands) | Dense black crackled (rich in iron) (coastal plain?) |
| V | 30% micro-gabbro and diabase (etc.) 1–8 mm (beach or alluvial sands) | Dense black crackled (rich in iron) (coastal plain?) |

V.2. Forming Techniques

V.2.1. Descriptive System

A visual examination of surface features on all the pottery sherds enabled me to recognize four technological groups (Figs. 13-16). For each one I have identified the forming technique based on the diagnostic attributes. No experimentation was conducted for this study, and the interpretations of surface features are based on experimental and ethnographical data already available (Balfet et al. 1989; Gelbert 1994, 2000; Huysecom 1994; Rice 1987; Rye 1981). A cautious approach is thus necessary.

1. Group a, drawing, with paddle and anvil .

The vessels in this group have been roughed out by drawing or pinching from a lump of clay. diagnostic surface features: No joins of coils or slabs are visible on the sherds and the mass is homogeneous. The material being of mediocre quality and the finishing quite rough, one can indeed suppose that the use of coils or slabs would have left visible traces on the final product.

The vessel was then shaped with the paddle and anvil technique, with an engraved paddle (group A1) or with a non-engraved paddle (A2). Diagnostic surface features: The external surface of the sherds from group A1 are covered with curvilinear paddled decorations (Fig. 13, a). This feature shows that the technique used was that of paddling with an engraved paddle made of wood or ivory.⁴ Sherds from A2 have a plain external surface without striations, but some large diagonal grooves are visible on a few sherds (Fig. 13, b). These grooves were not made by scraping the clay but rather look like an impression made with the edge of a tool. They may be an impression made by the edge of a paddle.

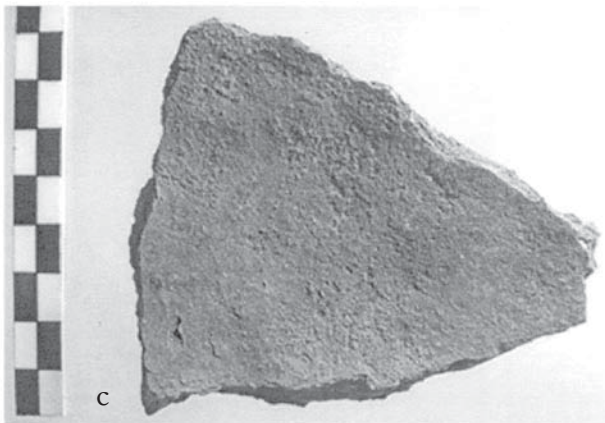
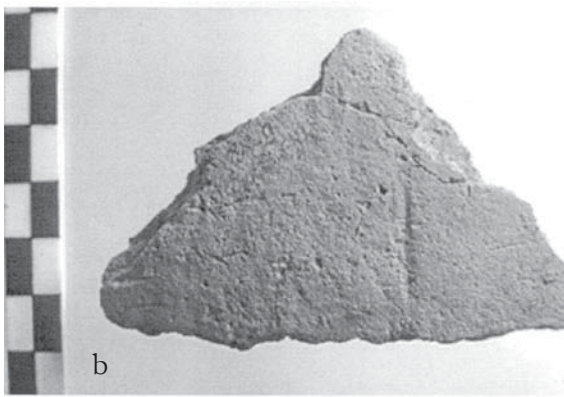
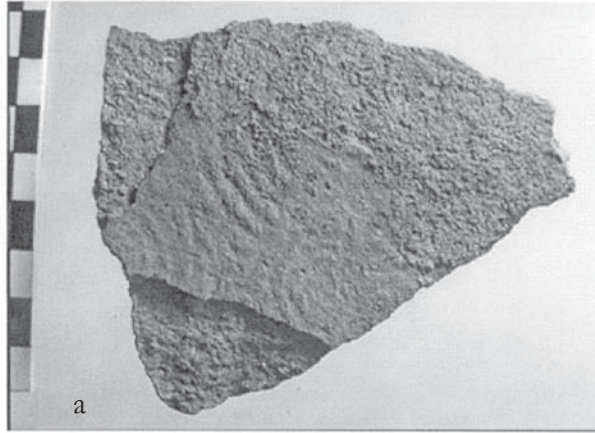


Figure 13. Sherds of vessel forming group A, drawn from a lump and then paddled: a, exterior marks of engraved paddle; b, marks of plain paddle (?); c, anvil marks on the interior.

⁴ Paddles engraved with the same motifs as those on the sherds were indeed found at Ekven.

In both groups the paste is compact and there are subrounded impressions on the internal surface (Fig. 13, c). These features indicate that an anvil was used, the shape suggesting a rounded tool such as a pebble or sherd.

2. *Group B, paddling over a convex basket mold.*

The roughout has been fashioned from a lump of clay either directly over the mold or before being pressed onto the mold. Diagnostic features: No joins of coils or slabs are visible on the sherds and the mass is homogeneous.

The vessel was shaped by paddling over a convex basket. Diagnostic surface features: The external surface is covered with curvilinear paddled decorations (Fig. 14, a) and the internal surface with matting impressions (Fig. 14, b). The wall has a very regular curve and the paste is compact.

3. *Group C, modeling.*

The vessels in this group have been roughed out and preformed by drawing or pinching from a lump of clay. Diagnostic surface features: No joins of coils or slabs are visible on the sherds and the mass is homogeneous; inside and outside surfaces show irregular depressions that look like finger prints; the curve and thickness of the wall are irregular; the paste is not compact (Fig. 15, a-b).

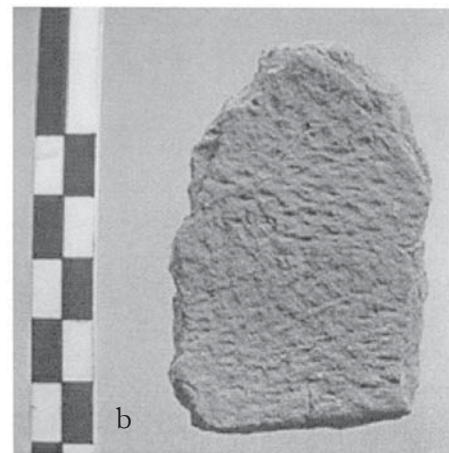
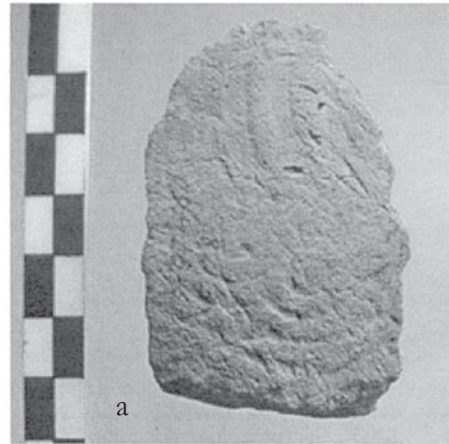


Figure 14. Sherds of vessel forming group B, paddled over a convex basket mold: a, exterior marks of engraved paddle; b, interior surface with matting impressions.

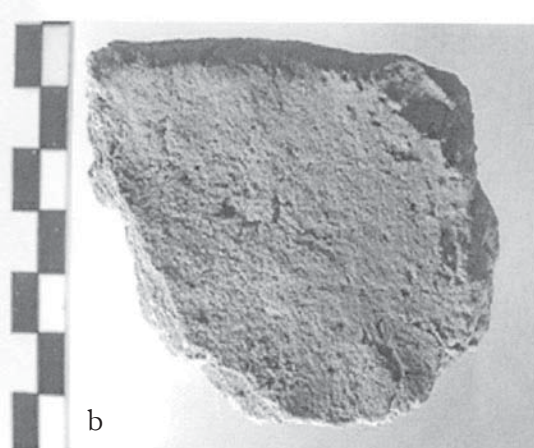
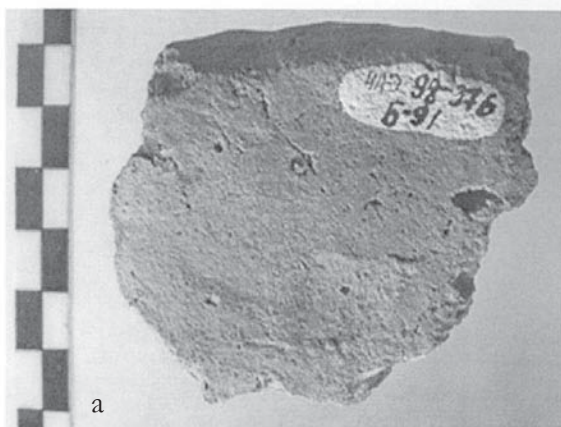


Figure 15. Sherds of vessel forming group C, formed by drawing and modeling: a, exterior surface; b, interior surface.

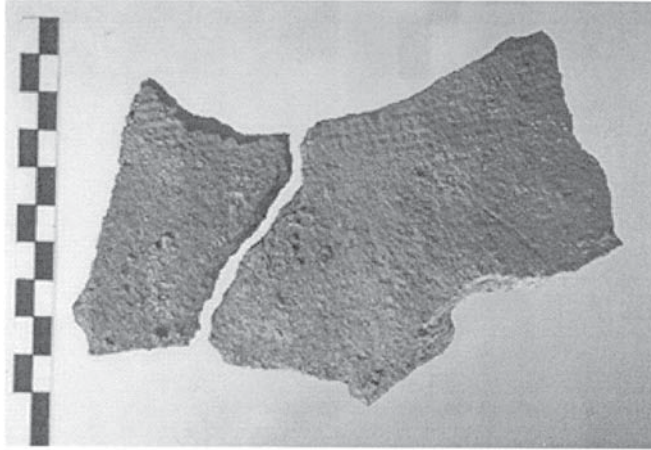


Figure 16. Exterior surface of sherds of vessel forming group D, pressed into a concave basket mold.

4. Group D, molding into a concave basket mold.

The roughout has been fashioned from a lump of clay either while in the mold or before being pressed in the mold. Diagnostic surface features: No joins of coils or slabs are visible on the sherds and all have a homogeneous mass.

The vessel was shaped by pressing the clay into a concave basket. Diagnostic surface features: The external surface shows matting impressions (Fig. 16); the curve and thickness of the wall are regular; there are no traces of paddling on the internal surface.

V.2.2 Forming Techniques in Collection Units

In the erosion front, group A (paddle and anvil) dominates and represents 73% of the sherds (Table 9). Among these, 35% were shaped with an engraved paddle (group A1). Another 17.5% of the sherds were made by paddling over a basket mold (group B) and only 7% by modeling (group C). Finally, the technique of molding into a concave basket mold (group D) was identified on 13 sherds only, 7 of which come from the same vessel.

In the EH21 test pit, among the 50 examined sherds, a large majority belong to group A (44 sherds), out of which 19 sherds were fashioned with an engraved paddle. Groups B and C are also represented by a few fragments (Table 9).

In the EH13 test pit, the sherds also mainly belong to group A (17 sherds, 9 of which belong to A1); 2 sherds fit into group B (Table 9).

Among the 44 sherds of the ER1 test pit, 40 belong to group A (14 of them to A1) and 4 to group B (Table 9).

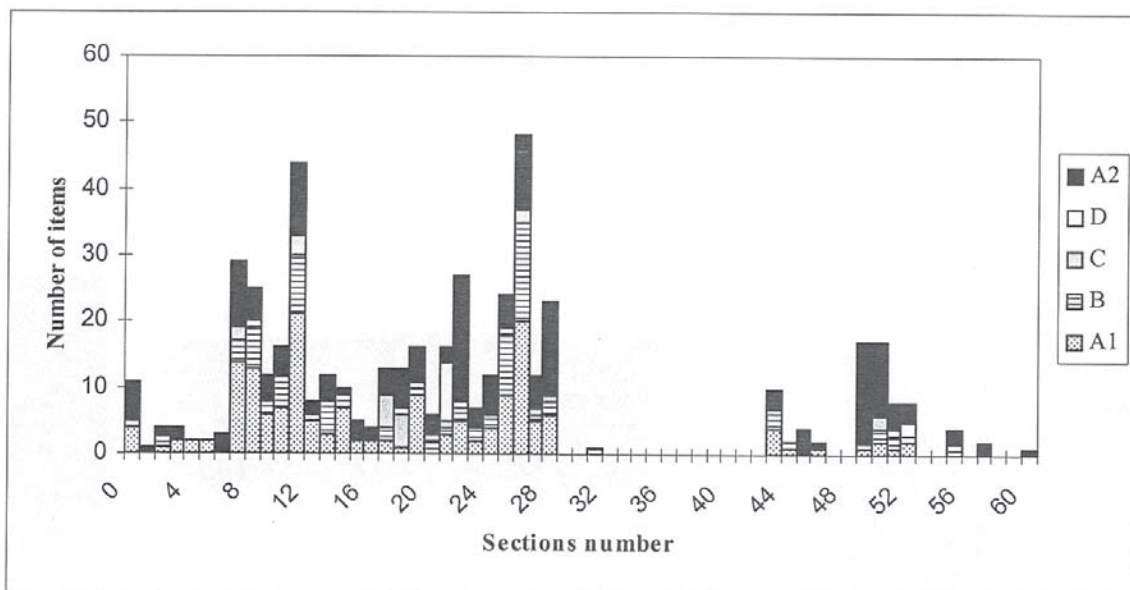


Figure 17. Distribution of forming techniques along the erosion front.

Table 9. Forming Technique by Collection Unit

| Collection Unit | Forming Technique | | | | | Total |
|-----------------|-------------------|-----|----|----|----|-------|
| | A1 | A2 | B | C | D | |
| EEF | 174 | 190 | 87 | 36 | 13 | 500 |
| EH13 | 9 | 8 | 2 | - | - | 19 |
| EH21 | 19 | 25 | 4 | 2 | - | 50 |
| ER1 | 14 | 26 | 4 | - | - | 44 |
| Total | 216 | 249 | 96 | 38 | 13 | 613 |

Whatever the ceramic unit, the main forming technique is paddle and anvil (group A). The technique of molding into a concave basket mold (group D) is not to be found in any of the three test pits, and modeling (group C) appears in only two sherds in EH21; nevertheless, considering the small number of sherds found in the test pits, this is not necessarily meaningful as it concerns technological groups that are also a minority in the erosion front.

All five technological groups are present all along the erosion front, and no particular grouping was observed (Fig. 17).

V.3. Surface Finishing Techniques

V.3.1. Descriptive System

Surfaces vary according to two criteria:

- (1) The surface microtopography is more or less flattened, due to the varying extent of the smoothing on the wet paste. The lack of striations indicates that a hard tool was used.
- (2) A gloss indicates that a very light polishing of the internal or external surfaces took place.

Taking into account the combination of these two criteria on the internal or external sides of the sherds, I have established four types of surface treatment:

- a.* Light smoothing
- b.* Light smoothing and light polishing
- c.* Thorough smoothing
- d.* Thorough smoothing and light polishing

V.3.2. Surface Finish in Collection Units

I have been able to determine the finishing techniques used in only 320 sherds from eef. among these, 234 (about 73%) reveal a light smoothing and light polishing (type b), either on both sides or on the external surface of the sherd (table 10). Only seven fragments (about 2% of the corpus) show a thorough smoothing and light polishing (type d) either on both sides or on the external surface. Eleven sherds (about 3.5%) were thoroughly smoothed on both sides (type c). Finally, 68 fragments (about 21.5%) were only lightly smoothed (type a).

In EH21, 11 sherds belong to type a, 18 to type b, 4 to type c, and 3 to type d (Table 10).

In EH13, 2 sherds belong to type a, 5 to type b, 3 to type c, and 4 to type d (Table 10).

In ER1, 13 sherds belong to type a, 15 to type b, and only 1 to c. type b is not represented (Table 10).

In all units a majority of the sherds were lightly smoothed and lightly polished. nevertheless, thoroughly smoothed sherds were indeed found in ekven, even though they are in small number.

Table 10. Finishing Technique by Collection Unit

| Collection Unit | Finishing Technique | | | | Total Sherds |
|-----------------|---------------------|-----|----|---|--------------|
| | a | b | c | d | |
| EEF | 68 | 234 | 11 | 7 | 320 |
| EH21 | 11 | 18 | 4 | 3 | 36 |
| EH13 | 2 | 5 | 3 | 4 | 14 |
| ER1 | 13 | 15 | 1 | - | 29 |

V.4. Firing

Sherd colors vary from light yellowish brown (10YR 6/45) to black (2.5YR 2/0) with a large variety of shades, several of which may be found on a single sherd (light brownish gray, 10YR 6/2; very pale brown, 10YR 7/3; grayish brown, 10YR 5/2; dark brown, 7.5YR 3/2; dark gray, 7.5YR 4/0). Many factors other than firing can determine the color, such as paste composition or taphonomic processes. The firing mode can therefore not be determined based on this criterion alone. However, the variety of shades and the traces of fireclouds suggest a bonfire, a circumstance in which the fuel was in direct contact with the pots.

The core of the sherds is usually darker than the sides, which may indicate that the firing time was short (only partial oxidation) but can also be explained by a high density of organic material in the paste.

⁵ Color code from Munsell Color (1988).

There is also no link between the forming technique and the finishing method (Table 12). Thorough smoothing is found only in the paddle and anvil technique (group A2). Nevertheless, other finishing techniques are also observed in this group.

Table 12. Relationship of Finishing and Forming Techniques

| Forming Technique | Finishing Technique | | | | Total Sherds |
|----------------------|---------------------|-----|----|---|-----------------|
| | a | b | c | d | |
| <i>Unit EEF</i> | | | | | |
| A1 | 18 | 127 | - | - | 145 |
| A2 | 21 | 41 | 11 | 7 | 80 |
| B | 16 | 45 | - | - | 61 |
| C | 12 | 13 | - | - | 25 |
| D | 1 | 8 | - | - | 9 |
| <i>UnitEH21</i> | | | | | |
| A1 | 3 | 12 | - | - | 15 |
| A2 | 6 | 4 | 4 | 3 | 17 |
| B | 3 | 1 | - | - | 4 |
| C | - | - | - | - | 0 |
| D | - | - | - | - | 0 |
| <i>Unit EH3</i> | | | | | |
| A1 | 2 | 4 | - | - | 6 |
| A2 | 2 | 3 | - | 1 | 6 |
| B | - | 2 | - | - | 2 |
| C | - | - | - | - | 0 |
| D | - | - | - | - | 0 |
| <i>Unit ER1</i> | | | | | |
| A1 | 6 | 10 | - | - | 16 |
| A2 | 6 | 22 | 1 | - | 9 |
| B | 1 | 3 | - | - | 4 |
| C | - | - | - | - | 0 |
| D | - | - | - | - | 0 |

No correlation can be established between the vessel type and the different steps of the production sequence. Thus, as the material from the erosion front shows, a wide variety of tempers (Table 13) and forming techniques⁶ (Table 14) are found on same vessel types.

Table 13. Relationship of Vessel Type and Paste Type, Unit EEF

| Paste Type | Vessel Type | | | | | |
|------------|-------------|----|----|----|----|----|
| | R1 | R2 | R3 | U1 | U2 | U3 |
| P1 | 17 | 1 | 1 | 5 | 25 | 22 |
| P2 | 1 | - | - | 3 | 5 | - |
| P3 | 1 | - | - | 3 | 5 | - |
| P4 | 1 | - | - | - | 1 | - |
| P5 | 1 | - | - | 1 | 1 | 1 |
| P6 | - | - | - | - | 1 | 1 |

Table 14. Relationship of Vessel Type and Forming Technique, Unit EEF

| Forming Technique | Vessel Type | | | | |
|-------------------|-------------|----|----|----|----|
| | R1 | R2 | U1 | U2 | U3 |
| A1 | 6 | - | 3 | 10 | 6 |
| A2 | 11 | - | 8 | 16 | 13 |
| B | 1 | 1 | 1 | 7 | 5 |
| C | 1 | - | 1 | 1 | 1 |

One should thus note the great flexibility in the making of ceramics at Ekven, which results from the free combinations of the variables identified at each step in production.

⁶ The angled-shoulder vessel seems to have been fashioned in two steps, since a join is visible in the angle of the bend. However, as there was only one fragment of this type, it was not possible to determine the exact forming technique.

VI. COMPARISON OF EKVEN AND ALASKA

As I did not have access to the small bibliography on Siberian ceramics,⁷ I have centered my comparative analysis on the ceramics from Alaska. This analysis is based on several more or less recent works: Arnold and Stimmell (1983), Collins (1937), Dumond (1998), Ford (1959), Harritt (1994), Lucier and VanStone (1992), Oswald (1955), and Stimmell (1994).

Morpho-Functional Types

The main morphological types observed in ekven have all been described for Neoeskimo sites in Alaska.

Restricted vessels (R1) are reported at point hope, in the Seward Peninsula, and near East Cape, associated with a “Barrow Curvilinear Paddled” type present from Birnirk to Thule (Harritt 1994:419; Oswald 1955:36). This form has also been described in ceramics from St. Lawrence island attributed to Old Bering Sea (Dumond 1998).

Restricted vessels with angled shoulders (R3), called “situla-shaped,” seem to be a recent form, associated only with the Thule stage from 1000 ad onward (Oswald 1955; Stimmell 1994:42-43). “Barrel-shaped” pots, or nearly vertical-sided vessels (U3), are also documented in various Neoeskimo sites of Alaska: in the Old Bering Sea ceramics of St. Lawrence Island (Dumond 1998), at the Birnirk site (Ford 1959:202-203), at the site of Nunagiak attributed to Punuk (Ford 1959:202), at different sites attributed to Thule culture such as Utkiavik (Ford 1959) and Walakpa (Stanford 1976:57), and at sites of the Seward Peninsula (Harritt 1994:418-421).

Extremely unrestricted vessels (U1) and slightly restricted vessels (U2) are also described in different regions and periods: in Old Bering Sea pottery from the Hillside site at Gambell on St. Lawrence Island (Dumond 1998), from the Birnirk site (Ford 1959:203), from Nunagiak where it is assigned to Punuk (Ford 1959:202), and from Thule contexts Ford 1959:197, 201; Stimmell 1994).

I have found no reference to necked vessels in the literature. Unfortunately, the neck fragment found in ekven doesn’t allow a reconstruction of the overall shape of the body.

Apart from the situla-shaped pottery, which may be associated with later Thule culture, the types found in Ekven are thus documented in Alaska in the entire Neoeskimo sequence. In some cases, these shapes are associated with flattened or conical bases. The rounded bases found in Ekven have long been considered a characteristic of Old Bering Sea (Oswald 1955), but they have since been reported for more recent periods, including the late prehistoric (Harritt 1994:165).

By ethnographic analogy, the Bering Strait pots have been considered to belong to two main functional categories: Cooking pots and lamps, which are almost always found together in the Neoeskimo sites. Morphologically, the Ekven vessels may be interpreted as belonging to these same two functional types. The restricted (R1, R2, and R3) and nearly vertical-sided (U3) vessels of Ekven, the

⁷ For example, publications in Russian by Dikov, Arutyunov, and Sergeev.

average wall thickness of which is below 10 mm (never more than 18 mm), correspond to the cooking pots. Many sherds are encrusted with a layer of soot, which seems to indicate that they were in contact with fire.

The extremely (U1) and slightly (U2) unrestricted pots, with wall thicknesses averaging 13.5 mm up to 27 mm, may be interpreted as oil lamps. Their morphology is similar to that of the shallow saucer-shaped lamps described for St. Lawrence Island (Collins 1937:168; Dumond 1998) and for Utkiavik, Nunagiak, and Birnirk (Ford 1959:201-203; Stimmell 1994:42). In these sites, round and oval shapes have been noted. At Ekven, the presence of these two types cannot be ruled out, even if no fragment is big enough to attest absolutely to their existence. As Dumond wrote concerning the lamp sherds collected at hillside, it can be said about Ekven that “none of them displays absolutely clear evidence of interior burning, and it is possible that they include at least some vessels other than lamps” (Dumond 1998:40).

Concerning the morphology of the lips, there is a degree of variability in the Alaskan ceramics. Most are rounded, flattened, and some have an inward bulge (Ford 1959:203; Dumond 1998:41, Oswalt 1955). No specific form can be clearly associated with a particular culture or period.

Decoration

There is very little information concerning lip decoration in Alaska. As in Ekven, undecorated lips are the most common. Diagonal lines across the top and herringbone patterns (types D2, D3, and D4) are described for Birnirk (Stimmell 1994:41) and Thule wares (Ford 1959:202; Oswalt 1955).

Body decoration is the element best described in the ceramic studies conducted in Alaska. Curvilinear impressions seen at Ekven are clearly integrated into the “Barrow Curvilinear Paddled” type observed from Birnirk times to historic contact (Oswalt 1955:36; Stimmell 1994), and to the “Ahteut Curvilinear Paddled” type assigned to Thule (Oswalt 1955:36). Such decoration has been found in various sites in coastal Alaska from the Colville River mouth to Cape Denbigh (Oswalt 1955:36), in Ahteut (Oswalt 1955:36), in the sites of the Seward Peninsula (Harritt 1994:418-421), at Walakpa (Stanford 1976:57), and near Point Barrow (Ford 1959:204). These motifs are clearly distinguished from corrugated decorations, characteristic of Old Bering Sea (Dumond 1998; Ford 1959:204; Oswalt 1955:32).

Temper

As at Ekven, varied combinations of organic (feathers, grass, or hair) and mineral (sand, gravel, or crushed rock) temper is to be found in all the ceramic corpuses of Alaska (Arnold and Stimmell 1983; Dumond 1998; Ford 1959:201-204; Harritt 1994:163-164 and 418-421; Oswalt 1955; Stimmell 1994). These combinations vary in a single chrono-cultural stage, so that they cannot be considered temporally or culturally diagnostic.

Forming Techniques

To my knowledge, no precise study of surface features has been conducted for Beringian ceramics. Nevertheless, certain elements hint at the existence in Alaska of the main forming techniques recognized in Ekven.

The use of the paddle and anvil technique (group A) may only be identified thanks to the curvilinear decorations impressed on the external side of the sherds. Only type A1 (with an engraved paddle) has thus been identified in the literature. The paddle and anvil technique seems to have been used at every stage of Neoeskimo production. Curvilinear decorations are indeed found on “Norton Linear Stamped” and “Norton Check Stamped,” “St. Lawrence Corrugated,” “Barrow Curvilinear Paddled,” “Ahteut Curvilinear Paddled,” and “Nunivak Check Stamped” types (Oswalt 1955). Several authors suggest the hand was used as an anvil (Dumond 1998:38; Oswalt 1955:34). However, the lack of a more precise description of surface features, in particular on the inside wall, makes it impossible to confirm this hypothesis. The main question is to determine if the described pots were first fashioned by modeling and then shaped by paddling, as in Ekven; or if the paddle was only used to decorate a preformed pot. Oswalt suggests that certain types were fashioned by coiling (Oswalt 1955), a technique that is absent in Ekven. Concerning the plain wares associated with paddled types, we can only presume the use of the paddle and anvil technique with a non-engraved paddle (group A2).

Molding on a basket also exists in Alaska and can be identified thanks to the matting impressions described on the pottery. However, it is sometimes difficult to infer from the literature whether the impressions are on the inside or outside vessel walls, and thus to distinguish concave (group D) from convex (group B) molding.

Oswalt states that convex molding was used in Thule-period ceramics at Ahteut (Oswalt 1955:35). Internal matting impressions were also observed for the same stage in the Seward Peninsula (Harritt 1994:163, 419), and on more ancient vessels in Birnirk (Ford 1959:204).

Concave molding, ethnographically documented (description by Curtis in Lucier and VanStone 1992:7), appears in late prehistoric sites in Kotzebue Sound (Lucier and VanStone 1992:11-12). Stimmell also refers to the existence of external matting impressions on more ancient Birnirk wares (Stimmell 1994:42).

Though modeling has often been mentioned concerning Alaskan ceramics (Oswalt 1955), no description of the surface features is clear enough to confirm these interpretations.

Finishing

Most descriptions of Alaskan pottery mention a light smoothing; only one of them evokes a more thorough polishing in Birnirk and late Neoeskimo wares (Stimmell 1994). However, as the polishing observed in Ekven is very light, it is possible to imagine that authors simply did not describe it.

VII. CONCLUSION

The Ekven ceramic, which is quite homogeneous in terms of decoration and morphology, is however extremely varied in terms of technology. The variables observed in Ekven were also described in several sites in Alaska and in almost all Neoeskimo cultures, so that none of them can be clearly placed from a chrono-cultural point of view. In currently available data, the most informative trait is the curvilinear design that enables us to assign the Ekven ceramics to a post-Old Bering Sea stage.

Apart from dating and chrono-cultural attribution issues (Bronshstein and Plumet 1995; Gerlach and Mason 1992), I was confronted in this study by the scarcity of comparative data available on Siberian and Alaskan ceramics. In spite of these problems, I am convinced that the technological variability observed in Ekven, over a large span of time, is an encouraging indication of the amount of information that Eskimo ceramics could yield, thus contributing greatly to the reconstruction of the chrono-cultural framework of Bering Strait prehistory.

Acknowledgments. I here express my appreciation to H el ene Tison for her assistance with my English.

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PART IV

Bering Strait and Eastward

The three chapters in this final part are diverse, with parts or all of the first two having been previously published in Russian. Chapter 9 presents original information regarding variation between paired radiocarbon ages from the Asian coast at Bering Strait, one of each pair on marine residues, the other on terrestrial material. This, with some previously published and comparable data from St. Lawrence Island and Cape Prince of Wales, is used as a basis for calculations directed at ascertaining a local correction factor to use in computerized calibration of radiocarbon dating of material such as sea-mammal bone or fat from the oceanic environment. This follows measures recommended some years ago by dating specialists (e.g., Stuiver and Braziunas 1993).

Chapter 10 reports a recent resumption of at least minor work at the site of *Chertov Ovrug*, or Devil's Gorge, located on southern Wrangel Island off the north shore of Chukotka. Earlier work has been published in English by Dikov (1988), and the materials have been of interest because of presumed similarities to finds from the American north that are interpreted as indicating a similarly early adaptation to Arctic coasts.

Chapter 11, then, presents a set of reactions by one of the editors from the viewpoint of Alaska-based research. This provides background information relevant to some of the chapters in this collection and attempts a very slight measure of synthesis.

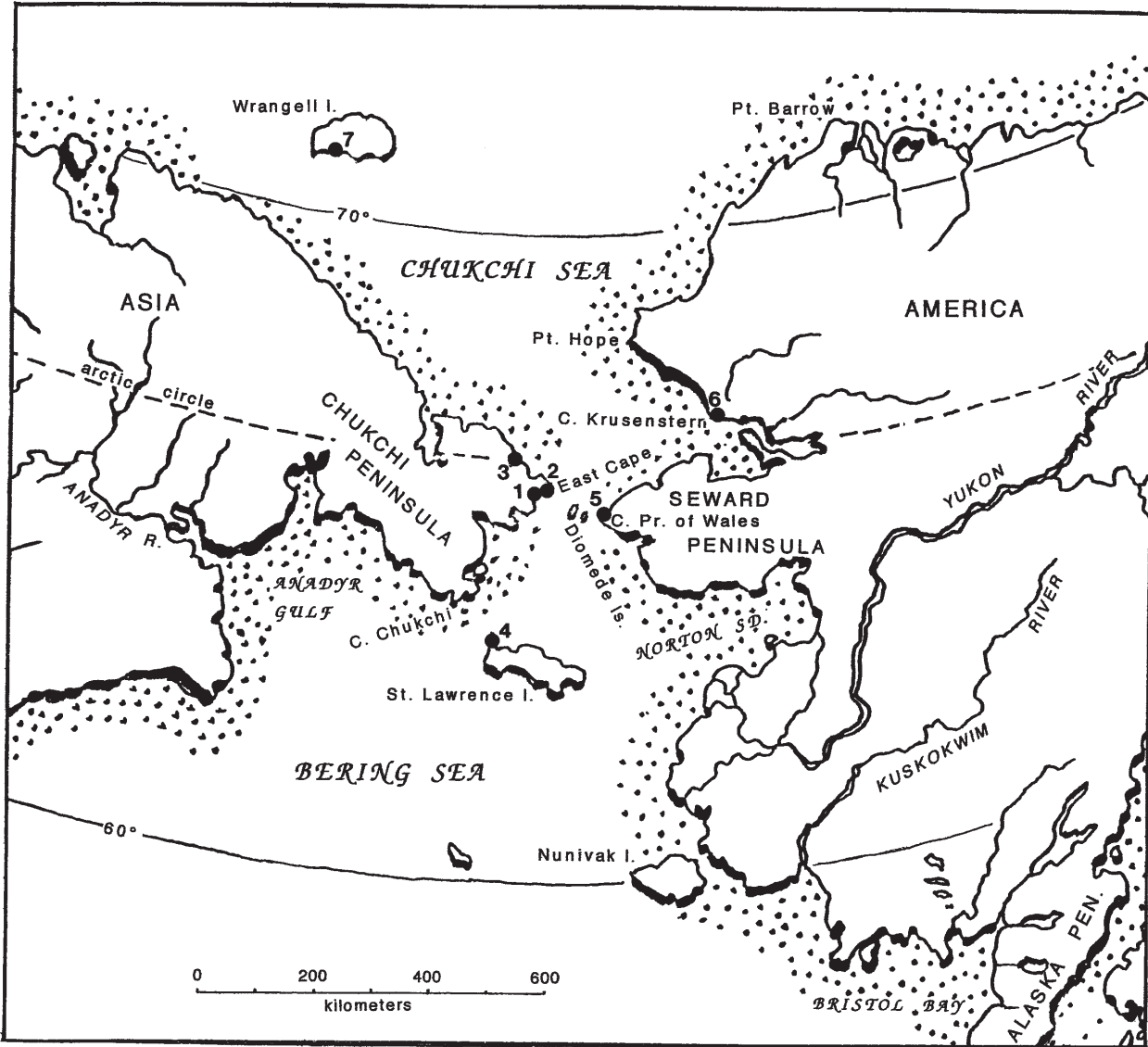
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Stuiver, Minze, and Thomas F. Braziunas

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The Bering Strait region, with some locations mentioned in chapters of Part IV. Numbered sites: 1, Ekven; 2, Dezhnev; 3, Paypelgak; 4, Gambell vicinity, St. Lawrence Island; 5, Wales, at Cape Prine of Wales; 6, Onion Portage, at Cape Krusenstern; 7, Chertov Ovrage or Devil's Gorge, on Wrangel Island.

Chapter 9

On the Marine Reservoir Effect in the Northern Bering Sea

B. F. Khassanov and A. B. Savinetsky¹

INTRODUCTION

Efforts to establish the age of archaeological sites on the coasts of Chukotka and Alaska have frequently involved the radiocarbon dating of the remains of marine animals. For purposes of accuracy in all radiocarbon dating, raw “age” measurements, must be transformed into calendar ages in order to adjust for a known and minor inaccuracy in the half-life of radioactive carbon (^{14}C), and to correct for oscillations of radioactive carbon in the atmosphere. When calibrating radiocarbon data derived from marine organisms, however, a still further correction must be made for a marine reservoir effect. In the past few decades several computer programs have been developed for these age calibrations, using calibration curves designed for both terrestrial and marine samples.

The marine reservoir effect reflects peculiarities of the carbon cycle in the marine environment. Specifically, atmospheric ^{14}C results from cosmic bombardment that varies in response to fluctuations in the strength of terrestrial and interplanetary magnetic fields. Although the level of this radioactive carbon appearing in the worldwide atmosphere is roughly constant at any given time, the speed of carbon exchange between the atmosphere and ocean waters is slowed to the point that radiocarbon “ages” from marine environments appear greater than those from terrestrial situations, and the degree of this slowing is dependent on water depth. As a result, organisms in deep waters or in waters near the surface in which deeper waters regularly upwell, are dated by radiocarbon as “older” than organisms from less mixed surface waters, which in turn appear “older” than those taken from dry land. For the purpose of calibration, the difference between radiocarbon ages of contemporary marine and terrestrial organisms can be thought to consist of global and regional components.

The global component incorporated in computer programs designed for marine samples is a gross average of the worldwide difference manifested between terrestrial organisms and those from shallow waters; it has been estimated at about 400 years (Berger et al. 1966) — although it has also been shown that this figure varies with time (Stuiver and Braziunas 1993). Beyond this, however, there is an additional regional correction for individual areas that relates to many local factors, in

¹This is a slightly expanded version of a paper that appeared in 2002 in the Russian series *OPUS: Interdisciplinary Investigation in Archaeology*, published by the Institute of Archaeology, Russian Academy of Sciences, Moscow. It appears here with permission.

particular the amount of local upwelling of waters from greater depths. This additional quantity must be entered into the computer program manually and is designated ΔR . Although results of ΔR measurements from many parts of the world are available on the worldwide web,² there are still few data available for the Bering Sea region. For this area, D. E. Dumond and D. G. Griffin (2002) have conducted some measurements of the marine reservoir effect in the eastern portion, while M. Stuiver and T. F. Braziunas (1993) reported a ΔR value for the southern zone. In this paper we aim to calculate a ΔR value for the northern part of the Bering Sea region on the basis of both original and previously published data.

MATERIAL AND METHODS

In order to measure the ΔR value in the northern part of the Bering Sea region, we first radiocarbon dated marine and terrestrial organisms derived from the same archaeological context. To the extent that we can determine, this provenience ensures the same depositional age of organisms of different origins. The radiocarbon was measured by the Historical Ecology Group of the A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Science (RAS), and measurements of $\delta^{13}\text{C}$ were conducted in the Laboratory of Geochronology of the Geological Institute, RAS. The value of $\delta^{13}\text{C}$ for bowhead whale baleen was determined at -16.7‰ ; for gray whale bones -14.0‰ ; for bones of smaller sea mammals -13.1‰ (Khassanov and Savinetsky 2002). These values were then used for correction of isotope fractionation (Mook and Waterbolk 1985), so that in the text below the radiocarbon data are reported only as “conventional” ages (i.e., corrected to -25‰).

Both marine and terrestrial measurements in each pair were then calibrated with the OxCal calibration program: terrestrial data by use of the *intcal98.14c* calibration curve, marine data with the *marine98.14c* calibration curve. In calibration of marine measurements we have set the ΔR value as zero; thus the difference between our marine and terrestrial calibrated results will be a practical individual measurement of the regional ΔR . Subsequent averaging of the values obtained for each pair provides a figure that then can be used more generally in calibration of radiocarbon data derived from marine organisms from the northern part of the Bering Sea.

DATA AND RADIOCARBON MEASUREMENTS

Ekven

This settlement is located on the northeastern coast of the Chukotka Peninsula. At present it is being rapidly degraded by the sea, its seaward side now an erosion cliff. Samples for radiocarbon dating were collected from both the eastern (profile 1/98) and central (profile 2/98) parts of this erosion face. In profile 1/98 the culture level, 150 cm thick, is clearly visible. A horizon rich in sea mammal bones, baleen, sea shells, charcoal, and plant remains is situated at a depth of 60 – 83 cm below the surface and is bounded by peat layers. We suppose that this horizon was formed during a relatively short interval.

² See <http://www.qub.ac.uk/arcpal/marine/>.

A segment of bowhead baleen, a fragment of gray whale skull, and wood of tundra shrubs have all been sampled within this horizon. Radiocarbon age measurement of the sea mammal remains provided a conventional (uncalibrated) radiocarbon age of the bowhead baleen at 1077 ± 73 years BP (IEMAE-1270), and that of the gray whale skull at 1207 ± 92 years BP (IEMAE-1282). These data are close enough that in the course of subsequent analyses we use the averaged figure of 1142 ± 59 years as the age of marine organisms from this horizon. The conventional radiocarbon age of tundra shrub wood from the same horizon was determined at 503 ± 57 years (IEMAE-1269). These two figures constitute our first pair of radiocarbon ages of marine and terrestrial organisms as shown in Table 1.

Table 1. Differences in Conventional Age between Paired Marine and Terrestrial Organisms from the Same Archaeological Context, Northeast Chukotka

| Numbered Pair | Conventional Age, Marine Material | Conventional Age, Terrestrial Material | Difference |
|----------------|-----------------------------------|--|---------------|
| 1. (Ekven) | 1142 ± 59 | 503 ± 57 | 639 ± 82 |
| 2. (Ekven) | 1615 ± 30 | 923 ± 28 | 792 ± 41 |
| 3. (Ekven) | 2385 ± 96 | 2158 ± 85 | 227 ± 128 |
| 4. (Ekven) | 1650 ± 34 | 1430 ± 200 | 220 ± 202 |
| 5. (Dezhnevo) | 2774 ± 92 | 1921 ± 83 | 853 ± 124 |
| 6. (Paypelgak) | 1658 ± 47 | 731 ± 22 | 927 ± 52 |

The thickness of the cultural level in profile 2/98 reaches 310 cm. From this, the horizon situated at a depth of 210 – 262 below the surface stands out because of its clear, layered structure and great quantity of bones, baleen, sea shells, driftwood, charcoal, and plant remains. Within it, layers of 4 – 8 cm thickness have been separated according to natural stratigraphy, and samples of bowhead baleen and the wood of tundra shrubs have been collected from each. Results of the resultant radiocarbon determinations are presented in Table 2.

Table 2. Radiocarbon Determinations from Marine and Terrestrial Organisms, Profile 2/98, Ekven Settlement

| Depth (cm) | Baleen of Bowhead Whale | | Plant Remains | |
|------------|-------------------------|-------------------|----------------------|-------------------|
| | Conventional Age, BP | Laboratory Number | Conventional Age, BP | Laboratory Number |
| 210 – 218 | 1958 ± 44 | IEMAE-1235 | 557 ± 61 | IEMAE-1240 |
| 218 – 226 | 1258 ± 72 | IEMAE-1274 | 1235 ± 72 | IEMAE-1271 |
| 226 – 230 | 1494 ± 76 | IEMAE-1275 | 1289 ± 45 | IEMAE-1239 |
| 230 – 235 | 1718 ± 63 | IEMAE-1276 | 612 ± 43 | IEMAE-1258 |
| 235 – 240 | 1747 ± 75 | IEMAE-1272 | - | - |
| 240 – 246 | 1719 ± 66 | IEMAE-1273 | - | - |
| 246 – 252 | - | - | - | - |
| 252 – 258 | - | - | 2158 ± 85 | IEMAE-1233 |
| 258 – 262 | 2385 ± 102 | IEMAE-1234 | - | - |

Clearly, the horizon as a whole accumulated consecutively, but with inversions in the upper half with regard both to baleen and plant remains — presumably because of the high accumulation rate of the horizon overall. For this reason, we decided to use averaged ages of the four upper layers for subsequent analysis, whereby the age of bowhead baleen was calculated as 1607 ± 32 years. At the depth 230 – 235 cm, a rib of gray whale has been sampled as well, its conventional radiocarbon age equal to 1645 ± 75 years (IEMAE-1277). These figures are close enough, and in the course of subsequent analysis we use the figure of 1615 ± 30 years — the mean of the total five determinations from whale remains from layers 210 – 235 cm — as the conventional age of marine organisms from these layers. An averaged age on plant remains from the same layers is 923 ± 28 years BP. Thus, these two figures constitute the second pair of radiocarbon measurements of marine and terrestrial organisms, while the data from the bottom layers provide the third (Table 1).

In the course of excavations in the Ekven settlement (Dneprovsky 2002), a human skeleton with remains of soft tissue was found inside house structure H18. Two samples of human hair were dated by the Dating Laboratory of the National Museum (Copenhagen, Denmark), and Dr. Hans Kapel has kindly provided us with the results. The conventional radiocarbon age of these remains was calculated at 1645 ± 45 (AAR-2776) and 1650 ± 50 (AAR-2777) years BP. The human skeleton lay on a bedding of leaves, and the radiocarbon age of plant remains from the bed was determined at 1430 ± 200 years BP (IEMAE-1197). This, along with the mean of age measurements from the human skeleton (1650 ± 34), make up the fourth pair (Table 1).

Dezhnevo

The Dezhnevo settlement is located 8 km northeast of Ekven. Kitchen middens 120 cm thick were excavated inside the settlement in 1989; a full description as well as the results of bone identifications have been published elsewhere (Dinesman et al. 1999). In this paper we take the radiocarbon data from sea mammal bones of the bottom layer of the deposit (2774 ± 99 years BP [IEMAE-893]) and plant remains from the buried sod found immediately beneath the middens (1921 ± 83 years BP [IEMAE-878]) to provide the fifth paired data set of marine and terrestrial organisms (Table 1).

Paypelgak

The Paypelgak settlement is located near the mouth of the Chegitun River on the Chukotka sea coast. Dr. K. Dneprovsky kindly provided us with samples of driftwood and the wood of tundra shrubs from the house structure as well as sea mammal bones from the collection associated with the same house structure. The conventional radiocarbon age of the bones was calculated at 1658 ± 47 years BP (IEMAE-1367). The conventional age of the driftwood at 673 ± 31 (IEMAE-1360) and that of the wood of tundra shrubs at 789 ± 30 (IEMAE-1362) are close enough for us to use their average (731 ± 22 years) for the analysis. These constitute the sixth pair (Table 1).

Table 3. Differences in Conventional Age between Paired Marine and Terrestrial Organisms from the Same Archaeological Context, U.S. Territory (after Dumond and Griffin 2002)

| Numbered Pair | Conventional Age of Marine Material | Conventional Age of Terrestrial Material | Difference |
|----------------------------|-------------------------------------|--|------------|
| 7. (St. Lawrence Island) | 2490 ± 35 | 1770 ± 40 | 720 ± 53 |
| 8. (St. Lawrence Island) | 2194 ± 40 | 1680 ± 40 | 514 ± 57 |
| 9. (St. Lawrence Island) | 1948 ± 78 | 1270 ± 86 | 678 ± 116 |
| 10. (St. Lawrence Island) | 1908 ± 78 | 1530 ± 94 | 378 ± 122 |
| 11. (St. Lawrence Island) | 1588 ± 108 | 1100 ± 86 | 488 ± 138 |
| 12. (St. Lawrence Island) | 1528 ± 84 | 940 ± 78 | 588 ± 115 |
| 13. (St. Lawrence Island) | 1298 ± 84 | 990 ± 86 | 308 ± 120 |
| 14. (St. Lawrence Island) | 1288 ± 92 | 460 ± 86 | 828 ± 126 |
| 15. (Cape Prince of Wales) | 1100 ± 50 | 460 ± 50 | 640 ± 71 |
| 16. (Cape Prince of Wales) | 1220 ± 40 | 590 ± 42 | 630 ± 58 |

DISCUSSION

Dumond and Griffin (2002) have reported results of paired radiocarbon determinations derived from marine and terrestrial organisms recovered from archeological sites in the Bering Sea region, especially the eastern portion, together with detailed descriptions of materials and their contexts. Among other determinations, however, they published ten pairs of marine and terrestrial results from the northern part of the region: eight pairs from St. Lawrence Island and two from Cape Prince of Wales. These latter results are summarized in the present Table 3, where pairs 7 and 8 are from the St. Lawrence Island Hillside site, and pairs 9 through 14 are from Gambell burials. These indicate that differences between conventional radiocarbon ages from marine and terrestrial organisms in the northern segment of the Bering Sea region range from 308 to 828 years.

According to our own data this span is even greater — from 220 to 927 years (Table 1). We take this discrepancy to reflect the nature of radiocarbon measurements, for the real ages of the materials fall within the time intervals defined by the reported uncertainty of the individual radiocarbon ages (Fig. 1). The differences between radiocarbon pairs in Tables 1 and 3 is calculated as the difference between reported mean values, whereas the real differences between ages of marine and terrestrial materials from the same archeological context can be greater or lesser than the differences between reported radiocarbon ages (Fig. 1).

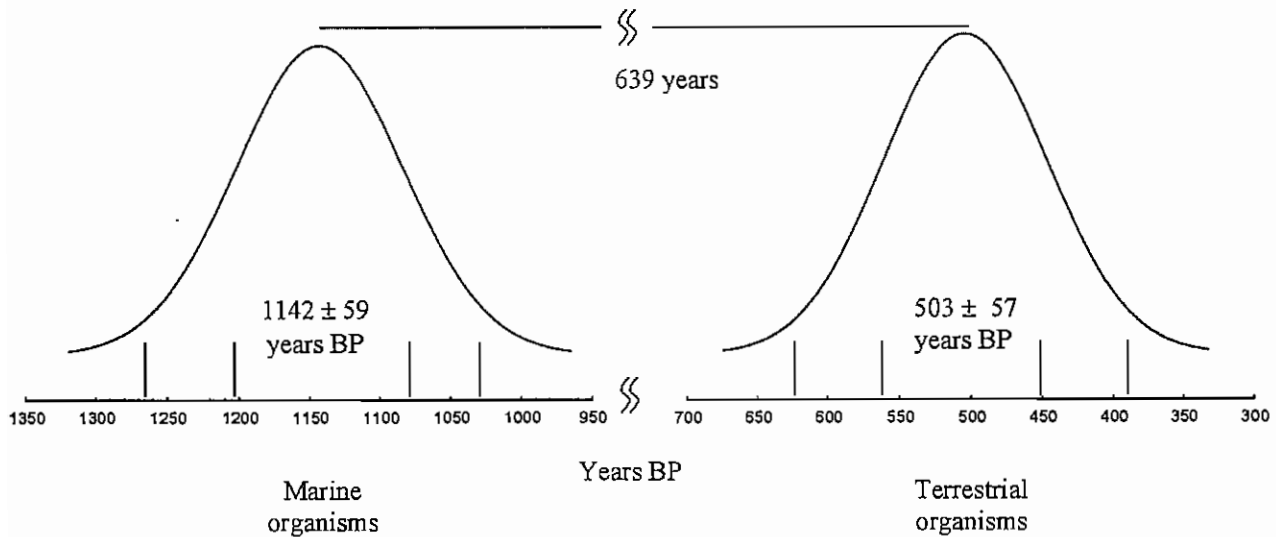
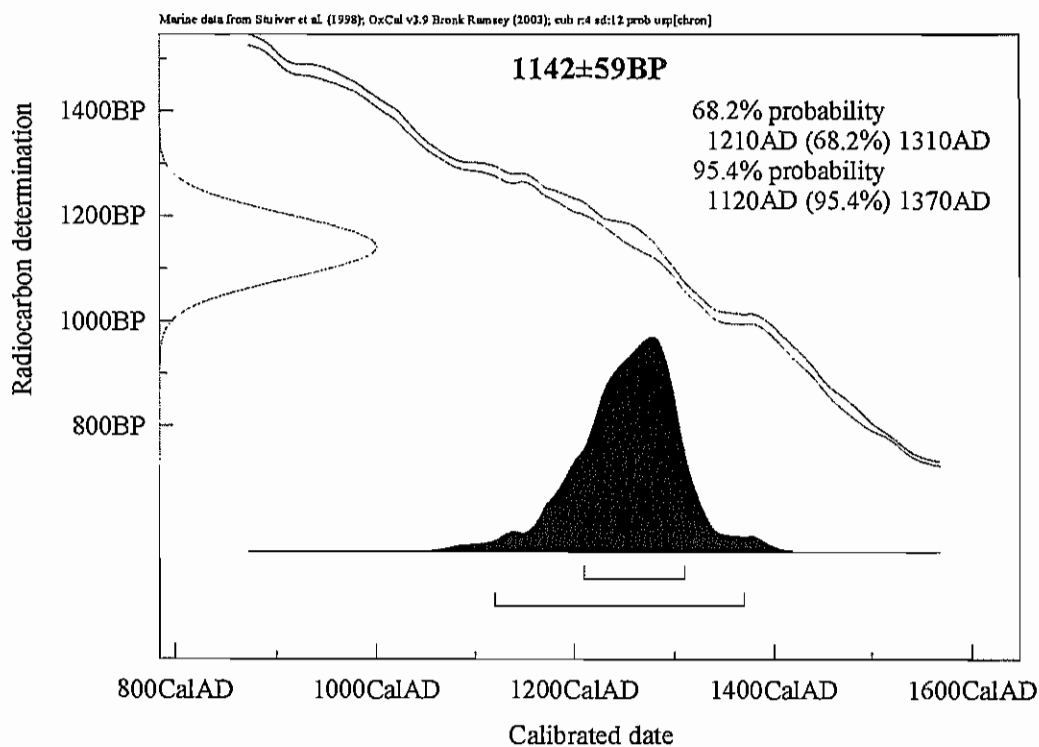


Figure 1. The first pair of radiocarbon determination from marine and terrestrial organisms excavated from the same archaeological context (Table 1).

For practical purposes it is important not only to know the difference between conventional radiocarbon measurements from marine and terrestrial organisms (to which Dumond and Griffin limited their report) but also to arrive at an overall regional correction value (ΔR) that can be entered into computer programs in the course of calibration. Such a calibration transforms the normal probability distribution, characteristic of radiocarbon ages, into a rather intricate probability distribution related to complications in the shape of the calibration curve (Fig. 2). After calibration (see Materials and Methods) the ΔR value can be measured as the difference between the age of terrestrial material and that of marine subjects. But which of the years of the time interval defined as the calibrated date span is to be chosen for these calculations? We decided to use only years within the span in which peaks of probability occurred. For the first pair, shown in Fig. 2, these years are 1277 for marine material and 1336 and 1427 for terrestrial organisms. Subtracting the former (1277) from the latter yields two ΔR values — 59 and 150 years.

A



B

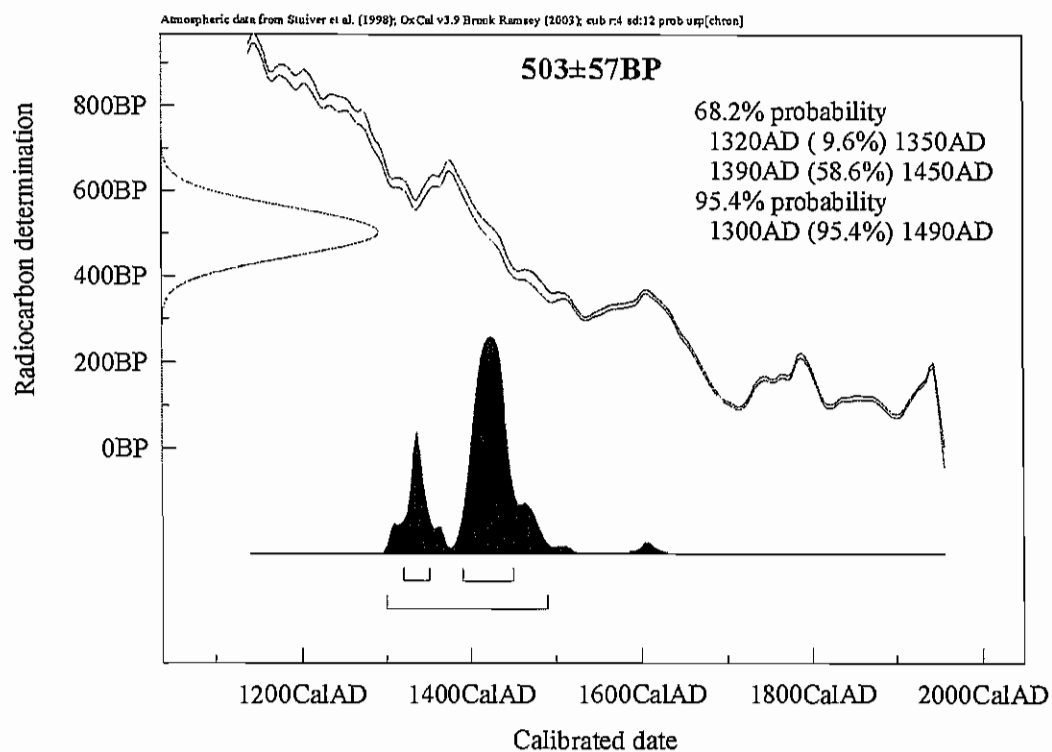


Figure 2. Calibrated ages of the first pair of marine and terrestrial organisms from the same archaeological context: A, marine date; B, terrestrial date.

Table 4. Preliminary ΔR Values from Sixteen Paired Marine and Terrestrial Organisms from the Same Archaeological Context

| Pair Number | ΔR | Pair Number | ΔR | Pair Number | ΔR | Pair Number | ΔR |
|-------------|------------|-------------|------------|-------------|------------|-------------|------------|
| 1 | 59 | 5 | 536 | 9 | 428 | 13 | 36 |
| 1 | 150 | 5 | 561 | 10 | -46 | 13 | 73 |
| 2 | 278 | 5 | 598 | 10 | -13 | 13 | 104 |
| 2 | 295 | 5 | 636 | 10 | 7 | 13 | 131 |
| 2 | 323 | 5 | 648 | 10 | 27 | 14 | 210 |
| 2 | 353 | 5 | 686 | 10 | 47 | 14 | 320 |
| 2 | 373 | 5 | 723 | 10 | 60 | 14 | 341 |
| 2 | 388 | 6 | 563 | 10 | 87 | 14 | 389 |
| 2 | 408 | 7 | 322 | 10 | 107 | 14 | 489 |
| 3 | -22 | 7 | 365 | 10 | 127 | 15 | 37 |
| 3 | -79 | 7 | 430 | 10 | 147 | 15 | 142 |
| 3 | -129 | 7 | 468 | 11 | -4 | 15 | 167 |
| 3 | -158 | 7 | 488 | 11 | 49 | 15 | 212 |
| 3 | -187 | 7 | 499 | 11 | 114 | 15 | 308 |
| 3 | -215 | 7 | 511 | 11 | 161 | 16 | 103 |
| 3 | -258 | 7 | 557 | 11 | 185 | 16 | 126 |
| 3 | -287 | 7 | 407 | 11 | 232 | 16 | 138 |
| 3 | -301 | 8 | 123 | 12 | 121 | 16 | 163 |
| 4 | -280 | 8 | 150 | 12 | 151 | 16 | 193 |
| 4 | -255 | 8 | 185 | 12 | 171 | | |
| 4 | -180 | 8 | 204 | 12 | 221 | | |
| 4 | -105 | 8 | 219 | 12 | 256 | | |
| 4 | -80 | 8 | 242 | 12 | 271 | | |
| 4 | -5 | 9 | 253 | 12 | 296 | | |
| 4 | 33 | 9 | 278 | 12 | 321 | | |
| 4 | 70 | 9 | 303 | 13 | -169 | | |
| 4 | 120 | 9 | 328 | 13 | -106 | | |
| 4 | -166 | 9 | 353 | 13 | -69 | | |
| 5 | 485 | 9 | 403 | 13 | -48 | | |
| 5 | 498 | 9 | 484 | 13 | -16 | | |

Calculations for all 16 pairs are summarized in Table 4. In some cases because of these probability peaks there are as many as ten ΔR values for one pair (i.e., pairs 4 and 10), in others only one (as in pair 6). Yet none of these provides the true ΔR value but rather results from individual measurements, each conducted with some error. That is why in some cases tentative ΔR values turned out to be negative, in others as great as 723 years.

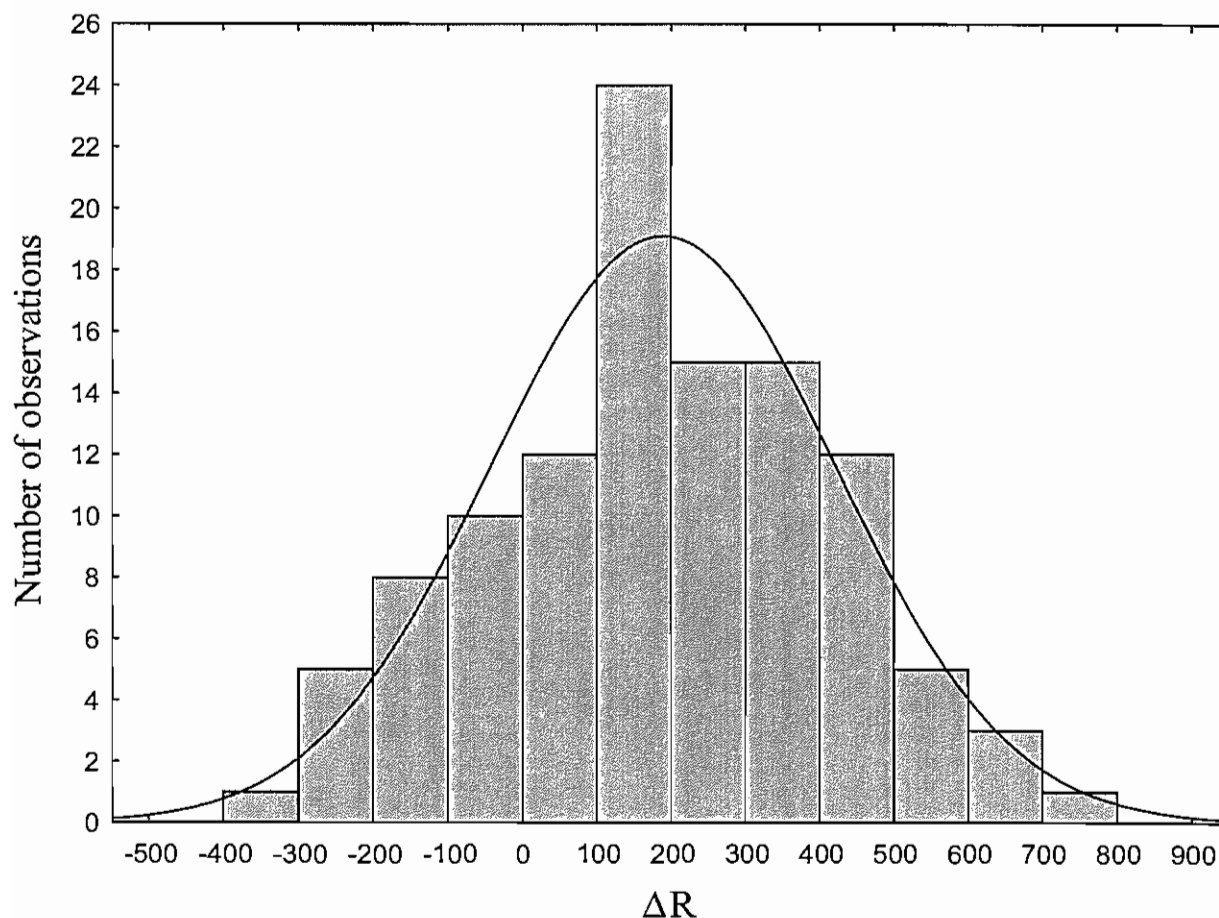


Figure 3. Histogram of ΔR values of 16 pairs of marine and terrestrial organisms from the same archaeological context.

A histogram of these measured values is shown in Figure 3, appearing as a normal distribution characteristic of most physical quantities. Additional paired data will undoubtedly change the shape of the curve and allow us to make still more accurate estimations of the ΔR value. At present, then, the mean value of ΔR for the northern Bering Sea is equal to 188 years. The standard error for this ΔR value is calculated as the square root of the summed variances of the 16 pair-differences divided by the number of analyzed pairs, yielding the figure 27. Finally, then, this allows us to recommend as the ΔR for the northern part of Bering Sea region the value of 188 ± 27 years.

Acknowledgments. We are very thankful to H. Gullov and H. Kapel for providing the results of radiocarbon dating of human bones; to B. Pokrovsky for measurement of the carbon stable isotopes ratio; to R. Blumer, M. M. and I. M. Bronshtein, Y. Csonka, K. A. and K. K. Dneprovsky, and H.-J. Müller-Beck for valuable assistance in realization of field investigations in Chukotka Peninsula; and to Y. Csonka and D. Dumond for fruitful discussion of the parallel dating of marine and terrestrial organisms as well as for samples afforded. The study was supported by the Russian Foundation for Basic Research (03-04-49323), Russian Programs "Origin and Evolution of the Biosphere," "Scientific Basics of Biodiversity of Russia Conservation," "Fundamental Basics of Biological Resources Management," and the U.S. National Science Foundation (OPP-9314472).

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Chapter 10

New Materials for the Interpretation of the Chertov Ovrage Site on Wrangel Island¹

D. V. Gerasimov, E. Yu. Giria, V. V. Pitul'ko, and A. N. Tikhonov

The place of the *Chertov Ovrage* (or Devil's Gorge) site on Wrangel Island among archaeological cultures of the Arctic has remained unclear from the moment of N. N. Dikov's (1977:210–212) discovery of the site in 1975. Through work by Dikov in 1975 and T. S. Tein in 1976, 1977, and 1981, archaeological materials were obtained on the basis of which they interpreted the site as a settlement of early sea mammal hunters (Dikov 1977:210–212; 1988:89–93; Tein 1959). The stone inventory, and especially the head of a bone toggling harpoon, led Dikov to propose a connection of the site with the circle of Paleo-Eskimo cultures (in particular, with the Independence culture of North America and Greenland). In a 1988 publication R. E. Ackerman noted some features possibly relating the collection from Chertov Ovrage to materials of the Old Whaling culture, identified in materials from one site on Beach Ridge 53 at Cape Krusenstern, northwestern Alaska (Ackerman 1988:66–67). In 2000, with the support of a joint program of the RFFI-INTASS (grant No. IR-97-1532), we carried out a small project at Chertov Ovrage. The materials obtained permit proposing a slightly different interpretation of the site.

We opened several trenches for a total area of 24 m² and found that the excavations of previous years had covered practically the whole site, which consists of about 400 m².

A small faunal collection was obtained from the excavation. In addition, a pile of bones was found near the edge of the old excavation. Based on information from L. Nanaun and G. Kaurgin, who took part in the work of Dikov and Tein, bones were stacked in exactly this place during the excavations of 1975–1981. Thus, with at least some degree of certainty these materials can be used to determine the species procured by the early inhabitants of the site. Identification of the faunal materials (carried out by A.N. Tikhonov) indicated that birds were the primary object of the hunt, especially the snow goose. Among pinnipeds, a walrus, a bearded seal, and a seal were identified by one specimen each (Table 1). Of course, based on food value the walrus substantially surpassed the geese, but the quantitative correlation of the species represented in the site attests that the hunt for geese was the primary occupation of the inhabitants there. In any case, such a small quantity of sea mammal bone remains can hardly be considered indicative of long-term settlement by sea mammal hunters.

¹ A version of this was originally published as *Novye materialy k interpretatsii stoianki Chertov Ovrage na o. Vrangelia*, in *The Second Dikov Readings*, pp. 379–383. Magadan (2002): Russian Academy of Sciences, Far Eastern Branch of the Northeast Scientific Center, Northeast Interdisciplinary Scientific Research Institute, Northeastern Branch of the Russian Mineralogical Society.

Table 1. Faunal Remains from the Chertov Ovrag Site, Wrangel Island^a

| Species | MNI | % of Total # of Individuals |
|--------------|-----|-----------------------------|
| Walrus | 1 | 2 |
| Seal | 2 | 4 |
| Bearded seal | 1 | 2 |
| Polar bear | 1 | 2 |
| Snow goose | 32 | 71 |
| Oldsquaw | 6 | 13 |
| Common murre | 1 | 2 |
| Snow bunting | 1 | 2 |

^a Identified by A.N. Tikhonov, ZIN RAN.

The small collection of stone artifacts obtained in 2000 (Fig. 1) consists primarily of tools — scrapers, skreblos, an arrow point, and a chisel. The small number of flakes represent debitage from trimming ground-stone tools. Trace analysis of the stone implements (conducted by E. Yu. Giria, IIMK RAN) indicated that practically all bear traces of long transportation in a skin bag (Fig. 1, 4, 5, 8–10). These traces are similar to those created by working hides; they are located not only on the edges of the tools but also on the ribs of the negative flaking scars. On some tools, negative scars made by trimming the working edge can be recognized as fresher than the remaining surface (Fig. 1, 4, 5, 8, 9). Traces of contact with skin are absent on the ribs of these later scars. On a flake removed during the process of making or trimming a ground-stone tool, traces of contact with soft material can be seen even by the unaided eye (Fig. 1, 1).

The collection gathered in previous years also consists predominantly of tools or blanks.

Thus, the site can be interpreted as a short-term camp of a small group of hunters who brought with them their ready-made tools or blanks. Tools were only touched up at the site. It can be supposed that the camp existed in July-August, when molting occurs — the most favorable time for hunting geese.

The hypothesis proposed by Ackerman concerning the association of the site with the Old Whaling culture appears at present preferable, but requires more substantial evidence.

Both sites have similar radiocarbon dates (Dikov 1988:84; Giddings and Anderson 1986:250). This is corroborated by new ages obtained in the radiocarbon laboratory of Armstrong University in

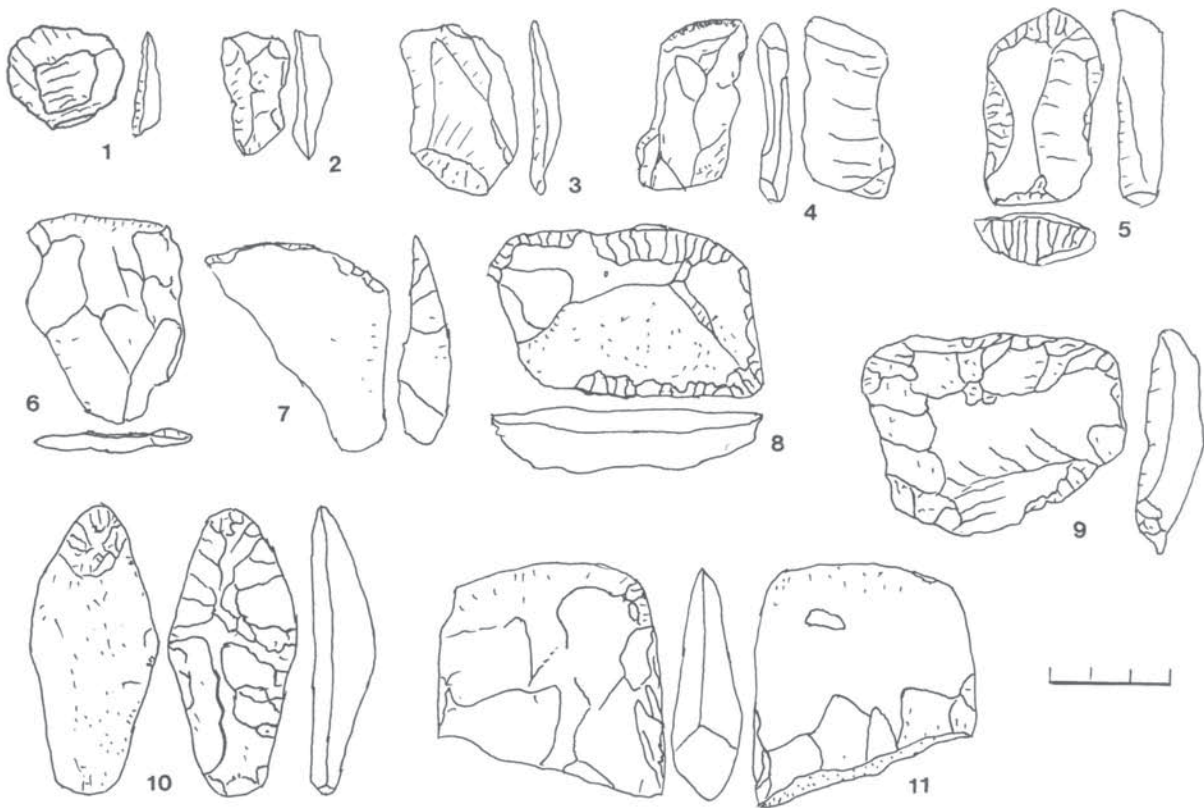


Figure 1. Stone artifacts from the excavations of AD 2000. See text for description; scale is in centimeters.

Upsala, Sweden: on a fragment of walrus bone at 3265 ± 65 (Ua-18085) and on a piece of worked wood at 3345 ± 70 years (Ua-18086).²

Points with lateral notches are considered a similar element. However, distinct from the points from Wrangel Island, those of the Old Whaling culture have a pronounced lanceolate form and a straight base. Scrapers with a stem are present in the collections of both sites, but they make up only a small part of the collection from Chertov Ofrag.

The clearest common element is the toggling harpoon head, with one specimen found at each site (Dikov 1988:86; Giddings and Anderson 1986:248). Although significantly different in dimensions, they are practically identical in form [see Chapt. 11 - eds.]. However, it should be kept in mind that such artifacts are present in the materials of various cultures in the circumpolar zone.

One should not forget that both Chertov Ofrag and the site on Beach Ridge 53 on Cape Krusenstern are unique sites, having no analogs. The recently expressed suggestion of considering materials from Chertov Ofrag and Beach Ridge 53 as possible variants of a “Choris Archaic” culture (Mason and Gerlach 1995) requires a more substantial argument than has been presented. For an understanding of the place of Chertov Ofrag in the system of archaeological cultures in the Beringian region and its relationship with materials of the Old Whaling culture, new materials are necessary — materials which will probably be found on the coast of Chukotka.

²We express our deep gratitude to Professor Goran Possnert for analysis of the samples we brought to him.

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Chapter 11

A Backward Glance from Alaska

Don E. Dumond

This chapter provides a brief statement of the way in which, in the view of one researcher, the materials presented in the preceding ten chapters bear on the archaeology of Alaska in particular, and of North America somewhat more generally. I approach this chronologically, following the general organization of the foregoing text, while warning that the first division — related to Part I (Chapters 1 to 3) concerning Paleolithic matters — will be substantially longer than some of those that follow it, where questions now seem more straightforward.

PALEOLITHIC

The editors point out in the Introduction that the development of information of human occupation in temperate North America preceding, say, 10,000 years ago, came much earlier than did information concerning occupations of comparable age in either more northerly Alaska or northeasternmost Asia. Further, given the notion that aboriginal inhabitants of America came from Asia by way of Alaska, there has been a significant tendency to conceptualize the archaeology of the northern regions in a model influenced by temperate America, with traces of early humans in the north expected to bear some recognizable similarity to early archaeological assemblages in America to the south. This idea will be developed in more detail in this chapter.

Earliest New World Technology?

Suggestions of the existence of a “pre-[stone]projectile point stage” among the earliest American tool industries have had a substantial but somewhat varied history in North America, as summarized briefly by Willey and Phillips (1958:82-86) in discussing the possible earliest aspects of their continent-wide “Lithic” stage of culture. Alex D. Krieger was an especially strong proponent of such a separable pre-projectile point cultural stage (as in Krieger [1964], cited by the author of Chapter 1, above). Whatever the strengths or drawbacks of the view, it did reflect an idea seemingly in accord with the assessment of Movius (1949) that the early Paleolithic of east Asia was one of a “chopper-chopping tool” tradition, rather than one depending on bifacially chipped handaxes, an idea pushed by Chard (1959) as implying that a non-biface technology equipped the first human migrants to the New World.

Early, Early Humans

Not many years ago, excitement was raised by the discovery of an undoubted artifact of carved caribou bone together with other, more dubious, bone artifacts, all amid fossilized faunal remains along the Old Crow River of northwestern Yukon Territory, a short distance east of the Alaska border. The area is a region unglaciated in the late Wisconsin, and the putative bone artifacts were dated (by means of their apatite fraction) to a probable range of 25,000 to 32,000 years BP (Irving and Harrington 1973). The research rush to the region that ensued reportedly documented two unconformities within the deep alluvium of the Old Crow River basin that might represent Pleistocene ground surfaces on which such people had lived; the youngest was dated at about 40,000 BP (Morlan 1978). Despite the absence of any reasonable examples of what might be contemporaneously used stone artifacts, the situation seemed to promise documentation of something on the order of a “pre-[stone]projectile point horizon” in the New World. The bubble was largely burst when the collagen fraction of remnants of the same original and high-profile caribou bone artifact was redated to some 1350 BP (Nelson et al. 1986).

Interest in this northwest Canada region did result in excavations at nearby Bluefish Caves, in which recovered microblades and cores are estimated to date around 12,000 BP, and some microlithic stone chipping detritus was recovered from levels believed on the basis of faunal remains to date well before that time (e.g., Ackerman, ed. 1996). There is, however, still no documented indication of the existence in the New World of a separate and early pre-projectile point stage or period. One must note also that the “Pebble Tool tradition,” as the term has been conceptualized and used more recently in the Pacific Northwest (e.g., Carlson 1996:8-9, with references), and referred to in Chapter 1, above, does not denote such a chopping-tool-only stage as conceptualized by Movius, but includes some well-shaped stone bifaces that depart significantly from putative flakes, flake cores, and pounding stones of what has been proposed as an American pre-projectile point stage of culture.

Paleoindians

As is well known, the real recognition of the presence of humans in the New World by the beginning of the Holocene was based on discoveries in the 1920s at Lone Wolf Creek in Texas and at Folsom in New Mexico of indubitable projectile points evidently associated with forms of extinct bison, finds followed not long after by recognition of the still older fluted-point Clovis culture, also first reported from New Mexico. In succeeding years more and more surface finds and sites with the distinctive fluted projectile or lance points were reported, and finally seen to extend (in somewhat scattered fashion) as the “Llano complex” from one North American coast to the other, south into Central America, and north into at least southern Canada (historical summaries by Haynes [1969] and Wilmsen [1965]). It was well after the original fluted point discoveries that other artifacts, such as large blades punched from prepared cores (Green 1963), were concluded to be part of the same Clovis toolkit. There is now a series of other artifacts that have been so listed (e.g., Tankersley 2004), although their distribution is in no case so well understood as is that of the large fluted Clovis or Clovis-like projectile points.

It is the fluted projectile points in particular that have become the hallmark of the first clearly recognizable and widespread cultural horizon in North America. Conceived by some researchers as representing a specific people, by others as a stylistic horizon that may have been participated in by

peoples of varied ethnicity and economies (see selections in Barton et al. [2004]), there are continuing disputes as to whether or not the horizon represents the first Asian immigrants to America.

Considerable interest, therefore, was aroused when a fluted point was reported from a 1947 geological survey of the Utukok River in northwestern Alaska (Thompson 1948). Not surprisingly, this was taken by numerous scholars to mark an immigration, possibly the first, into the New World from Asia across an exposed Bering land bridge to Alaska, thence southward into terrestrial North America through an open corridor between the major North American ice sheets of the Pleistocene (e.g., Haynes 1964). This Alaskan find was followed in 1950 by finds of two other surface artifacts only a few miles to the south of the first. And in the mid-1960s the Utukok drainage was surveyed by an archaeologist, resulting in the discovery of additional fluted point fragments apparently associated with traces of a blade industry, but in an unstratified context. In the relative proximity of these was an elephant tusk carbon dated at somewhat more than 17,000 BP, but with no specific artifactual association demonstrable. Nevertheless, the crucial sites were taken to represent an Asian incursion at that ancient date (Humphrey 1966; 1971). In almost the same years the Batza T'ena obsidian source was located in the Koyukuk River drainage south of the Brooks Range, with numerous surficial sites in the scatter of which were additional fluted points, undatable under the circumstances (Clark 1972; Clark and Clark 1993).

Unfortunately, the above were without exception surface finds. In the following decade, however, two buried sites with fluted point fragments were located in north Alaska by the trans-Alaska pipeline project, one named Girls' Hill, the other Putu. The unpublished Girls' Hill site also produced side-notched points of the sort commonly assigned in Alaska to the Northern Archaic horizon, dated somewhere around 5,000 years ago, and microblades and wedge-shaped microblade cores; a radiocarbon age from the approximate center of the deposit was about 4,400 years (Dumond 1980:989; Reanier 1995:41). The Putu site (Alexander 1987), as mentioned in the Introduction, produced fragments of fluted points as well as other unfluted lanceolate forms, and was concluded by the excavator to be dated by a remnant campfire with radiocarbon age of $11,470 \pm 500$ years (SI-2382). Through reanalysis and redating the crucial association has been questioned by another investigator, who concluded that the alleged association of fire area with fluted points was not justified, that whereas lanceolate points from the site complex do appear to date from about 8800 BP, the fluted points themselves are simply (as is the case everywhere else in Alaska) undated (Reanier 1995).

At the same time, one must recognize the recent interest in the recurrent and early appearance of large and basally ground lanceolate points in contexts lacking microblades and microcores; most but not all of these sites have been reported from the north slope of the Brooks Range. The most thoroughly sampled, and recently the most talked of, is the Mesa site, located on the north slope of the Endicott Mountains of the Brooks Range, at the southern periphery of the Colville River drainage. Here the great majority of 44 AMS radiocarbon determinations fall between 9,700 and 10,300 years ago, with only two out of the 44 suggesting ages older than 11,000 years (Kunz and Reanier 1995; Kunz et al. 2003). The acceptance of an age of about 10,000 years for the Mesa complex and its look-alikes places the manifestation not in contemporaneity with the Clovis complex of temperate America (~11,000 BP) but closer to dates of later Paleoindians commonly presumed to be Clovis descendants (e.g., Bever 2001; Dumond 2001). This is in line with a supposition that these artifacts reflect a southern (North American) origin rather than one from the north or from Asia.

Blades, Cores, Microcores, Microblades

The late or terminal Paleolithic of Northeast Asia, as it has been dealt with here in Part I, is predominately a period of the production of microblades from microcores. It should correspond in time to Alaskan sites and complexes dating within at least a couple of millennia before about 8,000 radiocarbon years ago. This same period includes the non-microblade Mesa complex and its relatives of essentially non-Asian appearance, but it also includes others.

With the discovery in 1933 of the Campus site on the grounds of what is now the University of Alaska Fairbanks, and its exploration in succeeding years, the Asian cast of some of the stone industries was publicized (e.g., Nelson 1937; Rainey 1939), although dating of that site (e.g., Mobley 1991) is still considered a problem by some researchers (see Pearson and Powers 1999). The site has given its name to the “Campus-type microcore” of general wedge shape, from which were pressed diminutive blades or microblades — among its most distinctive artifacts, and a dead ringer for certain Asian products.

Denali Complex and Paleo-Arctic Tradition

Possibly the best known of presumably related manifestations of this time range is the Denali complex of central Alaska. This was defined and called to our attention by West (1967) based on work in 1964, although a representative site of the complex was not satisfactorily dated by radiocarbon for another decade (West 1975). Since then, reports of sites with Denali components dating somewhere around 10,000 C-14 years ago — hence contemporary with the non-microblade Mesa complex — have been reported fairly regularly, especially in the area close to the major north-south and east-west highways that converge on Fairbanks, a placement directly related to the existence of the central Alaska highway system.

The recognition of the Denali complex, however, occurred only a little before the discovery (1965) and first report of the related Akmak and Kobuk complexes at Onion Portage on the Kobuk River south of the Brooks Range in northwest Alaska, complexes which together have been conceptualized as the American Paleo-Arctic tradition (Anderson 1968). A reasonably exhaustive report on the Akmak complex followed its discovery rather quickly (Anderson 1970). Although presumed to date somewhere around 9,600 radiocarbon years ago, this possible Akmak age was derived from a caribou scapula apparently associated with Akmak-type artifacts, but not situated on the major Akmak occupational surface (Anderson 1988:57). Located in a region much less easy of access than the central Alaska of the Denali complex, the Akmak complex, while including much of the Denali inventory — blades, microblades, and certain burins — also includes numerous heavy bifaces and more-or-less discoidal cores, some of which appear to have served for the detachment of pre-formed flakes somewhat analogous to those of the Mousterian industry of the Old World. In this respect, the artifacts bear comparison to some from the Khaya site reported above (Chapter 3). Other assemblages compared to Akmak, including the heavy biface cores, include the early Narrows phase material from the upper Ugashik River on the Alaska Peninsula (Henn 1978; see also Dumond 1980:988) dated about 9,000 radiocarbon years ago. Apparently related industries that derived microblades from microcores of more-or-less wedge shape are reported southward along the Northwest coast, presumably as a Paleo-Arctic or Denali derivative (Dumond 1980, with references). Within mainland Alaska the dated sites of this character are south of the Brooks Range.

It is sites and industries such as these that have been repeatedly compared to those of the widespread terminal Paleolithic of Northeast Asia, described by various investigators as aspects of the Dyuktai complex, centered especially along streams in the Lena River drainage, or of somewhat variant analogs of that complex found more widely in Northeast Asia (see Chapter 1). A few investigators have claimed to see the forerunner of the southerly Clovis horizon in the Denali-related materials themselves (e.g., West 1981; 1996). In any event, it is the Paleo-Arctic and Denali-related manifestations that are most widely accepted as a derivative manifestation of the microblade-yielding cultures of the Northeast Asian Paleolithic, aspects of which are treated in Part I of the present edited collection.

Non-Fluted Point – Non-Microblade?

More enthusiasm in terms of possible northern “Clovis origins,” however, has been generated by recurrent finds of what has been designated the Nenana complex, the name taken from the southern tributary to the Tanana River along which the sites have been discovered. The first of these, Dry Creek, discovered in 1973 and explored by crews from the University of Alaska over the succeeding years, was announced as including three or more components, the second-oldest of which was recognized as a clearly recognizable representative of the Denali complex. Very closely underlying were deposits yielding no microblades but producing larger blades and a few thin and usually round-based bifacial points that have been compared to those artifacts designated “Chindadn” points from a site of somewhat unclear stratigraphy at Healy Lake in the upper Tanana River valley (e.g., Cook 1996). This underlying Component I at Dry Creek, the Nenana complex, has been dated a few centuries earlier than 11,000 BP (Powers and Hamilton 1978; Powers and Hoffecker 1989).

It was largely, although not completely, the apparent non-microblade character of this component that spurred comparison with the Clovis horizon and attempts to recast questions concerning the original peopling of the New World (e.g., Goebel et al. 1992; Hoffecker et al. 1993). In the context of the present collection, it is the represented character of the Nenana complex — including, as just indicated, some bifaces, larger blades and cores, but no microblades — that contributes to the organization of the present Chapter 1, in which the survey of Northeast Asia in the Paleolithic devotes considerable effort toward recognizing sites that can similarly be suggested to include larger blades, some bifaces, but no microblades or wedge-shaped microcores. In Chapter 3, as well, the urge is evidently to show that the Khaya site provides evidence of a transition from a non-microblade to a microblade-using culture.

One can reasonably suggest, I think, that those Nenana-based interpretations of the archaeology of Alaska have provided a spur to the impulse to seek a pre-microblade manifestation in Northeast Asia that might provide an Asian counterpart and probable predecessor. Certainly they can be blamed directly for the energy some investigators have lavished on the attempt to discern direct Clovis ancestors in Asia, even ancestors as yet lacking the diagnostic Clovis projectile points (e.g., Goebel 2004), or in the determination shown by American and Asian investigators to relate the earliest horizon at the Ushki sites of central Kamchatka (level VII) to the same Clovis horizon (e.g., Goebel et al. 2003; see also Chapter 1).

At the same time, one cannot well argue that the interpretation of the Nenana complex as preceding the Denali complex is without any Old World basis. Specifically, with Japan as the most

heavily researched region in eastern Asia insofar as archaeology is concerned, one can with apparent reason base some broader Asian expectations on the Japanese model. In Japan, it does indeed appear that a blade-producing culture preceded the appearance of microblade users. More specifically, in millennia before about 22,000 BP flakes were struck from amorphous cores, but there was no prepared core and blade technology. From that time until possibly 15,000 BP large blades struck from prepared cores were characteristic, with some bifacially flaked leaf-shaped points appearing somewhat before the latter date. After 15,000 or 14,000 BP this assemblage was joined by wedge-shaped microcores and microblades (e.g., Aikens and Dumond 1986, with references). It is not surprising, therefore, that one might see a progression from larger blades to the manufacture and use of microblades such as has been concluded by the Alaskan researchers referenced above. On the other hand, that the still earlier amorphous flake technology apparently present in Japan would qualify as the pebble- or cobble-tool stage sought in Chapter 1 seems doubtful.

Microblades Again

And yet it does not seem certain that either the Nenana complex or comparable complexes without microblades that may be identified in Northeast Asia will qualify as immediate ancestors of the Clovis horizon of North America. Confusion is injected especially by results of excavations at the site of Swan Point, one of the Tanana Valley sites, where microblades and core fragments are evident in the earliest component, which is dated at or only shortly after 12,000 BP (Holmes 1998; Holmes et al. 1996), hence earlier than either the Nenana or Mesa complexes. In the light of this find, which is being confirmed by further investigations at the site year by year, it appears that the production of microblades preceded the appearance of the Nenana complex, and that indeed that complex itself may not have been entirely without microblades. As remarked elsewhere “in three of the four Tanana and Nenana River valley sites in which fairly reasonable collections of Nenana materials have been recovered — Dry Creek, Chugwater, Moose Creek, and Walker Road — the [Nenana] deposits closely underly those of the Denali complex. Thus, while greater age for the Nenana materials is indicated, so also is an apparent site-specific association with later Denali assemblages” (Dumond 2001, with references).

As a result, unlike some recent reports, in which the Nenana complex is treated as the earliest documented and clearly identified archaeological culture in mainland Alaska (e.g., Goebel et al. [2003], and Chapter 1, above) , a recent summary of the expansion of humans into Arctic Asia and beyond concludes that the earliest movement into farthest Northeast Asia was by people who already manufactured microblades from wedge-shaped cores, and that the latitude of the Bering Platform of the terminal Pleistocene was not reached by them before about 16,000 BP (Hoffecker 2005). Like Swan Point, the results of excavations at the Bluefish Caves referred to above, while not so directly dated by radiocarbon, appear to provide some support for such a position.

Thus, to turn again to Part I of this collection, interest in a possible pre-microblade stage of archaeological culture in northeasternmost Asia relates well enough to material from farther south in that continent — of which the evidence from Japan can be taken as important. Nevertheless, results of such a quest if successful may tend only to reinforce the notion that there was a period postdating the introduction of microblades in which the production of bladelets fell into a quantitative slump. If this manifestation in Asia or Alaska relates directly to the southern Clovis horizon, a great deal more work on the underpinnings of the Clovis development will be called for.

To sum up this segment of the present chapter, although it is clearly necessary for prehistorians to pay close attention to formulations by archaeologists in adjacent regions as well as in their own, there is an important line, although a very fine one, between constructing the history of their chosen region in its own terms and imposing on it dictates derived from somewhere next door. That is, in the final analysis the prehistory of Northeast Asia must depend on the evidence from Northeast Asia, and that of Alaska on evidence from Alaska. This will be returned to.

USING OBSIDIAN

As noted in the brief introduction to Part II, the identification of trace elements permitting the pinpointing of obsidian sources has not yet been extended seriously to Chukotka, although one may hope that eventually more testable obsidian will be recovered from that area than is mentioned in the present Parts I and II. Similar obsidian identification research has been extended to Alaska somewhat more seriously, although reportage of the major project of analysis is not yet complete. In the existing progress report (Cook 1995) it appears that of some 25 obsidian groups (that is, a grouping suggesting there are 25 sources) that can be differentiated through instrumental neutron activation analysis of obsidian from sites, only five actual sources have been more directly identified. Two of these are represented in sites in Southeast Alaska, and one is apparently confined in its effects to the Aleutian Islands and the Alaska Peninsula. The two others are of direct or potential interest in terms of Alaska-Asia interactions.

The major single source in all of mainland Alaska consists of a series of flows near the Koyukuk River in the central part of the state, locally known as Batza Téna (Clark 1972; Clark and Clark 1993). Some 115 separate site components have yielded obsidian traced to this source, the occurrences spread from north of the Brooks Range to Cook Inlet on the south, from as far west as Cape Prince of Wales to the Alaska border with Canada on the east, in sites dated from 10,000 BP to historic times (Cook 1995). Although not yet recognized across the Bering Strait, it is not farfetched to expect that some Batza Téna obsidian may ultimately be identified in Northeast Asia, as a further indication of the kind of interchange that is suggested so clearly by other artifactual evidence — some of it mentioned in Part I, more of it suggested in Parts III and IV.

More directly provocative is the fifth identified source group, said to be represented by “two small river-worn cobbles from the Anadyr River” (Cook 1995:98, reference to his Group S) that matched a sample from the southern Chukchi Peninsula (“Whalebone Alley”), another from a site on St. Lawrence Island (the Hillside site near Gambell), and a third from an apparent Arctic Small Tool-related site on the Seward Peninsula of Alaska. Although the dates of the separate Asian and American occurrences are noticeably divergent, the indication that cross-Strait transport of obsidian occurred is intriguing, to say the least. One can only hope that the progress in the analytical treatment of obsidian from sources and sites in Asia that is represented in Part II will shortly be extended farther north to the extent that available samples make it feasible.

MAKING POTTERY

As remarked in the introduction to Part III, several regional surveys of archaeological pottery in Alaska predated comparable efforts in Northeast Asia, although chapters of Part III carry surveys farther in terms of the evolution of pottery making as technology. As also noted in the same brief introduction, a major gap in coverage in Part II coincides with the period of the appearance and early growth of the Eskimo culture in Asia. In this present section I am able to build on the discussions of technological evolution in Part III, while suggesting what information might fill the developmental gap in eastern Chukotka around two millennia ago.

Both Chapters 6 and 7 of Part III direct attention toward a shift through time from organic to non-organic material used for those non-plastic additions to pottery clay that are commonly referred to as “temper,” but a change accompanied by little or no development in methods of firing and the firing temperatures achieved. A major, although not the only, effect of non-plastic temper additions is to limit shrinkage during the drying that is necessary before firing. From the standpoint of effectiveness in this function, as well as for improving the general strength of the clay bodies, evolution might be expected to culminate both in the management of higher firing and in the choice of non-organic additives of irregular or angular shape, such as is present in modern ceramics with the use of pulverized stone or pulverized potsherds. These changes might well be approximately concurrent — as indicated in Chapter 6 in its brief reference to post-Neolithic advances in east Asia — with improvements in surface treatments such as slipping, and with an increase in vessel functions and shapes. These advances were not achieved in Neolithic Sakhalin (Chapter 6) or in northeasternmost Asia (Chapter 7), and neither are they known to appear consistently in Alaska. East of Bering Strait there was, however, a movement from organic temper to non-organic temper that was as consistent as was the comparable movement in Northeast Asia, and almost certainly was related to Asian developments.

Turning more specifically to Alaskan pottery, what is still one of the more comprehensive treatments, published a half-century ago (Oswalt 1955), projects a temporal sequence confined almost entirely to types based on surface design elements, and one that moreover was hampered by the lack at the time of adequate dating information. Thus, for example, the Old Bering Sea ceramic types were presented as the oldest available, older than types from the Norton culture excavations on Norton Sound (Oswalt 1955:39). Less than a decade later, however, a reasonably definitive report on the multi-period ceramics from the Iyatayet site on Cape Denbigh on Norton Sound appeared as an appendix to the report on the site excavations (Griffin and Wilmeth 1964). From type definitions beginning with design elements, the treatment progressed to the differentiation of two temporally distinct pastes and wares — Norton Ware and Barrow Ware. The former exhibited more fiber, scattered sand, and thinner walls, was plain or decorated with check- or linear-stamp impressions, and was characteristic of Norton sites, some of which dated to several centuries BC. The latter had evidence of temper more heavily of sand and pebbles, thicker walls, and was plain or decorated with concentric circle-stamp impressions, or still later with stab and groove incisions; this ware class is now known to date after the beginning of the Christian era.

The authors emphasized an overall continuity in these developmental changes, however:

From the time of manufacture of Norton ware to the historic period, there is a trend toward increasing vessel wall thickness, increasing coarseness of paste, and increasing size and abundance of sand and pebble temper (Griffin and Wilmeth 1964:287).

The design elements themselves, shifting from linear and check stamping to curvilinear stamping and finally to incising and punctating, they concluded to be useful time markers.

With regard to the earlier of these ware classes, excavations in three houses at the Chorus culture type site on Choris Peninsula in Kotzebue Sound revealed pottery described as a “well-fired, fiber-tempered thin variety stamped over all of the outer surface” with linear impressions, apparently imparted by a paddle carved with parallel grooves, whereas one or more check-stamped sherds were produced in campsites on the peninsula concluded to be later than the c. 2700-BP houses (Giddings and Anderson 1986:192, 222-223). At Cape Krusenstern at the north edge of Kotzebue Sound, excavations added more to the sense of progression in terms of surface design elements. Specifically, fiber-tempered potsherds with impressions of cord-wrapped paddle appeared on the beach numbered 48 and the later Beach 47, linear-stamped potsherds appearing on still later Beach 46 and again on 44, in one case apparently associated with cord-marked sherds, and check-stamped sherds (relatively large checks) appearing on beach 44 and continuing to the Norton beach 38 (Giddings and Anderson 1986:209-222). These beaches, not dated directly themselves, were concluded on the basis of radiocarbon evidence from other beaches to lie between about 3,200 and 2,700 radiocarbon years ago, or somewhere around the end of the second millennium BC (Giddings and Anderson 1986:32).

Anderson (1980:243, citing Mochanov 1969) has pointed out that this was essentially the decorative progression reported from the Neolithic site of Bel'kachi I on the Aldan River in Siberia: cord-wrapped paddle to linear stamp to check stamp. Nevertheless, although these particular design elements were all described from Neolithic sites of Northeast Asia by Ackerman (1982) in his close survey of that region in terms of its possible relation to the Norton culture of Alaska, and the same design elements are also referred to from sites in the region covered by the author of the present Chapter 7, there appears to be no evidence in northeasternmost Asia that the elements fall into the same temporal progression. That is, they may be essentially contemporary.

With regard to Alaska, although linear-stamped designs appear in general to precede check stamping, or at least the broad spread of check stamping from the Alaska Peninsula to northeastern Canada at its maximum distribution (see, for instance, Ackerman 1982), what is more relevant to the presentation in Chapter 7 is that these decorative types in mainland Alaska are uniformly found in wares that can be characterized as fiber-tempered or with sand so scattered that one can conclude it to be of natural presence in the clay rather than purposely added. This contrasts clearly with a later class of wares in which fiber is much more rare, and small pebbles come to dominate. These two ware classes have thus been concluded to characterize Alaskan pottery in general (e.g., Dumond 1969), and clearly represent an analog of the developmental progression adduced for eastern and northeastern Asia as described in Chapters 6 and 7 of Part III. On the other hand, the ceramic

remains treated in Chapter 8, from the erosion face at Ekven, are very clearly representative of the later paste class, which indeed is reported all over the region of Eskimo occupation in Alaska in later prehistoric centuries.

Where and when, then, does the division come? In Alaska, the major change from the first ware class to the second seems to be exhibited in the early material from St. Lawrence Island, a conclusion based on descriptions in the literature in which some of the earliest material from the island, at the Hillside site near Gambell, was described as fiber-tempered, although decorated with broad linear corrugations as were some of the later mineral-tempered pots (see Dumond 1969:Table 2). Firsthand examination of ceramics from that site later confirmed this. Specifically, among sherds evidently of non-lamp vessels, an apparently slightly earlier house yielded only fiber-tempered examples, whereas the two later houses were represented about equally by predominantly fiber-tempered and predominantly mineral-tempered sherds (Dumond 1998:Tables 2, 6, 10). The period especially represented by this site, however, is precisely that interval that is lacking in the coverage of Chapter 7, in which the only pottery described of the Eskimo tradition involves the erect-sided, often squared pots and the partitioned lamps of the very latest prehistoric and early historic time (e.g., Collins 1937:341-342, Pl. 84, 4, 5).

With the Hillside site reasonably dated to the very early centuries of the first millennium AD, a period some centuries earlier than the comparable shift in the similar ware classes can be shown to occur on the Alaska mainland, one is driven to conclude that the shift was derived from Asia at about the time represented by the earliest known representatives there of the Eskimoan cultural tradition. Was it, however, the result of borrowing by people who would be recognized archaeologically as ancestral Eskimo people? Or was it brought to St. Lawrence Island (and presumably to the east coast of the Chukchi Peninsula) by an Asian people who formed at least a portion of that ancestral Eskimoan population? Unfortunately, the relevant archaeological information for this crucial period in Northeast Asia, where excavations have been so nearly confined to a few cemeteries, is virtually nonexistent.

There is also an additional factor to be considered. With regard to both linear- and check-stamped decoration, there is an overall trend through time from the use of paddles with fine grooves closely aligned to those with somewhat broader grooves separated more widely. The result is an increased spread from the earlier linear-stamped decoration to the more broadly spread striations that led Oswalt (1955) to class the Old Bering Sea and related ceramics as “corrugated” (i.e., St. Lawrence Corrugated) rather than linear-stamped. Comparably, there was a shift from small checks in the check-stamped ware widespread in Norton sites to larger checks more comparable to those found on waffles from a modern kitchen. Both the parallel striations found in the Old Bering Sea period on St. Lawrence Island and comparable designs, as well as those check-stamped sherds reported from earlier explorations on the Chukchi Peninsula by Rudenko (1961), appear to be of the later rather than the earlier sort. This appears consistent with the fact that at least the St. Lawrence Corrugated type includes many sherds tempered predominantly with sand and pebbles, which is also more characteristic of slightly later times. This was specifically addressed some time ago, with the remark that “there was a general tendency for ceramic design motifs to be enlarged through time, and . . . the corrugations and large check impressions of later times are the lineal descendants of earlier linear- and check-stamp decorations” (Dumond 1965:1245).

Altogether, however, one can conclude — as have others who have specifically addressed the question (e.g., Ackerman 1982; Griffin 1970) — that the early class of ceramic ware in Alaska was derived from Northeast Asia, and that it appeared east of Bering Strait sometime around 3000 BP. One must conclude that this represents the same early stages of ceramic manufacture that are described by the authors of both Chapters 6 and 7. Around or perhaps slightly later than the beginning of the Christian era, however, major changes in paste formation involved the increasing use of mineral temper, sometimes sand but probably more often small pebbles, and at about the same time linear- and check-design motives began to be somewhat enlarged. This mode in the paste, although not necessarily in design elements, endured generally until the historic period. As in Northeast Asia, there was no later movement into manufactured mineral temper such as would be provided by purposely crushed rock, and similarly there was no coherent move to improve surface finish by slipping with clay slurry, and there was no concerted development of vessels of differing forms that would suggest expanded function for ceramic products.

In this respect, then, one can certainly conclude that Alaska served as an Asian outpost in terms of pottery technology, although such evidence as is available (not closely examined in the present collection) makes it fairly clear that the Norton culture as a whole was not Asian. In terms of the present discussion, however, what is most unfortunate is the absence of coverage of ceramics on the Chukotkan coast for the period in which the shift to the later ware class occurred at this western edge of the Eskimo world.

THE MARINE RESERVOIR EFFECT

Chapter 9, the first of Part IV, addresses a topic of importance to archaeologists who work anywhere on the coasts of the Bering and Chukchi seas by attempting to arrive at a correction factor to use in adjusting to the modern calendar radiocarbon ages obtained from marine materials around the northern Bering Sea.

For some decades, of course, it has been recognized that measurements of radiocarbon ages require calibration in order to correspond more closely to calendar ages — this as a result both of the slight under-value of the conventional ^{14}C half-life that is employed worldwide in measurement laboratories, and of fluctuations in atmospheric carbon-14 that result from variations in cosmic bombardment of the earth's atmosphere. This has been accomplished by development of calibration curves based on the departures of radiocarbon measurements from time estimates based on enumerated tree rings and other year-sensitive phenomena (e.g., Stuiver and Becker 1986; Stuiver and Braziunas 1993). With regard to the adjustment of radiocarbon ages derived from oceanic materials (remains of marine flora, shell, mammal or fish), the problem is further complicated by the fact that the oceans serve to dampen carbon exchange with the atmosphere with greater effects proportional to ocean depth; thus, all things being equal, organisms in waters from greater depths yield older radiocarbon “ages,” but when mixture of deeper and shallower waters is caused by ocean currents, further corrections may be required (see, for instance, discussions in Taylor [1987] and background summary in Dumond and Griffin [2002]).

Problems derived from this that are relevant especially to archaeologists working in arctic regions were enunciated by McGhee and Tuck (1976) and further elaborated by Arundale (1981). An approach to solutions for the problem of calibrating radiocarbon ages from marine materials has been presented by Stuiver and Braziunas (1993) and Stuiver et al. (1998b), by which the overall effect in the ocean surface waters is modeled through comparisons between the atmospheric radiocarbon calibration curve and measurements of marine products from relatively shallow depths and of known calendar age; these latter are chiefly shells regarding which the date at collection (i.e., death) is known. In the absence of sea-water mixing, organisms from surface waters in general are considered to yield radiocarbon measurements about 400 years older than would comparable terrestrial samples (Stuiver et al. 1998b:1131), and this figure has been built into the marine calibration curve that is now chiefly in use (Stuiver et al. 1998a). There is, however, the possibility in local regions of mixing through upwelling on the one hand, or river-introduced fresh water on the other, that skews results in either direction. For this reason, an additional local or regional correction factor must be entered into calibration calculations. That is, the difference between a local radiocarbon age of material and its known calendar age is compared to the age offset that is modeled for that calendar date in the calibration system (Stuiver and Braziunas 1993:Fig. 17, Table 1). The difference between the two then becomes this regional adjustment. The major computer programs used in calibration, programs such as CALIB (Stuiver and Reimer 1993, with upgrades) or OxCal (Bronk Ramsey 1995), accept such a correction figure and in general make use of the same set of calibration data, INTCAL98 (Stuiver et al. 1998a).

It is this regional correction factor for the northern Bering Sea that is sought in Chapter 9. Is this achieved? The final figure they suggest for this correction, or ΔR , is 188 ± 27 years. This, if added to the approximate 400 years of the overall value of the reservoir discrepancy built into the curve, provides a final difference of C-14 age from calendar age of a little under 600 years.

Some other estimates of reservoir effect based on archaeological data have taken a different approach. That is, rather than estimating the discrepancy between radiocarbon ages and calibrated ages of terrestrial materials from the same contexts, they have simply compared radiocarbon ages on marine samples from those on contextually similar terrestrial samples. In this way Blumer (2002:96, n. 6)) arrived at a figure of this difference for sites on St. Lawrence Island of 562 ± 50 years. Dumond and Griffin (2002:Table 5) arrived at two possible values for the eastern Bering Sea, including St. Lawrence Island and Cape Prince of Wales — 737 ± 20 years and 460 ± 40 years — and concluded that there is almost certainly no single value for the reservoir effect in the region, with variations related to micro-differences in water mixing, coupled especially with differential feeding ranges for mobile marine organisms.

Although there is certainly no intention here to undermine the results set out in Chapter 9, some aspects may lead to a suspicion that the mean figure that is presented with its assigned error value as the final regional correction to the INTCAL98 calibration curve (188 ± 27 years) is more restrictedly specific than the data truly allow. That is, examining Figure 4, Chapter 9, with these values in mind, the interval around the mean that is demarcated by that error estimate of 27 years (i.e., ~160 to 215 years) could embrace little more than 40% of the bar for the 100-200 interval, and 15% of the 200-300 interval, or what one could approximate as about 12 of the 109 values in the figure and from which the mean was drawn. That is, 97 of the 109 values lie outside the interval specified by the

standard error of the mean that is given by the authors.¹ Indeed, from the appearance of the graph and imposed normal curve of Figure 4, one would expect a standard deviation around the central figure of 188 years to be considerably more than 200, if the one-sigma interval is to fulfill the common expectation of including two-thirds of the 109 observations, or about 74 in total.

With regard to the paired differences between marine and terrestrial specimens dated, the spread in values representing the Chukotka coast (Table 1) is great (220 ± 200 to 853 ± 124 years). If one adds to them the values from St. Lawrence Island and Wales (Table 3) in which the range although somewhat less is not so grossly different (308 ± 120 to 828 ± 126), a mean difference, unweighted by variance, is 589 years — surprisingly close to the Chapter 9 figure of 188 plus the approximately 400 years of the standard programmed reservoir effect — but with a standard deviation of some 212 years. That is, in unweighted data two-thirds of the expected results from other, comparable dated pairs would fall between about 375 and 800 years, and it is unlikely that weighting would change the result drastically. Surely this wide range suggests that there is no single value for a ΔR correction relevant to calibrated dates for sea mammal remains from the northern Bering Sea.

As suggested by some commentators, the wisest policy is simply to avoid the dating of specimens potentially subject to the marine reservoir effect. If estimates must be based on them, it is not likely that the effect will be found to be less than 400 years (some results in Chapter 9 notwithstanding), and there is a real possibility that the discrepancy may be double that figure.²

Whatever this case, the authors of Chapter 9 are to be complimented for presenting their data in a form that can be drawn on profitably by other researchers, thus providing important data from the northwest Bering Sea. Their information in Tables 1 and 3 of the present chapter 9 are detailed enough to permit further manipulations by anyone interested, and thus provide a valuable addition by filling a major hole in available evidence.

WRANGEL ISLAND

As indicated in Chapter 10, N. N. Dikov claimed discovery of the site known as *Chertov Ovrug* (Devil's Gorge, or Devil's Ravine) in 1975, with the announcement and brief description following in 1977 and 1979 in publications now available in English translation (Dikov 2003:198-199; 2004:130-133). Research at the site was continued in 1976, 1977, and 1981 by T. S. Tein (e.g., Tein 1979), the overall results to be summarized in English (e.g., Dikov 1988). In his statements, Dikov interpreted the finds as the first site of Paleo-Eskimo culture in Asia and as showing the emergence of sea-mammal hunting, with some similarities noted as far east as the Independence culture of Greenland (Dikov 1988). Artifacts were described as bifacially flaked projectile points, knives, graters, and

¹The final mean is derived from a universe of 16 calibrated C-14 measurements, from each of which is derived from one to ten values by the OxCal computer program (Chapter 9, Table 4) for a total of 109. It is these 109 from which an unweighted mean is derived, so that the original C-14 measurements have drastically different influences on the final mean, some with ten times the influence of one of the others. Further, the standard error given is calculated on 16 pair-differences in the original C-14 measurements (Tables 1 and 3) that are only indirectly related to the 109 calibrated values from which the mean is derived.

²Information from paired determinations from Buldir Island in the Aleutians (Debra Corbett, personal communication, Feb. 16, 2005) suggests a discrepancy as great as 800 years may also characterize the southern Bering Sea.

scrapers, with slight grinding on some evident adze blades; these were made predominantly of argillaceous slate, the points generally stemmed. One large organic artifact was a toggle harpoon head of walrus ivory, the point indented with a bed for a stone endblade. Middens were said to hold “fractured walrus, bearded seal, small seal, and bird bones” (Dikov 1988:81).

In the same journal issue in which Dikov’s summary description appeared, Ackerman (1988:66-67) compared the Devil’s Gorge finds to those from the Old Whaling site on Beach 53 at Cape Krusenstern, suggesting that similarities in “bifacially chipped, side-notched knives/points, long bifacially chipped lance (?) [question mark in original] blades, stemmed or tanged scrapers, and toggling harpoons (open socket with lashing slots or grooves, offset line hole, single asymmetric spur)” imply close cultural ties while recognizing some differences in the harpoon heads. Mason and Gerlach (1995:3) note Ackerman’s partial conflation of Devil’s Gorge material with those of the Old Whaling complex at Onion Portage, suggesting that

many of the tools could be classified as a facies or a distant descendent of the Northern Archaic tradition. . . . We recommend the further inclusion of the Palisades assemblages and the southern Alaskan Security Cove materials as a co-tradition within a broader cultural tradition termed the Chukchi Archaic.

Mason and Gerlach (1995) thus suggest combining the coastal sites of Devil’s Gorge and Old Whaling with complexes (e.g., Palisades and Security Cove) considered by most investigators to represent brief and seasonal approaches to the coast by people who were firmly terrestrial in adaptation. That is, few Alaskan researchers would be particularly happy with this as a definable cultural unit. In any event, it is to these suggestions of Ackerman and of Mason and Gerlach that the authors of Chapter 10 refer in their final paragraph.

As remarked in Chapter 10, the radiocarbon age determinations obtained from Devil’s Gorge and the Old Whaling site are similar. Specifically, six Devil’s Gorge ages on charcoal or wood — including that on wood reported in Chapter 10 but omitting the age on walrus bone, inasmuch as no treatment for the reservoir effect is reported — range from 2851 ± 50 (MAG-415) to 3360 ± 155 (MAG-198) (Dikov 1988:89). Eighteen determinations on charred material or wood from the Old Whaling site range from 2470 ± 150 (B-280) to 3678 ± 63 (P-400) (Giddings and Anderson 1986:30). In both sites the wood involved must have been driftwood; this circumstance, together with the chance that inner (older) rather than outer (younger) growth rings may have been involved, indicates the ages may somewhat exceed the age of the occupations themselves. Anderson additionally points out (Giddings and Anderson 1986:32) that the charred material dated from the Old Whaling site evidently included residue of sea-mammal fat, hence the magnitude indicated — a mean age of about 3,500 years — may be discounted somewhat. But he regarded the average of 2848 ± 57 years for the six wood dates to be too young in terms of the Kotzebue regional sequence as a whole, and chose a 10% correction of the average of the charred material and an overall age of about 3,200 years. Mason and Gerlach (1995:7), following Mason and Ludwig (1990), prefer the age from wood specimens for the occupation. In any event, the ages of the Devil’s Gorge and Old Whaling occupations are close enough that without further information it would be risky to assign temporal priority to either.

How similar are materials from Old Whaling and from Devil's Gorge? According to Dikov, faunal remains from the latter indicated a clear maritime subsistence focus, citing "bones of walrus, bearded seal, small seal, and bird" (Dikov 1988:81), which the faunal enumerations in Chapter 10 support while not providing strong evidence for heavy sea-mammal use, although one can hardly expect people to be on Wrangel Island who were not adept at coastal living. Comparably, the "Old Whaling" designation for the occupation and site of that name has been questioned (Mason and Gerlach 1995) on the ground that direct artifactual or faunal evidence for the taking of whales is lacking; at the same time, however, the hearth deposits rich in seal bones, together with a sealing-size toggle harpoon head of antler, make it clear that sea mammals were a major subsistence resource for Old Whaling people (Giddings and Anderson 1986:231-267).

With regard to portable artifacts, the sites exhibit analogs in a general sense, but similarities fall short of identity. The present Figure 1 provides, at the same scale, some representative and presumably reasonably diagnostic stone points of the two sites as well as the harpoon heads of organic material, a single example of which occurs in each of the two assemblages. As noted, the Devil's Gorge artifact is of ivory, the Old Whaling specimen of antler.

At this time the principal observation regarding the putatively paired sites of Devil's Gorge and Old Whaling is that they both provide evidence for the presence of people on the coasts north of Bering Strait at about the same time, around 3,000 radiocarbon years ago; that not surprisingly the levels of technology exhibited are comparable; but that the artifact collections are considerably less than identical. This in total and of itself is a statement significant enough to be worth making.

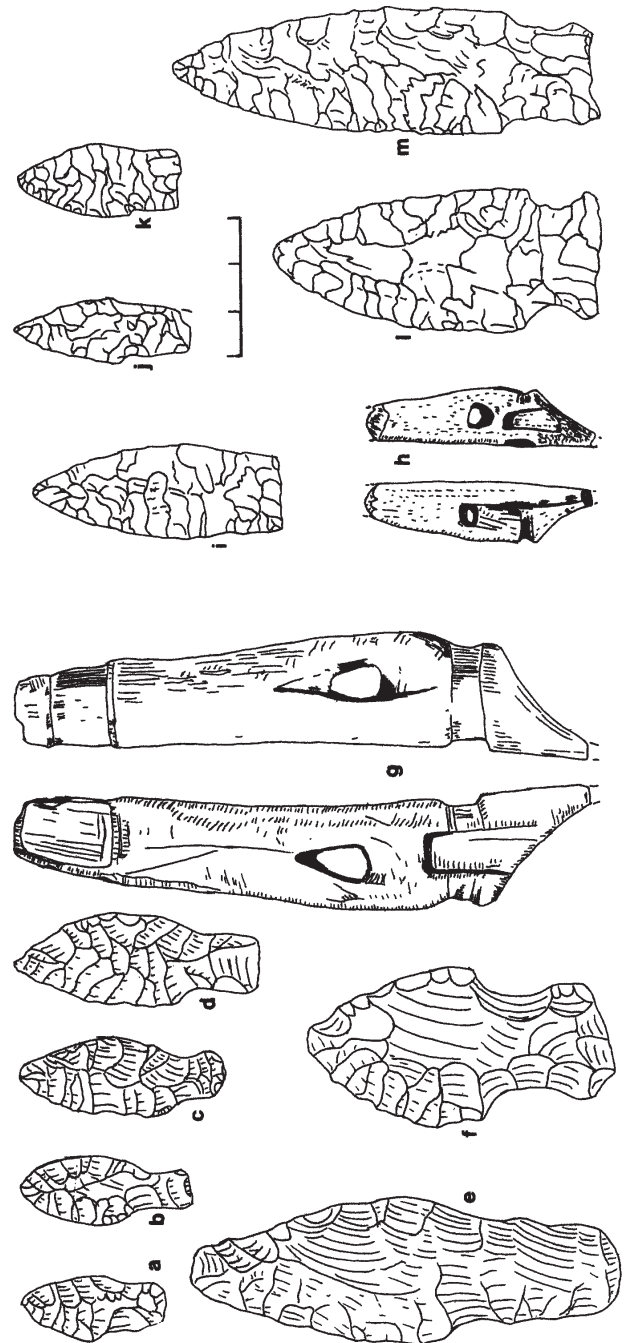


Figure 1. Artifacts from the Devil's Gorge (Chertov Ovrag) and Old Whaling sites: **a – g**, Devil's Gorge; **h – m**, Old Whaling. **a – f**, selected stone points redrawn from Tein (1979: Figs. 2 and 3); **g**, ivory harpoon head (with open bed for a stone arming point, gouged line hole, open foreshaft socket with full lashing groove) redrawn from Dikov (1988: Fig. 2); **h**, antler harpoon head (apparently originally self-armed, with crudely gouged line hole, open foreshaft socket with coordinated lashing groove and lashing slot), redrawn from Giddings and Anderson (1986: Fig. 136); **i – m**, selected stone points redrawn from Dumond 2000: Fig. 2). The scale is in centimeters.

FINAL COMMENTS

What can be the final impression? Simply enough, it is that Northeast Asia and Alaska have much in common, first in the earliest widespread cultural horizons and then in the ceramic developments on the coastlines in the first millennium AD. But how *much* is in common?

If an archaeological observer unencumbered by prior knowledge of the archaeology of Northeast Asia, Alaska, and temperate North America were to examine the evidence from the region's early periods beginning around ten millennia ago, it seems clear that similarities would appear strongest between Northeast Asia and Alaska in view of the very widespread, pervasive, and similar microblade-creating cultures in both of them, whereas temperate North America would be set generally aside from the two. A notable exception to this set-aside would be the geographically scattered — but only scattered — occurrences in Alaska of fluted points and unfluted lanceolate points (and, still later, of side-notched points of general North American archaic form), which might be concluded to be the result of diffusional transmissions from North America toward Alaska that never reached Asia. Alaska, that is, could seem to have a base largely Asian, punctuated by the scattering of certain artifacts much more common in temperate regions to the southeast. Alaska, in other words, would be true to its geographic position between the two in that it would manifest some aspects of both, but with the nearer Northeast Asia somewhat dominant over temperate America. In this mixture, Alaska would find an identity of its own, not entirely shared with either of the other two.

With the advent of pottery-making cultures, it is probable that the perplexity of the unbiased observer would increase, simply because there have been fewer attempts to really compare Asia and North America in a transit across Alaska. There has certainly been less of an impulse to focus on periods only a few millennia ago than on those of earlier times; presumably this is because there is no drive quite comparable to that provided by the festering need of some prehistorians to find the origin of the first Americans. This perplexity would find certain areas in which opinions regarding cross-Strait connections have been expressed, however. There is a well-worn tradition that sees the Arctic Small Tool tradition of 4,500 to 3,500 years ago as a close Asian affiliate. Yet even here the tradition has on one hand been characterized as a regional creation of the American Arctic through uniquely combined characteristics derived more piecemeal from the Neolithic of Siberia (e.g., Irving 1969-70), and on another hand as a component of a greater Asian-American continuum in which the Arctic Small Tool tradition is conflated with the north Siberian Bel'kachi culture, to be *together* termed the Arctic Small Tool tradition (Powers and Jordan 1990), although these two are certainly not identical.

With the ensuing Choris-Norton period or tradition and the appearance of pottery, the relationship of Alaska and Northeast Asia in this one cultural property has been clear for a long time. But coverage of the remaining cultural inventories has been much less fully explored, although, of course, the relative paucity of sites thus far reported for the period from Asia — through the difficulty of research coverage by a very limited number of researchers in a huge region — is in major part to blame. Thus, although Dikov (2004:110) has remarked on certain parallels of his North Chukotkan culture with Norton, the major element he mentions as held in common is still the check-stamped potsherds. And this shortage of Northeast Asian information for this period is closely related to the

absence of coverage of the immediately ensuing period, when a specifically Eskimoan culture appeared on the Asian shores that its bearers are known to have occupied over the past two millennia.

Finally, in other words, one must simply posit that the same general situation will be found to exist in these times that was noted for the period of the Northeast Asian Paleolithic: most of Alaska will ultimately be found to share more with its Northeast Asian neighbor than with temperate North America, but it will also incorporate elements foreign to that closer neighbor. In its observable combination of elements it will exhibit its own identity, however complex its picture may turn out to be.

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