The Earliest Stages of Settlement by People of Northeast Asia

Yu. A. Mochanov

Translated and Edited by Richard L. Bland

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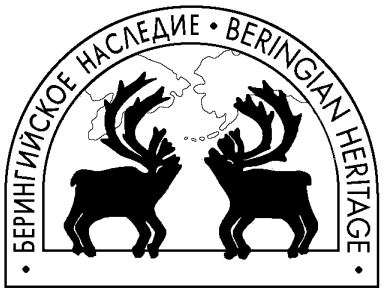
SHARED BERINGIAN HERITAGE PROGRAM

The Shared Beringian Heritage Program of the National Park Service, established in 1991, recognizes and celebrates the natural resources and cultural heritage shared by Russia and the United States on both sides of the Bering Strait. The program works to improve local, national, and international understanding of these resources and sustain the cultural vitality of Native peoples in the region. The program fosters a climate of mutual understanding and cooperation among the United States, Russia and the indigenous people of Beringia in environmental protection, historic preservation and interpretation. It supports subsistence opportunities within Beringia, recognizes the unique and traditional activities by indigenous people of the region, and promotes the study, interpretation, and enjoyment of the natural and cultural resources of international significance. Cultural exchanges between the indigenous people on both sides of the Bering Strait are supported as well.



ПРОГРАММА «ОБЪЕДИНЕННОЕ НАСЛЕДИЕ БЕРИНГИИ»

Программа «Объединенное наследие Берингии» Службы национальных парков США, организованная в 1991 г., отмечает и признает значимость природных ресурсов и культурного наследия, находящихся на обеих сторонах Берингова пролива и являющихся общими для России и Соединенных Штатов. Программа стремиться углубить понимание этих ресурсов на региональном, национальном и международном уровнях и поддерживает культурную жизнеспособность коренных жителей этого региона. Программа благоприятсвует климату взаимопонимания и сотрудничества между Соединенными Штатами, Россией и коренными жителями Берингии в областях охраны окружающей среды и сохранении и обяснении истории. Она поддерживает обычаи и традиционный образ жизни и природопользования в регионе Берингии, признает ценность уникальных и традиционных видов деятельности коренных жителей региона и поощеряет изучение, толкование и наслаждение природными и культурными ресурсами международной значимости. Программа также поддерживает программы обмена между коренными жителями, проживающими по обе стороны Берингова пролива.

TABLE OF CONTENTS

Figures

Plates

Tables

TRANSLATOR'S INTRODUCTION

This book was originally published in 1977 by the publisher Nauka in Novosibirsk as *Drevneishie etapy zaseleniya chelovekom Severo-Vostochnoi Azii*.

The term *cheshuika* is used in Russian archaeology to designate a lithic category. The category consists of flakes measuring less than 1 cm in length and less than 0.15 cm in thickness. I have translated *cheshuika* as "flakelet." Also, the strata and layers of the sites are often made up of much thinner layers. I have translated *sloi* as layer and *prosloika* as interlayer. The author often provides the number of small, medium, and large flakes. In this work, flakes that are less than 3 cm in length or width are considered small, those 3 to 5 cm in length or width are medium, and those exceeding 5 cm in length or width are large. The expression *technical-typological index* refers to an artifact's technique of manufacture and to its type.

For those wishing to refer to the original text, the following alphabetical correspondences were employed. The English alphabet used contains no letters J or Q. The Russian alphabet used in the book has no ё, ъ, ь, or ѣ.

а	A	л	L	ц	W
б	B	м	M	ч	X
в	C	н	N	ш	Y
г	D	о	O	щ	Z
д	E	п	P	ы	AA
е	F	р	R	э	BB
ж	G	с	S	ю	CC

Abbreviations can be found at the end of the monograph on p. 285.

A frustrating aspect of this or any translation from Russian is trying to settle on a suitable form of English transliteration for names. None of the three systems available to us (U.S. Board of Geographic Names [BGN], Library of Congress [LOC], or "Linguistic" system [Ling]) was entirely adequate for our needs. We therefore created our own system in which we use some of the BGN system with a slightly modified version of the LOC system. For example, the "ye" of BGN is written as "e" following LOC. The Russian "ё" is also written as "e" (not "yo"), following Ling. The Russian "э" is written as "e," following BGN. Both the Russian "и" and "і" are transliterated as "i," unlike any of the three systems. The Russian soft sign appears as an apostrophe, and though often dropped in transliterations, is retained here. The Russian "ю" and "я" are written as "yu" and "ya," respectively, following BGN. We also have settled on a single ending for words, as the English language forces us to do, rather than on the four endings (masculine, feminine, neuter, and plural) available in Russian. There also is the problem of established forms, that is, the transliteration of some names, such as Wrangell instead of the Russian Vrangel', which have been adopted in English. Other names, semiformalized in English, leave the translator with a variety of endings from which to choose, for example, the name ending in the Russian "-skii" is found in English as "-sky," "-skiy," "-skij," and "-ski". This in no way exhausts the possibilities and problems, but rather

provides a notion of the difficulties attendant upon any translation project. Nonetheless, we hope the explanation of our method will forewarn the reader.

I would like to thank Anna Gokhman for her fine job of proofreading the translation, Mary Sharon Moore for turning the manuscript into readable English, Sue Roberts for an excellent job of layout, and Jaime Dexter for a fine job of proofreading. I would also like to thank Bruce Greenwood, Peter Richter, and Katerina Wessels of the Shared Beringian Heritage Program, without whose support this project could not have been done. We must all thank Professor Yurii Alekseevich Mochanov for permission to have his ground-breaking work published.

Richard L. Bland

Museum of Natural and Cultural History
University of Oregon

FORWARD

With regard to the completeness of the archaeological chronicle, specialists in the Paleolithic of Northern Asia separate it into two large groups.

Representatives of one group believe that at present, sufficient material exists for reconstruction of the Paleolithic period of Northern Asia. As a rule, adherents to such ideas do not participate in expeditionary investigations. They believe that expeditionary work is not easy and therefore prefer to work in offices and, under the pretense of interpretation of the works of expedition researchers, publish various compiled articles and books under their own names. Typical representatives of such armchair archaeologist are S. A. Vasil'ev (1996:197) and A. M. Kuznetsov (2002:8). In order to somewhat justify their nonparticipation in expeditions, the armchair archaeologists try in every way to depreciate the significance of archaeological fieldwork and the discovery of new archaeological sites. Some armchair archaeologists generally believe that only those archaeologists can successfully master prehistory who can avoid "not only fieldwork, but also personal participation in analyzing the field materials" (Kolpakov and Vishnyatskii 1993:6, 7).

I hold to a diametrically opposite opinion about the completeness of the archaeological chronicle, especially about the degree of study of the Paleolithic of Northern Asia. I and my constant coauthor on expeditions and in the laboratory, Svetlana Aleksandrovna Fedoseeva, have noted (2002:9): "Modern archaeology, especially Paleolithic studies, finds itself, with regard to knowledge about what sites of prehistory are concealed in various geological deposits of the anthropogene, at the level of pre-Columbian geography."

Comparing the archaeology of the Paleolithic with "pre-Columbian geography," we thereby assume that archaeologists can still discover not only new "archaeological islands," but also whole unknown "archaeological mainlands."

Being convinced of such possibilities in archaeology, I moved in 1964 from the Paleolithic Sector of the Leningrad Division of the Institute of Archaeology, Academy of Sciences, USSR, where I was pursuing the theme for a candidate dissertation entitled "Drevneishie etapy zaseleniya chelovekom Ameriki" [The Earliest Stages in the Settlement by Man of America], to the Yakutsk branch of the Siberian Division of the Academy of Sciences, USSR. I was convinced that the problem of the first settlement of America could be solved only by new archaeological materials from Northeast Asia. Later I wrote about this (Mochanov and Fedoseeva 1996:160, 161): "All questions connected with the problem of people settling in America can be resolved only by joint efforts of archaeologists who study the Paleolithic of Asia and America on expeditions and in the laboratories. The most refined criticism of this or that Paleolithic site of Asia or America, without concrete study of those sites, does not provide anything positive for solving the problem of the first people settling in America."

In 1964, during survey along the Aldan River conducted by S. A. Fedoseeva and me, the multilayered sites of Ust'-Timpton I, Sumnagin I, Ugino I, Bel'kachi I, Bilir I, and Ust'-Mil' I were discovered in the alluvial deposits of the high flood plain of the Aldan, in which cultural remains belonging to different stages of the last 10,000 years of Yakutian prehistory were embedded in clear stratigraphic conditions.

Especially valuable was the isolation of a new archaeological culture, the Sumnagin, based on the materials of the early Holocene. It was assigned stadially to the uppermost (Holocene) Paleolithic. Earlier this stage of ancient history of Yakutia had not been distinguished (see Okladnikov 1955:74).

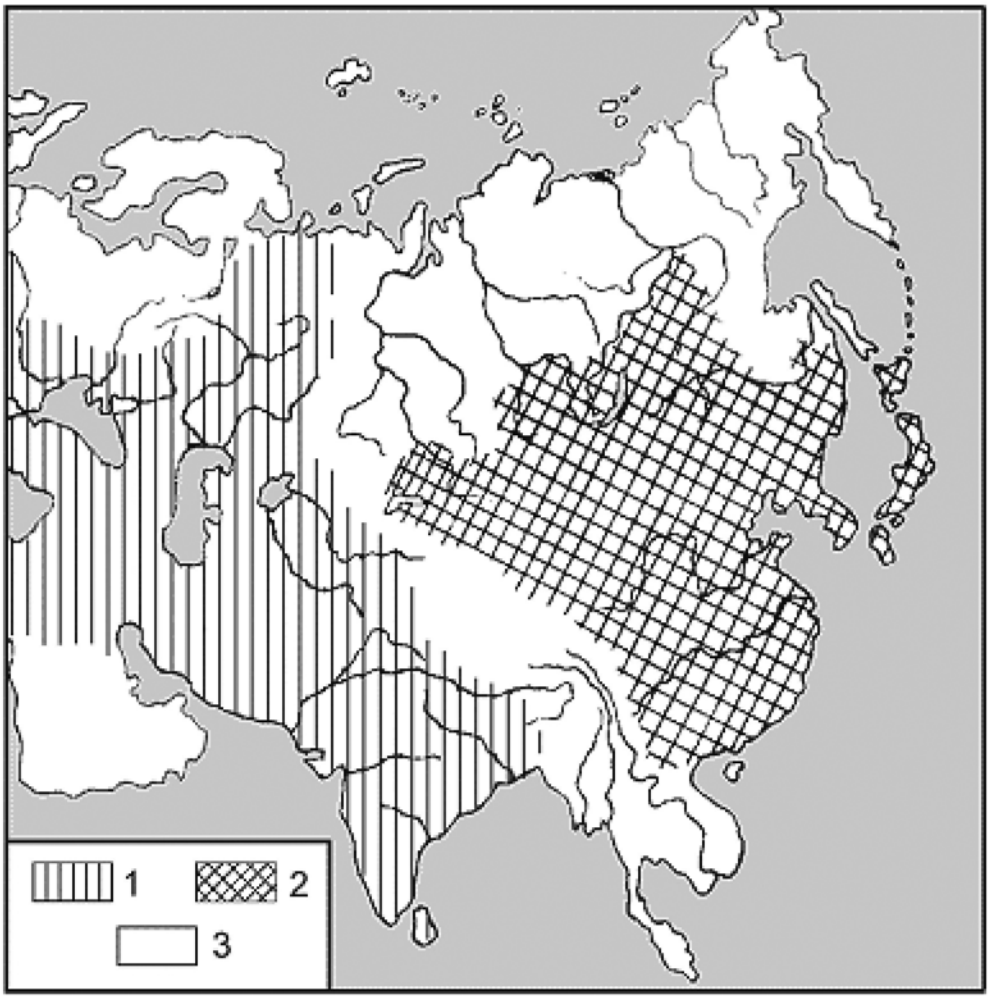


Figure 1. Map of areas of the cultural-historical regions of Asia during the Paleolithic-Mesolithic (after A. P. Okladnikov 1966:222). 1—European-African region (Paleolithic—hand axes; Mesolithic—with geometrically shaped tools); 2—East Asian-Siberian region (Paleolithic—uniface choppers; Epipaleolithic—with tools of Siberian and East Asian forms); 3 — unexamined territories.

Materials of the Sumnagin culture, dating to 10,500 to 6,500 years ago, totally contradicted A. P. Okladnikov's conclusion that, for the "East Asian-Siberian cultural region" (Fig. 1) that he distinguished, "the primary bulk of stone tools" from the earliest times and up to the Neolithic were made up of large tools of "ancient Asian forms," made from pebbles (Okladnikov 1966:222).

By 1966 I had proved (Mochanov 1966:12) that the pebble tools of the early Holocene Sumnagin culture made up only 5 to 10% of the total number of stone tools in this culture. In 1968, G. I. Medvedev (1968:19) also noted that, in the stone assemblage of the early Holocene sites of the upper Angara area, the artifacts of pebbles "are not prevalent" and consist of no more than 1% of the total number of tools.

In 1967, on the Dyuktai River (a right bank tributary of the Aldan River) S. A. Fedoseeva and I discovered the Paleolithic site in Dyuktai Cave. In its deposits, together with the bones of mammoths, muskoxen, bison, and other Pleistocene animals, were excellently worked flint biface knives and spear

points. In 1968, on the Aldan River, the new Paleolithic sites of Ust'-Dyuktai I, Bilir II, Ust'-Mil' I, Verkhnetroitskaya, and others were discovered, and based on materials from them a new late Paleolithic culture was distinguished—the Dyuktai culture, dating to 35,000 to 10,500 years ago.

Regarding this culture the greatest specialist on the historiography of the Paleolithic of Northern, Eastern, and Central Asia, V. E. Larichev, wrote (1971:4–7): "In Yakutia they have been fortunate enough to make perhaps the most outstanding discovery in recent time in the realm of Siberian archaeology—the discovery in the Aldan valley of the sites of a new Old Stone Age culture, previously unknown in Siberia, which was formed in eastern Yakutia about 15,000 to 20,000 years ago, and perhaps even much earlier. . . . On the whole, the set of Dyuktai stone instruments for the first time has permitted determination of the main features of Siberian Paleolithic culture, representatives of which in a favorable moment crossed Bering Strait and penetrated into North America. . . . It should not be forgotten that in Yakutia a Paleolithic culture was distinguished that is unusual for Siberia, differing in its main features from the known cultures of Pribaikal'e, the Yenisei region, the Ob' valley, the Altai, Zabaikal'e, and the Far East."

In a report for the international Beringian Symposium in 1973 I drew the following conclusion (Mochanov 1976:563): "Today it seems to us that the separation of two different cultural traditions (bifacial and unifacial) in the Paleolithic of Siberia is the most fruitful for finding out not only the different aspects of the most ancient past of Northern Asia, but also for resolving the cardinal questions of the problem of initial settlement by man of the New World."

In 1975, I added to this conclusion (Mochanov 1975:29, 30): "The existence of a bifacial cultural layer, the historical reality of which is attested by an ever greater quantity of new data, makes it urgently necessary to reexamine Okladnikov's (1966) concepts about the assignment of Northern and Central Asia to a special 'East Asia-Siberian region of choppers.'"

The Dyuktai culture and the bifacial and unifacial cultural traditions that I distinguished for the Paleolithic of Northern Asia brought on bitter criticism from several archaeologists. Leading this criticism were Z. A. Abramova and A. P. Derevyanko. The latter wrote (1975:196): "All the talk about the Dyuktai culture is wishful, but not reinforced by any serious arguments." Z. A. Abramova expressed it even more "weightily" (1981:115): "The assertion of Yu. A. Mochanov that distinguishing two traditions is most fruitful for figuring out the different aspects of the earliest past of Northern Asia has no basis. The lack of historical content in the concept being proposed is not fruitful, but rather impedes further development of science, leading it into a blind alley."

After publication in 1977 of the book *Drevneishie etapy zaseleniya chelovekom Severo-Vostochnoi Azii* [The Most Ancient Stages of Settlement by Man of Northeast Asia] the work of the Prilensk Archaeological Expedition (PAE) continued, under the leadership of the author. The extent of the survey routes of the PAE exceeded 50,000 km (Fig. 2). In an area of about five million square kilometers practically all the various regions of Northeast Asia were studied for the possibility of their settlement by people during the various periods of prehistory: the inner-continental and the coastal; the taiga and tundra; lowlands, uplands, and high mountains; the valleys of large and small rivers; large and small taiga and tundra lakes. The cross survey was completed: north-south, east-west. By 1981 the crews of the PAE had gone from the islands and shores of the Arctic Ocean to the Amur basin and from the Yenisei basin to Chukotka, Kamchatka, the Okhotsk area, and the Shantar, Kuril, and Commander Islands. During the process of this work about 1,000 diachronic and multicultural archaeological sites were discovered. The total area of excavations, trenches, and test probes placed in them exceeded 50,000 square meters. Two fundamental summaries of the archaeological sites located in the basins of the Aldan, Olekma, Vilyui, Anbar, and Olenek Rivers were published, with a description of them and illustrations of all the artifacts of stone, bone, ceramics, and metal found in them (Mochanov et al. 1983; 1991).

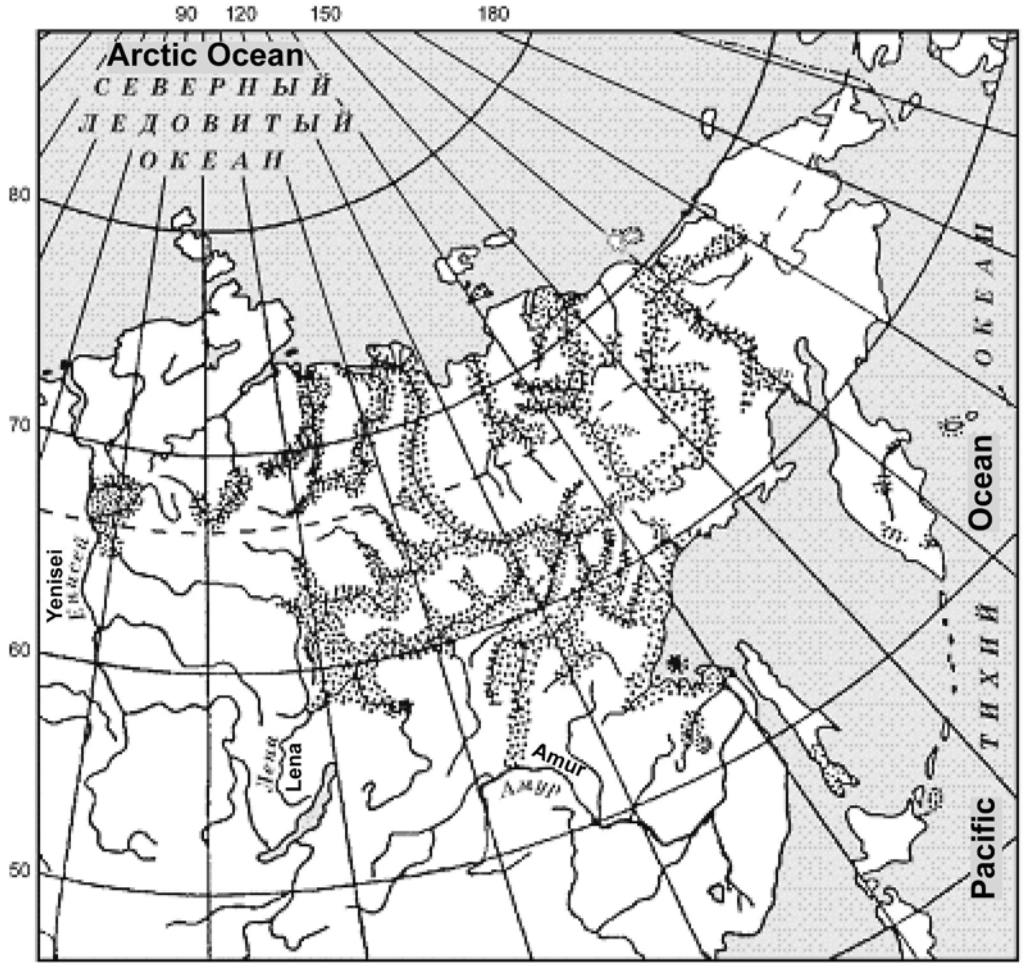
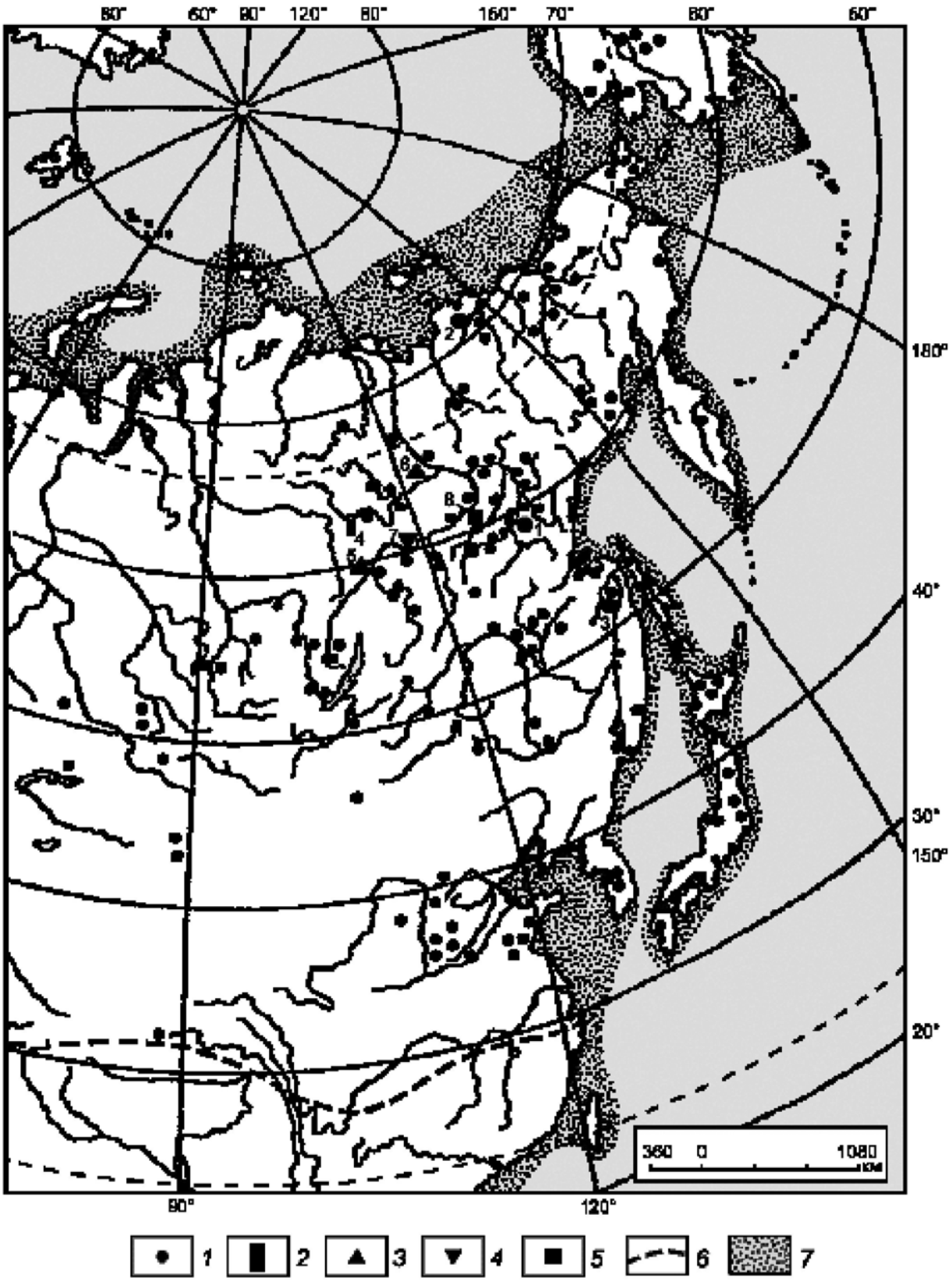


Figure 2. Map of survey routes of the Prilensk Archaeological Expedition.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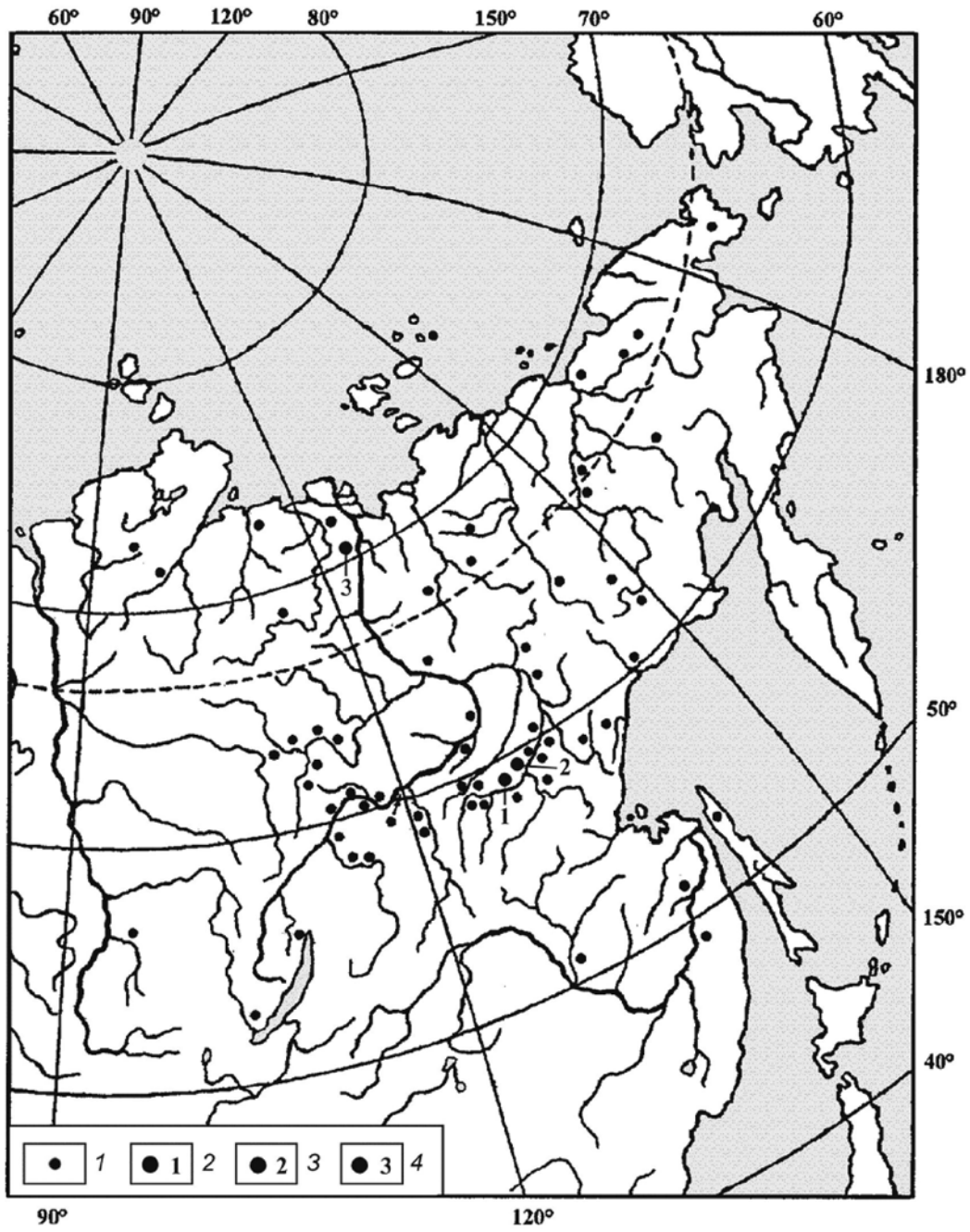

Figure 3 (opposite). Paleolithic sites of Northeast Asia. 1—Dyuktai tradition (1—Dyuktai cave; 2—Berelekh; 3—Kondon, a Paleolithic site discovered in 1960 by Yu. A. Mochanov); 2—Chirkuo culture (4—Ust'-Chirkuo); 3—Kyzylsyr culture (5—Kyzyl-Syr; 6—Mungkharyma); 4—Allalaika culture (7—Allalaika); 5—Diring culture (8—Diring-Yuryakh); 6—boundary between the Holarctic faunal region of the Arctogaean realm and the Indomalaisk region of the Palaeogaean realm; 7—shelves that were dry in the Pleistocene.

Figure 4 (above). Map of distribution of sites of the Sumnagin culture. 1—Sites of the Sumnagin culture; 2—Sumnagin I; 3—Bel'kachi I; 4—Siktyakh.

Based on the results of this work, new maps of the Pleistocene Paleolithic (Fig. 3) and the Sumnagin culture of the latest (Holocene) Paleolithic (Fig. 4) were composed. By comparing these maps with maps of the Dyuktai and Sumnagin cultures published in the 1977 book, one can readily see what new discoveries were made by PAE during the period between 1977 and 2008.

Interestingly, one of the chief opponents of the author, A. P. Derevyanko, now writes about the significance of the bifaces for the study of the Paleolithic of Northern Asia (Derevyanko and Shun'kov 2002:16): "The distribution of biface technology in Paleolithic industries of Northern Asia is one of the key problems in the study of the earliest stages of the mastery of this region by people, it being relevant for the understanding of practically all stages of development of Paleolithic culture. . . . The presence of bifacially worked forms in the composition of the industrial complexes of the concluding stages of the Paleolithic epoch serves as a reliable criterion for cultural-typological differentiation of the Upper Paleolithic sites of Siberia and adjacent regions of Asia. In addition, the presence of bifacial points is one of the most important arguments in the determination of the routes of initial settlement by people of the American continent from the territory of Northeast Asia."

Regarding one of A. P. Okladnikov's main conclusions about the "pebble appearance" of the Paleolithic of Siberia, which A. P. Derevyanko at one time supported and Yu. A. Mochanov went against in the 1960s and 1970s, A. P. Derevyanko now writes (2007:198): "It has been necessary for a long time to reject the myth of a pebble appearance for Paleolithic industries in Siberia."

Importantly, the work of the PAE has not only enriched science with new archaeological materials, but has also stimulated the work of other expeditions in regions formerly researched by PAE. Thus, after the discovery in 1970 of the Paleolithic Maiorych site, work was begun by the Magadan archaeologists in the search for the Paleolithic on the Kolyma. They continued the work of the PAE on the Omolon, Malyi Anyui, in central Chukotka at Lake Tytyl', and in the Okhotsk area at Kukhtui. Irkutsk archaeologists continued the work begun by the PAE in 1973 on the lower Vitim.

Of course, the author understands that the work of the PAE must be followed by new, broader and deeper archaeological work in the study of the Paleolithic both in Yakutia and in all of Northern Asia, especially in regions located north of 60º north latitude. S. A. Fedoseeva and I have already noted (2002:36) that if one can compare archaeological investigations by the PAE in the coldest region of the Northern Hemisphere with the history of the discovery of Antarctica, then we can say that we have seen the archaeological mainland. Its investigation still lies ahead. All who take part in these investigations should remember the words of Norbert Vinner (1967:310–311): "The battle for knowledge is important, and not victory. . . . The idea of victory itself dissolves at that very moment when it is attained."

I hope that with publication in English, the book The Earliest Stages of Settlement by People of Northeast Asia will be useful for all who are interested in the history of the study of the Paleolithic of Northeast Asia and the problem of the initial stages of settlement of America.

I offer deep gratitude to Richard Bland for an excellent translation of this book into English. In addition, I am grateful to all who worked with me on the Prilensk Archaeological Expedition and helped with writing this book. I offer special gratitude to Svetlana Aleksandrovna Fedoseeva.

Yurii A. Mochanov

15 July 2009

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PREFACE

The ever frozen land of Northeast Asia keeps many treasures for itself. Of special value among them for science are archaeological sites that permit tracing the history of the penetration by people into one of the most severe regions of the globe, located at the juncture of the Old and New Worlds.

Through the works of A. P. Okladnikov, S. A. Fedoseeva, I. V. Konstantinov, N. N. Dikov, and other archaeologists the general outlines of the earliest history of Northeast Asia gradually begin to appear. However, as Okladnikov correctly noted at the end of fieldwork by the Lena Historical-Archaeological Expedition of 1940–1946, "the archaeologist goes through this virgin expanse of untouched materials only with the first plough" (Okladnikov 1947a:107). And, in fact, until recently the blank spots on the archaeological map of Northeast Asia were in excess of many hundred thousand square kilometers.

Considering this void, the Institute of Language, Literature, and History (IYaLI) of the Yakutsk branch of the Northern Division of the Academy of Sciences of the USSR organized the permanently active Prilensk Archaeological Expedition (PAE) in 1965. Based on the Vilyui and Aldan Expeditions, the PAE was given the task of starting a complete archaeological investigation of the territory lying east of the Yenisei basin and north of the Amur basin.

For the last ten years the PAE has conducted investigations on the Lena, Vilyui, Aldan, Vitim, Mai, Amga, Anabar, Olenek, Yana, Indigirka, Berelekh, Kolyma, and Anyui Rivers, and on the northwest coast of the Sea of Okhotsk, as well as the Novosibirskie Islands. The total extent of survey routes of the PAE amounts to more than 15,000 km (Fig. 1).

As a result of PAE work, traces of hunters of mammoths, woolly rhinoceroses, and other extinct animals have been recorded in various regions. In addition, the Paleolithic Berelekh site, northernmost in the world today (71° north latitude), also has been examined. The multicomponent sites of Bel'kachi I, Sumnagin I, Ust' Timpton, and others, discovered by the PAE, have played a significant role in illuminating the history of the last 10,000 years.

The interdisciplinary study of the archaeological sites, a collaboration of geologists, permafrost experts, paleozoologists, paleobotanists, and specialists in the method of radiocarbon dating, has permitted creating a rather reliable periodization of the early cultures of Northeast Asia and substantiating them with an absolute chronology.

Beginning in 1963, the author became primarily occupied with Stone Age Northeast Asia, with sites of the Dyuktai, Sumnagin, Syalakh, Bel'kachi, and Ymyyakhtakh cultures. The results of the study of the three last cultures, which are assigned to the Neolithic, were set forth in "The Multicomponent Bel'kachi I Site and Periodization of the Stone Age of Yakutia" (Mochanov 1966a, 1969a).

In the present work the sites of the Dyuktai and Sumnagin cultures are examined, these having the greatest significance for illuminating the beginning stages of settlement of Northeast Asia. The foundations of the study are the materials of the PAE, in which the leaders of the crews, N. V. Antipina, N. G. Bagynanov, V. A. Kashin, V. I. Kozlov, I. V. Konstantinov, S. A. Fedoseeva, Z. I. Filippova, N. M. Shcherbakova, and captain of the expedition boat, K. I. Kalganov, took a permanent part. E. A. Vangengeim, N. K. Vereshchagin, and O. V. Egorov identified the fauna. Palynological analysis was carried out by G. M. Savvinova and A. I. Tomska. Radiocarbon dates were obtained through the efforts of N. V. Kind, V. V. Kostyukevich, E. N. Romanova, A. A. Sementsov, L. D. Sulerzhitskii, and V. A. Ul'yanov. Valuable counsel on the geological conditions of the deposition of the individual sites was obtained from E. M. Katasonov, S. M. Tseitlin, and A. V. Sher. V. I. Kozlov made the illustrations of stone and bone tools.

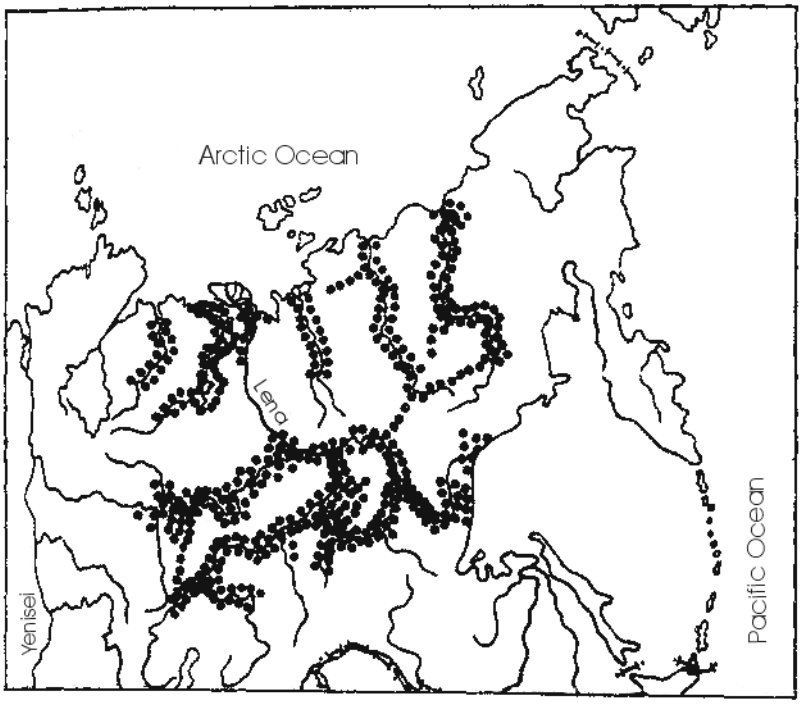


Figure 1. Map of the survey routes of the Prilensk Archaeological Expedition. * — route of the expedition.

S. A. Fedoseeva provided an especially great amount of help in the expedition's research and in preparing the manuscript for printing. She also took part in the discovery and excavation of almost all the sites of Northeast Asia being described.

To all the friends and colleagues who took part in the work of the Prilensk Archaeological Expedition and who rendered help with the writing of the monograph, the author offers his deepest gratitude.

Chapter I

ARCHAEOLOGICAL TYPE SITES OF THE LATE PLEISTOCENE OF NORTHEAST ASIA (35,000–10,500 Years Ago)

Until recently only one archaeological site was known in all the huge region lying east of the Yenisei Basin and north of the Amur Basin that contained stone artifacts in the same layer with Pleistocene fauna. This was the Chastinskaya site, discovered in 1941 by A. P. Okladnikov on the left bank of the Lena at approximately 58º north latitude. The cultural layer of the site was confined to the top of the floodplain alluvium of the 10-meter terrace of the Lena. Okladnikov excavated the cultural layer over an area of about 18 m^2 and found a small quantity of quartzite and jasper flakes in it, three of which, in his opinion, were worked along the edges by retouch and had evidently been used as skreblos. Several bones of woolly rhinoceros, reindeer, and Arctic fox were found in the layer together with the artifacts (Okladnikov 1953).[1]

At present, sites of hunters of mammoths and other Pleistocene animals have been found on the Lena, Aldan, Vitim, Maya, Indigirka, and Kolyma Rivers, the northwest coast of the Sea of Okhotsk, in Kamchatka, and other places (Fig. 2). Discovery of the world's northernmost Paleolithic site of Berelekh in the Indigirka Basin (71º north latitude) revealed that by the late Pleistocene people had settled almost all regions of Northeast Asia accessible to them.

Still, the presently known archaeological sites of the Pleistocene are far from equal in their significance and degree of study. Some of them, such as the sites of Dyuktai Cave, Ust' Mil' II, Ikhine I, Ikhine II, Ezhantsy, Verkhne-Troitskaya, and Berelekh, occur in clear stratigraphic conditions with well defined archaeological and faunal remains. Several radiocarbon dates also were obtained for most of them. Other sites, for example Tumulur, have clear stratigraphy but the archaeological material is not accompanied by faunal remains. Some sites, in particular Maiorych, Olenek, and Kyra-Krestyakh, are represented only by isolated surface finds and thus their Pleistocene age can be determined only by the typological appearance of the find.

Finally, we note that today not a single Paleolithic site in Northeast Asia has been completely examined. At present, either the excavations or detailed studies of the materials obtained from them continue. Meanwhile, the Paleolithic sites of Dyuktai Cave, Ust' Mil' II, Ikhine I, Ikhine II, Ezhantsy, Verkhne-Troitskaya, Tumulur, and Berelekh are of greatest interest for resolving problems of the earliest stages of the settlement of Northeast Asia.

[1] In 1967 and 1974 the Chastinskaya site was investigated by the PAE. The total area of excavation amounted to 50 m^2, but no new cultural remains were found—if several pieces of reindeer antler are not considered as such.

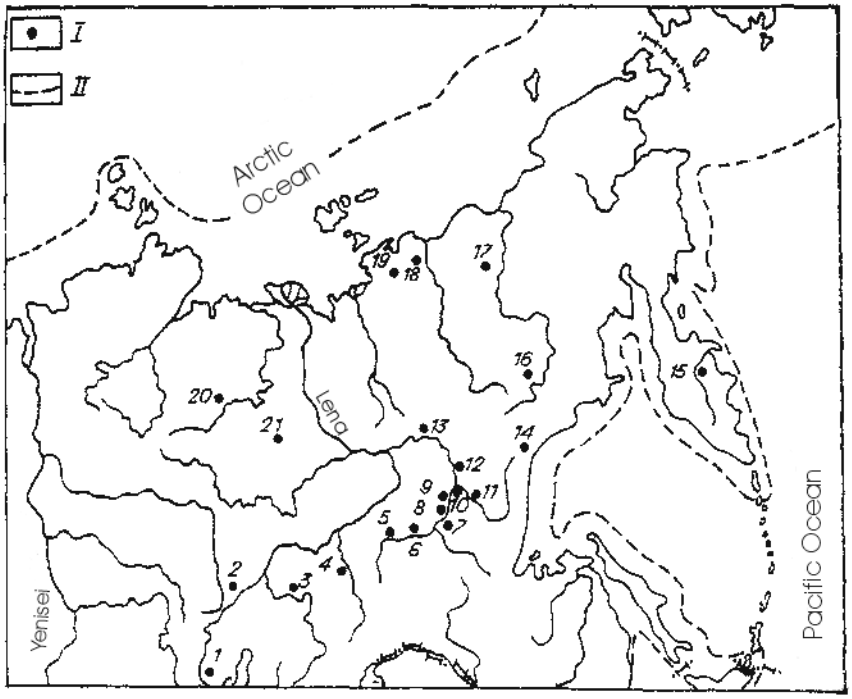


Figure 2. Map of the distribution of Pleistocene archaeological sites in Northeast Asia:

I. Archaeological sites: 1) Makarovo II, III; 2) Chastinskaya; 3) Avdeikha; 4) Leten Novyi; 5) Sumnagin III; 6) Tumulur; 7) Dyuktai Cave, Ust' Dyuktai I; 8) Ust' Bilir II; 9) Ust' Mil'; 10) Verkhne Troitskaya, Nizhne Troitskaya; 11) Kyra Krestyakh; 12) Ezhantsy; 13) Ikhine I, II; 14) Kukhtui III; 15) Ushki; 16) Maiorych; 17) Bochanut; 18) Chonurdakh; 19) Berelekh; 20) Olenek; 21) Kyuskyunde (Markha).

II. Approximate boundary of dry land in the late Pleistocene.

The sites of the upper Lena and Kamchatka are also of great significance for the study of the Paleolithic of Northeast Asia. Unfortunately, detailed characteristics of these sites are not available since the materials from them have not yet been fully published.

Dyuktai Cave

Discovered in September 1967 during work by the PAE, Dyuktai Cave is located on the right bank of the Dyuktai River, 112 m from its mouth (Fig. 3). The Dyuktai River is a right-bank tributary of the Aldan, 1,020 km from its mouth.

The cave represents a karst cavity cut by the Dyuktai River, formed in dolomitic Cambrian limestones. An initial small karst cavity in the area near the mouth was expanded as a result of wave action in the Dyuktai River.

Figure 3. View of Dyuktai Cave from the left bank of the Dyuktai River.

The form of the cave is subtriangular in plan. Its area amounts to about 60 m^2. The length of the cave in an east-west line is 12.5 m. The greatest width of the cave, at its mouth (the entrance), is 10.5 m. It narrows to 5 m approximately in the center. The height of the cave at the entrance is 2.7 m from the present ground surface to the ceiling. In depth (from the back) it gradually drops, reaching 1 to 1.2 m in the center. The drop of the cave is connected with the sloping position of its modern floor relative to a horizontal line, for which the river bank was accepted. The angle of drop of the floor from the source of the cave to its mouth (along the east-west line) is 7 to 8°. In addition, the floor of the cave falls at an angle of 5 to 6° from the south side to the north. The roof (ceiling) of the cave relative to the river bank is situated almost horizontally.

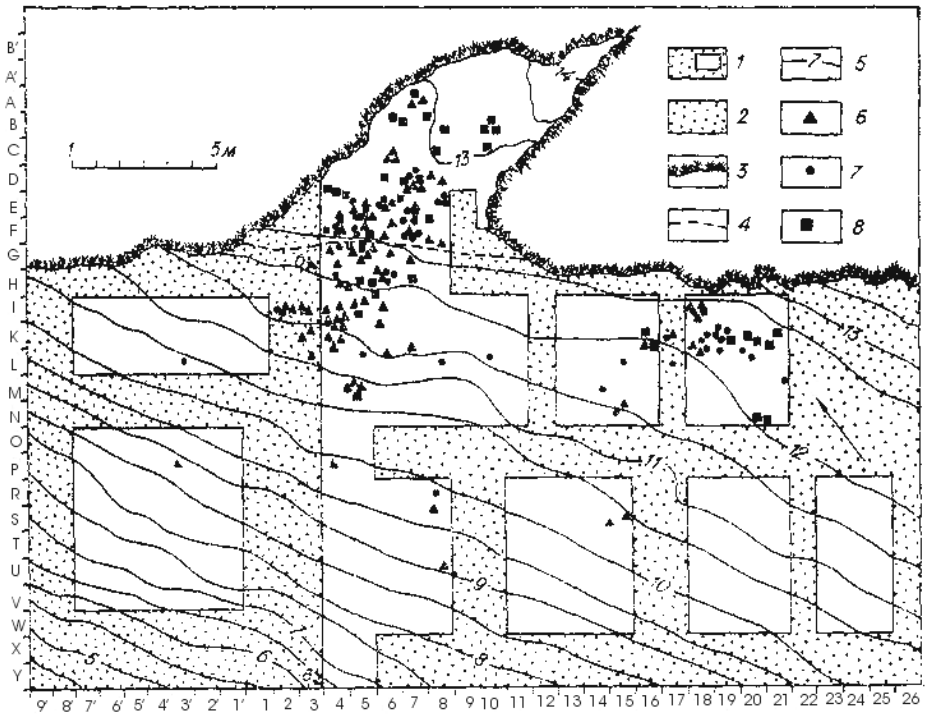


Figure 4. Plan of the excavation at Dyuktai Cave and the cave apron: 1) excavation; 2) unexcavated; 3) Cambrian limestone (cliff); 4) line of the overhang; 5) horizontal and vertical contours above the mean Dyuktai River level; 6) stone artifacts of Horizon A; 7) stone artifacts of Horizon B; 8) stone artifacts of Horizon C; a–b–c is lines of the profiles.

Figure 5. General view of the excavation, cave and cave apron.

The height of the floor at the mouth area of the cave is 12.5 m from the mean water level of the Dyuktai and Aldan Rivers. In the center of the cave the floor rises to 13 m, and at the back it reaches 14.5 m.

Because of its position the cave was very favorable for early humans. Considering the fact that its entrance faces the south-southwest, it is lighted by the sun almost all day, with the sun's rays reaching even its most distant corners in the afternoon. Therefore conditions were always dry in the cave. At the same time, the cave offered shelter from even the most wearisome heat.

In front of the cave is a rather level area on which a dwelling could have been constructed. The level area stretches along the Dyuktai approximately 30 to 35 m, and from the cave to the riverbank 5 to 10 m. Beyond this (especially along the east-west line) the ground drops sharply to the Dyuktai and is unfavorable for living.

Figure 6. Cave apron during excavation.

No surface materials were noted either in the cave or on the cave apron that would attest to the existence here of early people. On 21 September 1967 a 10.25 m^2 exploratory excavation was made in the cave apron. Well defined artifacts were found in it that permitted identifying a Paleolithic culture, named Dyuktai (Mochanov 1969b, 1969c, 1970a).

In 1968–1970 work continued at the site, which embraced not only the cave but also the cave apron (Fig. 4). The total area of the excavations amounted to 317 m^2 (Figs. 5, 6). The greatest thickness of the loose deposits lying on the Cambrian limestones reached 2.3 m in the cave and 5.2 m in the cave apron.

The excavations revealed the following stratigraphy of the site (Fig. 7):

1. Sod (Stratum 1 in Figure 7) had a thickness in the cave apron of 15 to 30 cm. The sod extended into the cave 1.5 to 2 m, with its thickness reduced to 2 cm. A dark-gray cloddy sandy loam (Stratum 4 in Figure 7) 5 to 30 cm thick spread over a large part of the surface of the cave. Rubble (the product of decomposing bedrock) was often encountered in the sod and cloddy sandy loam. The dimensions of the rubble fluctuated from 1 x 1 cm to 50 x 70 cm. Directly on the surface in the cave were occasional slabs of limestone measuring 120 x 170 cm. Several pieces of iron slag, isolated flint flakes (in the cave apron), and a small quantity of animal bones were discovered in the sod. Several artifacts from the early Iron Age and Neolithic, as well as animal bones, were encountered in the cloddy sandy loam.

2. Under the sod in a large part of the area in the cave apron and partially in the area of the cave mouth lay a horizontally layered packet (Strata 3a and 3b in Figure 7), which consisted of lenses of sandy loam 0.5 to 6 cm thick and dark-brown humic sandy loam 1.5 to 8 cm thick. Rubble was found in both these and other lenses. The total thickness of the packet was 0.5 to 1.5 m. The upper part of the packet (Stratum 3a in Figure 7) possessed the clearest layering, predominated by lenses of sandy loam preserving relatively little rubble. A radiocarbon date of 740 ± 50 BP (LE-829) was determined on charcoal taken from the middle of Stratum 3a in Quadrant U'_3. Judging by the character of the layering, the stratigraphic position, and the date obtained, Stratum 3a appears to be a late Holocene deposit of alluvium that began to accumulate on the surface of the high floodplain and accumulated parts of the lower (I–III) floodplain terraces approximately 1,000 years ago. In the very bottom of Stratum 3a, at the contact with Stratum 3b, flint flakes and slabs were discovered, along with fragments of ceramics of the early Iron Age, iron knives, and animal bones.

   Stratum 3b, which was found only in front of the cave, was significantly darker in color than Stratum 3a, due to the prevalence of humic sandy loam and impregnating rubble. Sandy loam occurred in layers of thin (0.5 to 1 cm) lenses. Evidently during the formation of Stratum 3b the ground surface in the cave apron was only rarely inundated. Various artifacts from the early Iron Age (upper horizon) and the Neolithic (lower horizon), as well as animal bones, were found in the deposits of Stratum 3b.

3. Under Stratum 3b in the area of the cave apron gray compact loam with rubble (Stratum 5 in Figure 7), 20 to 40 cm thick, occurred everywhere. In some places dark-gray slightly humic loam lenses 2 to 3 cm thick could be traced. The genesis of this stratum is not entirely clear. It most probably represents the Soil II of the floodplain terrace buried under deposited Holocene alluvium. In the upper and middle horizons of Stratum 5 were flint and chalcedony knifelike blades and flakes, flint prismatic microcores, angle burins, and end scrapers on blades. Not one fragment of ceramics was found in the gray loam. All these finds evidently belong to the Sumnagin culture. In the lower horizon were flakes of black and gray banded flint. Based on the material, they are closest to artifacts from the lower lying strata. Fauna found in Stratum 5 are represented by bones of elk (*Alces Alces* L), reindeer (*Rangifer tarandus* L), squirrel (*Sciurus vulgaris* L), sable or marten (*Martes* sp.), and beaver (*Castor* sp.).[2]

[2] Identification of the remains of hoofed and predatory mammals was conducted by E. A. Vangengeim and O. V. Egorov, the remains of rodents by V. S. Zazhigin, the remains of birds by P. Ballaman and E. N. Kurochkin, and the remains of fish by E. A. Tsepkin.

4. Under gray loam in the area of the cave apron was a horizontally layered parcel (Strata 7a, 7b, and 7c in Figure 7) that is represented by alluvial floodplain Facies II of the floodplain terrace. The maximum thickness of the parcel is 3.9 m. In some places Strata 7b and 7c also pinched out in the Pleistocene deposits at the mouth of the cave (in Stratum 8 in Figure 7). The alluvial stratum was excavated all the way to bedrock only in Area 84 of Quadrant M, in areas along the line $I_{4–21}$ to $N_{4–21}$ (Fig. 4). In some places, primarily in front of the cave entrance, between the alluvium (Stratum 7a) and the gray loam (Stratum 5) lay a lens of yellowish-gray cloddy loam with rubble (Stratum 6 in Figure 7). The thickness of the lens was 10 to 15 cm. Sometimes it increased to 40 cm. In the loam, pieces of mammoth tusk (*Mammuthus primigenius* Blum.) were occasionally encountered, as well as isolated flint flakes and slabs with spalls removed. Some lenses of this loam could also be traced along Lines 15–21. The yellowish-gray loam was probably talus that slipped down from the cave with accumulated parts of the cliff.

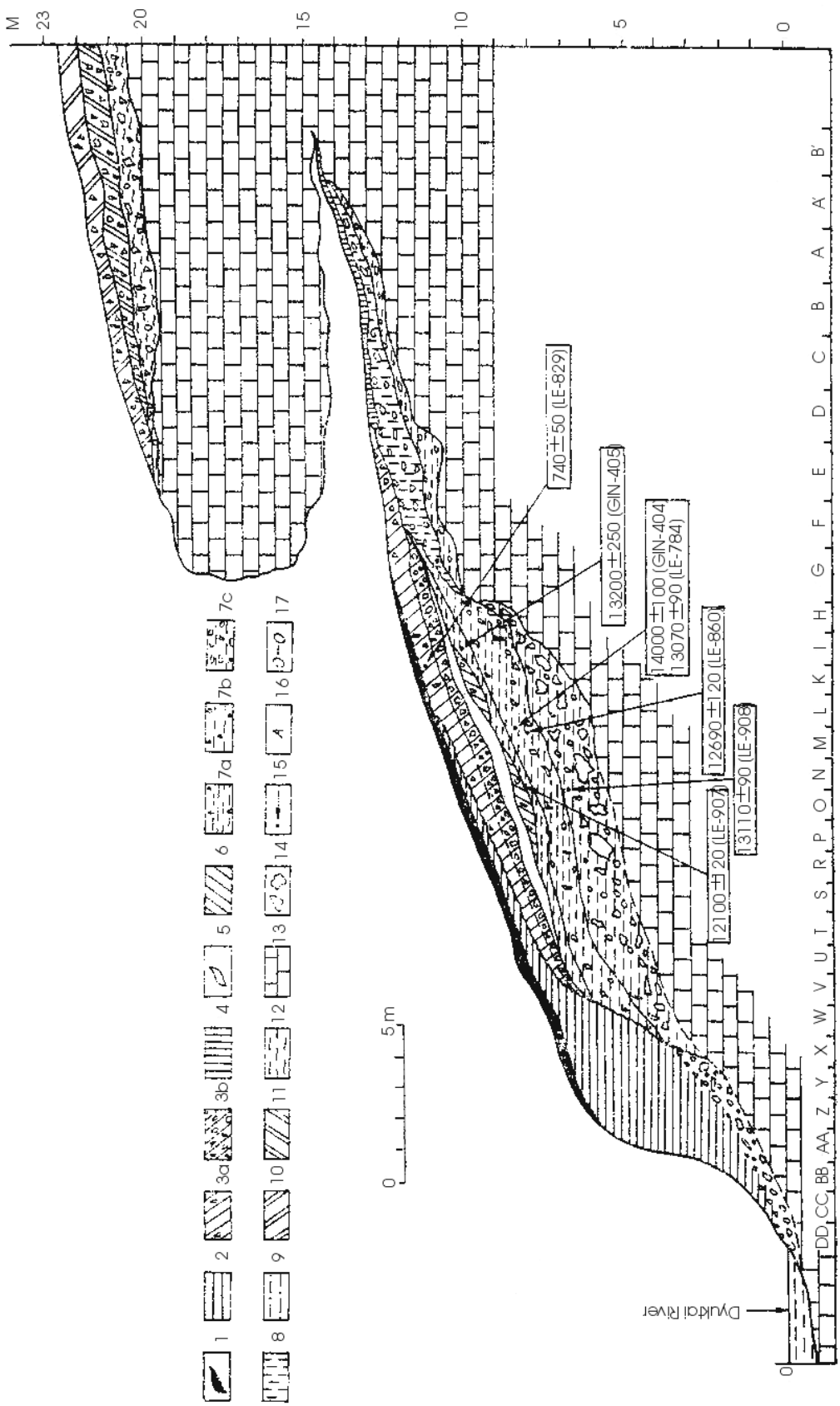
   In color, character of stratification, and amount of rubble, the alluvial layer was rather clearly subdivided into three strata: 7a, 7b, and 7c.

   Stratum 7a is represented by a horizontally layered parcel composed of interlayers of yellow inequigranular sands 0.2 to 3 cm thick and grayish silty sandy loam 0.5 to 2 cm thick. Plant remains were often encountered in the latter. The interlayers of sand were substantially thicker than the interlayers of sandy loam, and therefore the parcel had a fundamentally yellow tinge. The total thickness of the parcel was 40 to 50 cm, reaching 60 cm in some places. Primarily characteristic of Stratum 7a were soil veins of defraction. Along with them small buried ice veins were occasionally encountered. Rubble in the parcel occurred rather rarely and was represented by very small pieces.

   In Stratum 7a were numerous bones of Pleistocene animals and various artifacts of the Dyuktai culture. Based on a wood sample collected in Quadrant O_1 and a sample of charcoal from a hearth in Quadrant I_4–K_4, two radiocarbon dates were obtained for the middle part of the deposits of Stratum 7a: 12,100 ± 120 BP (LE-907) and 13,200 ± 250 BP (GIN-405).

   Stratum 7b is represented by a horizontally-layered packet that is made up of interlayers of inequigranular gray sands 0.1 to 1 cm thick and grayish-bluish silty sandy loam 0.3 to 4 cm thick. The total thickness of the parcel was 100 to 120 cm, sometimes diminishing to 65 cm or increasing to 140 cm. This stratum is characterized by an insignificant content of rubble. Frost cracks here had the form of small horizontal veins of defraction. In Stratum 7b were numerous bones of Pleistocene animals and various artifacts of the Dyuktai culture. Based on a sample of charcoal collected from an eroded hearth in Quadrant $M_{20,}$ two radiocarbon dates were obtained for the upper part of Stratum 7b: 13,070 ± 90 BP (LE-784) and 14,000 ± 100 BP (GIN-404). Charcoal collected in this same quadrant, but 30 cm lower, gave a radiocarbon date of 12,690 ± 120 BP (LE-860). Considering the stratigraphic position of packet 7b and the newly obtained radiocarbon dates, the most correct age is in the interval between 13,000 to 15,000 BP.

   Stratum 7c is represented by grayish-bluish sandy loam with lenses of light-gray fine-grained sand emphasizing a horizontally wavy bedding. Rubble was rather often encountered in the sandy loam (especially in its lower part). The total thickness of Stratum 7c fluctuated from 130 to 210 cm. The frost cracks in the sandy loam had the form of small ground veins of defraction. This stratum lay on whitish-gray Cambrian limestones in all the opened parts of the cave apron area. Its top was represented by yellowish softened slabs. At various levels in Stratum 7c were the bones of Pleistocene animals and artifacts of the Dyuktai culture. The latter were chiefly associated with the upper part of the deposit. Isolated stone objects were noted in the lower part. This evidently can be explained by the fact that during the accumulation of the bottom of Stratum 7c the cave apron area, being continually inundated, was visited episodically by people, but only during brief periods of dry weather.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740±50 (LE-829)
13200±250 (GIN-405)
14000±100 (GIN-404
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12690±120 (LE-860)
12100±20 (LE-907)
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Based on a wood sample from Quadrant O_1, a radiocarbon date of 13,110 ± 90 BP (LE-908) was obtained for the top of Stratum 7c. However, considering the stratigraphic position of Stratum 7c and the radiocarbon dates obtained for the lower part of the flood-plain alluvium at the Verkhne Troitskaya (Fig. 13), the age of sample LE-908 is too young. Until additional radiocarbon dates are obtained, Stratum 7c can be tentatively dated to the interval beginning 23,000 to 22,000 years ago and ending 15,000 years ago.

5. Within the cave, under the Holocene alluvia (Strata 3a and 4 in Figure 7), lay grayish-yellowish sandy-loamy cloddy deposits, completely saturated with rubble (Stratum 8 in Figure 7). The thickness of these deposits fluctuates from 30 to 105 cm. In the mouth area of the cave, in Stratum 8, small lenses of horizontally laminated yellowish-grayish alluvial sandy loam could be traced, confirming that during the accumulation of the upper layer of alluvium of Terrace II (probably Strata 7a and 7b) the mouth area of the cave was episodically inundated by flood waters. In Stratum 8 (especially in the mouth area and middle part of the cave) were large numbers of bones of Pleistocene animals and artifacts of the Dyuktai culture.

6. In the cave, under the deposits of Stratum 8, lay horizontally-laminated yellow sandy loam (Stratum 9 in Figure 7) with a lamellar nature emphasized by the thinnest (to 0.3 cm) interlayers of inequigranular yellow sand. In the Stratum 9 deposits, rubble was very rarely encountered. The thickness of Stratum 9 amounted to 20 to 40 cm over almost the whole area of the cave, except along Line D–E, where in a hollow in the bedrock it was greater than 90 cm. Judging by the character of the layering, the deposits of this stratum belong to a floodplain facies of alluvium. The last layer, according to the analysis of archaeological and faunal materials, probably accumulated simultaneously with the deposits of Stratum 7c. Everywhere under Stratum 9 lay yellowish sandy loam with a porous, pumicelike structure. The thickness of this sandy loam, which is evidently the eluvial top of the rocky floor of the cave, was 3 to 5 cm.

   In this profile only the cultural remains of Pleistocene deposits of the cave and of the area around the mouth of the cave could be seen, that is, of Strata 7a, 7b, 7c, 8, and 9. The artifacts from them were assigned to separate cultural layers: VIIa, VIIb, VIIc, VIII, and IX. Also preliminarily included in these layers were the materials recovered from cultural layers of Pleistocene age opened in 1967 (Mochanov 1970a). Their numbering does not agree with the present one: Layer III of 1967 corresponds to the top of Layer VIII of 1968–1970, Layer IV of 1967 to Layer VIIa, Layers V–VIII of 1967 to Layer VIII, and Layers IX–XIV of 1967 to Layer IX.

Figure 7. Profile of deposits at Dyuktai Cave and cave apron along Line a–b–c: 1) sod; 2) cloddy sandy loam with plant remains (deposits of the modern middle floodplain); 3a) horizontally laminated sandy loam (deposits of the modern high floodplain); 3b) humic sandy loam with artifacts of the early Iron Age and Neolithic; 4) cloddy sandy loam; 5) humic loam (in the upper part with early Holocene Paleolithic artifacts); 6) deluvial sandy loam; 7a) horizontally laminated yellowish-grayish sandy loam (upper Pleistocene Paleolithic cultural Horizon A); 7b) horizontally laminated grayish-bluish sandy loam (cultural Horizon B); 7c) vaguely laminated grayish-bluish sandy loam (cultural Horizon C); 8) vaguely laminated sandy loam (in the upper part of cultural Horizon A and in the lower part of cultural Horizon B); 9) horizontally laminated yellowish sandy loam (cultural Horizon C); 10) humic loam; 11) deluvial loam; 12) horizontally laminated sandy loam; 13) Cambrian limestone; 14) rubble; 15) location of C-14 samples; 16) lines of excavation; 17) mean Dyuktai River level.

Cultural Layer VIIa

In Layer VIIa were found a total 1,693 stone and 8 bone objects, as well as 1,631 animal bones. The bones identified belonged to mammoth (*Mammuthus primigenius* Blum): 24 specimens (pieces of tusk); bison (*Bison priscus* Boj): 2 specimens; horse (*Equus caballus* L.): 1 specimens; reindeer (*Rangifer tarandus* L.): 32 specimens; moose (*Alces alces* L.): 33 specimens; snow sheep (*Ovis nivicola*): 4 specimens: wolf (*Canis lupus* L.): 4 specimens; fox (*Vulpes vulpes* L.): 9 specimens; Arctic fox (*Alopex lagopus* L.): 12 specimens; hare (*Lepus* sp.): 38 specimens; ground squirrel (*Citellus* sp.): 7 specimens; various rodents: 32 specimens; various birds: 2 specimens; and various fish: 2 specimens. According to O. V. Egorov, many of the pieces of large long-bones most probably belonged to mammoth.

The stone objects consisted of flakes (1,328 specimens), flint flakelets (190 specimens) and slabs (54 specimens), blades (60 specimens), ski-shaped spalls (5 specimens), cores (23 specimens), and tools (33 specimens).

Flakes (Pl. 1:3) are divided by material into flint (1,323 specimens) and diabase (5 specimens). Among the first, specimens of black and black banded flint predominate, though flakes of white, red, gray, and grayish-pink banded flint also were encountered. Based on size, they were subdivided into large (230 specimens), medium (330 specimens), and small (768 specimens).[3] All the diabase flakes are small.

Flint slabs served as a source material for making cores and tools. Nearly all are in the initial blank stage, from which the nodule cortex was partially removed, and they have traces of flaking (Pl. 1:5). The length of the slabs is 6.7 to 17.8 cm, the width 3.4 to 9.9 cm. One piece of a slab had intersecting strokes scratched on it that are reminiscent of the linear design on a tusk from Berelekh.

The overwhelming majority of blades were made from black or black banded flint (46 specimens), but gray, white, pink, and grayish-banded flint (14 specimens) were also encountered. One whole blade has a length of 5.5 cm and width of 0.9 cm. The remaining blades are broken. Based on width they are distributed in the following way: blades 0.3 to 0.4 cm wide: 9 specimens; 0.5 to 0.7 cm wide: 35 specimens; 0.8 to 0.9 cm wide: 8 specimens; and 1.0 to 1.5 cm wide: 8 specimens.

Ski-shaped spalls (Pl. 1:1) were removed from wedge-shaped cores of black flint (2 specimens) and black (1 specimen) and gray (2 specimens) banded flint. Their length is 4.1 to 5.1 cm, their width 0.9 to 1.5 cm.

The cores discovered in the layer are divided into four types: wedge-shaped (16 specimens), flat unifacial subprismatic (3 specimens), prismatic (2 specimens), and subdiscoid (2 specimens).

The wedge-shaped cores are represented by blanks (12 specimens) and finished artifacts (4 specimens). The form of the blanks is subrectangular (5 specimens), subtriangular (3 specimens), semilunar (2 specimens), truncated oval (1 specimen), and amorphous (1 specimen). Slabs of the black and black banded flint were used as material for the blanks. Most of the cores were found in the initial stage of being worked. Their bases had been sharpened on two sides by the removal of spalls and work begun on the working end. Finally, one of the blanks had the working end formed in the shape of a rib and the subtriangular pressure platform formed by diagonal removal of a spall (Pl. 2:5).

[3] In this work, flakes that exceed 5 cm in length or width are considered large; those 3 to 5 cm in length or width are medium; those less than 3 cm in length or width are small.

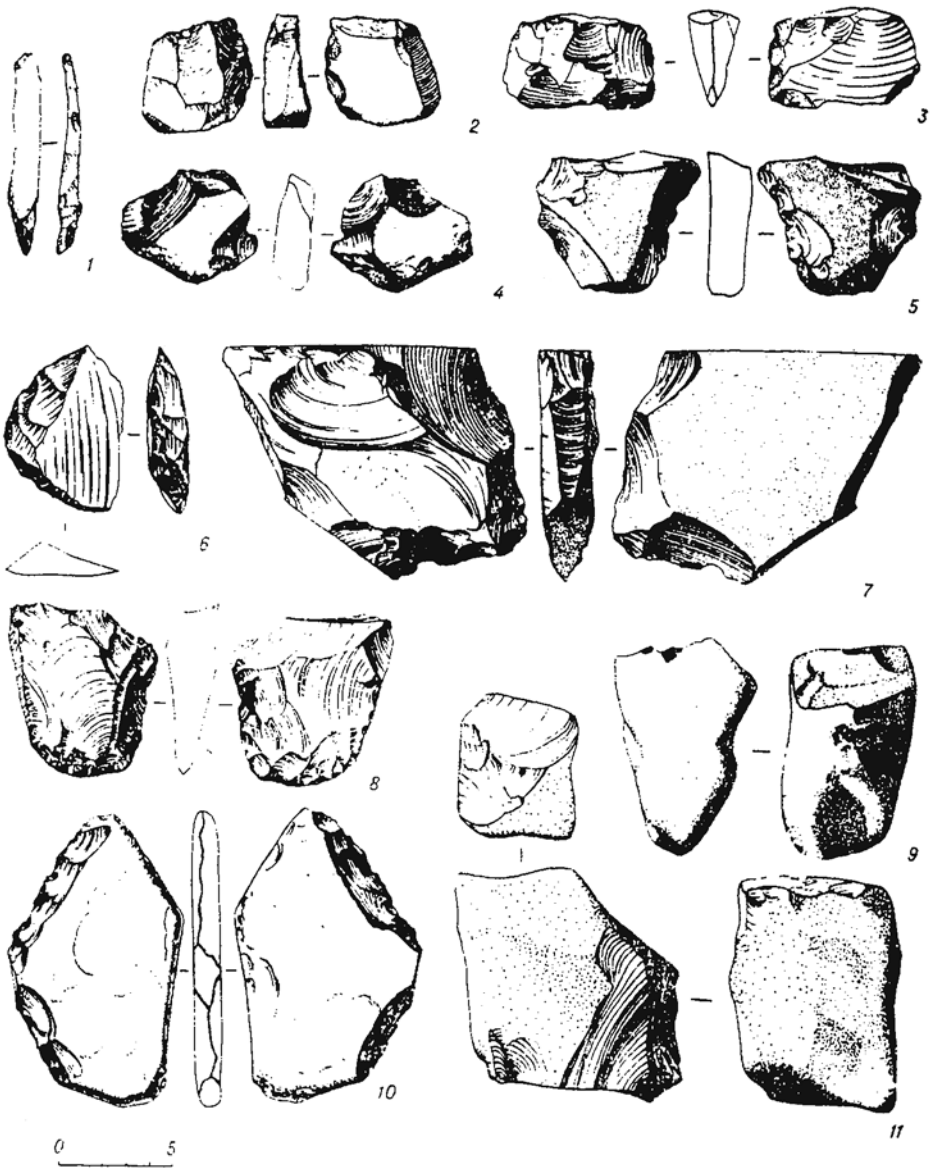

Plate 1. Dyuktai Cave. Stone assemblage from Layer VIIa.

A high wedge-shaped core blank is represented by a truncated oval specimen. The artifact was stripped entirely of cobble cortex. Both broad surfaces were worked by flat pressure retouch, and the convexly arced base was sharpened. The long section of the blank is triangular, the cross section trapezoidal. The pressure platform and working end were not modified (Pl. 1:8).

Among the blanks of wedge-shaped cores is an artifact on which one broad surface is completely cleared of nodule cortex, the base and rear rib sharpened by bilateral spall removal, and a crude primary blade removed from the unprepared pressure platform (Pl. 1:7). The length of the blanks fluctuates from 5.2 to 12.3 cm, the height from 3.8 to 10.1 cm.

Finished cores are divided into three subtypes: boat-shaped (1 specimen), triangular (2 specimens), and high subrectangular (1 specimen).

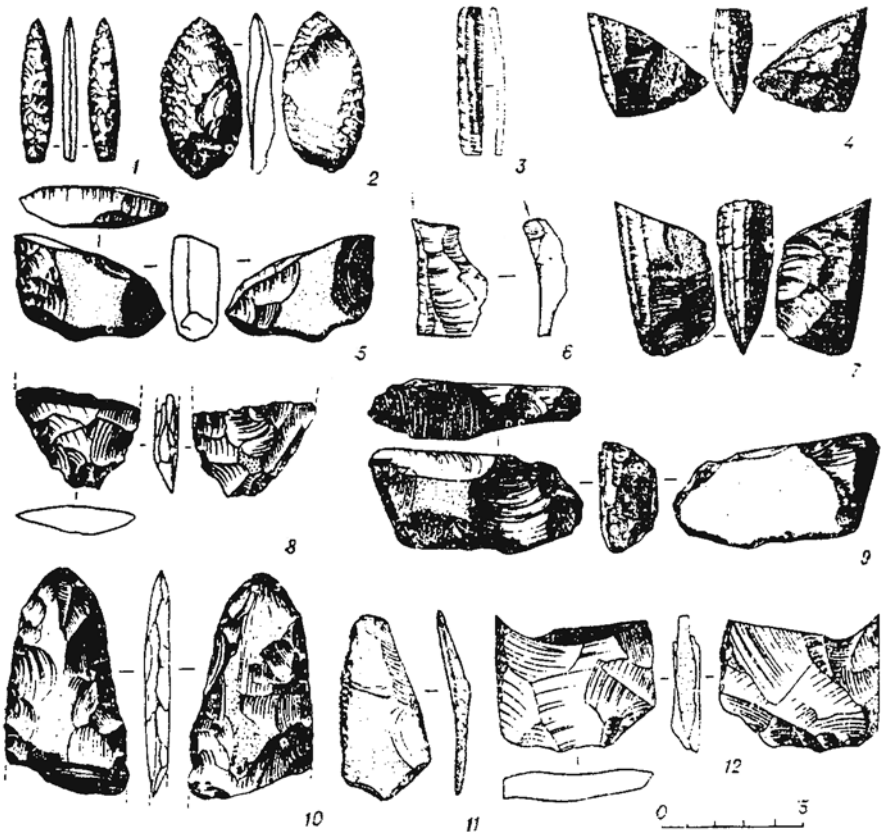

Plate 2. Dyuktai Cave. Stone assemblage from Layer VIIa.

The broad surface on one side of the boat-shaped core is partially covered with cobble cortex, and on the other side, completely covered. The base and rear rib were not sharpened. The pressure platform was formed by removing one longitudinal spall. The platform is directed at an acute angle to the working end, from which primary blades were removed. The length of the core is 7.8 cm, the height 3.6 cm, and the dimensions of the platform 4.4 x 2.1 cm (Pl. 2:9).

The triangular cores are represented by a whole specimen and a broken one. The whole core has triangular longitudinal and transverse sections. Its broad surfaces were worked by retouch. The convexly arced base was sharpened. The triangular pressure platform was formed by the removal of one broad diagonal and was directed at an acute angle to the working end. No additional work was done to the platform. Thin regular knifelike blades were removed from the end. The length of the core is 3.9 cm, the height is 3.7 cm, and the dimensions of the platform 5.0 x 1.4 cm (Pl. 2:4).

The high subrectangular core has a triangular longitudinal section and a subrectangular transverse section. Its convexly arced base is sharpened. One of the broad surfaces of the core is completely worked by flat pressure retouch, the other surface partially preserves cobble cortex. The subrectangular pressure platform was formed by the removal of one spall, but was not subjected to any additional work by retouch. The platform is beveled toward the working end, from which long regular blades have been removed. The height of the core is 5.6 cm, the length 3.4 cm, and the dimensions of the platform 3.7 x 1.9 cm (Pl. 2:7).

The flat unifacial subprismatic cores were made from slabs of black flint. They have poorly worked beveled platforms, from which broad irregular blades were removed. The side of the artifact opposite

blade removal is covered with cobble cortex. The length of the cores is 5.4 to 4.5 cm, their width 3.3 to 4.6 cm (Pl. 1:2).

The prismatic cores are represented by blanks. One of them was made from a cobble of gray argillaceous-siliceous slate, the other from a diabase cobble. The form of the blanks is subrectangular and subtriangular. On both blanks, subrectangular pressure platforms were formed by the removal of spalls. The platforms are directed at an acute angle to the longitudinal axis. On the slate blank, the lateral rib was sharpened by unifacial spall removal. The length of the blank is 5.0 to 9.6 cm, the height 8.9 to 9.3 cm (Pl. 1:9, 11).

The subdiscoid cores are represented by artifacts from slabs of black and black banded flint. One of them was partially worked on both sides by radial spall removal. The diameter of the core is 5.9 cm, the thickness 1.7 cm (Pl. 1:4). The other core was formed by radial spall removal on only one side, with the exception of a small area of cobble cortex in the center. Its length is 5.7 cm, its width 5.6 cm, and its thickness 3.2 cm.

The tools are represented by scrapers (2 specimens), burins (2 specimens), knives and knife blanks (14 specimens), points of darts (?) and spears (3 specimens), lamellar blades with a beveled edge (3 specimens), inset blades (4 specimens), skreblos (4 specimens), and whetstones (1 specimen).

The scrapers were made on flat flakes of black flint. One was an end scraper with a trapezoidal form and ovally convex working edge that was worked by steep retouch directed from the ventral side to the dorsal. The length of the scraper is 2.5 cm, the width 1.6 cm. Another scraper has two working edges: one on the end and one on the side, and is nearly oval in form. The working end is ovally convex. It is worked by the smallest steep retouch directed from ventral to dorsal. The lateral working edge is straight. A small pointed “beak” projects from the middle of the working edge, which was worked by steep retouch directed from ventral to dorsal. The length of the scraper is 2.8 cm, the width 2.2 cm.

The burins were made on flakes of black flint and gray argillaceous-siliceous slate. Both are angle burins. Their working edge was formed by the removal of a burin spall 0.6 to 1.5 cm long and 0.2 to 0.7 cm wide directed at an acute angle to the transverse plane of the bottom of the flake. The length of the burins is 2.0 and 4.3 cm, the width 1.2 and 2.5 cm (Pl. 2:6).

Flint blades (2 specimens) and flint slabs (10 specimens) served as material for making knives. The initial type of blank for two small pieces of flint knives was difficult to establish.

The knives on blades were made of black flint. Both knives on flint blades had a dual assignment: their longitudinal edges served as the working edges of knives, while the transverse, lower ends served as the working edges of scrapers. The knife working edges were formed by pressure retouch on the edge, directed along the right edge from dorsal to ventral, and along the left edge from ventral to dorsal. The convexly arced working edges of the scrapers were formed by fine steep retouch directed from ventral to dorsal. The length of the tools is from 6.0 to 9.9 cm, the width 3.1 to 3.3 cm, and the width of the working edges of the scrapers 1.3 to 1.6 cm (Pl. 4:5).

The knives on flint slabs are represented by blanks (7 specimens), whole tools (1 specimen), and broken ones (2 specimens). These are bifacially worked tools. The blanks have subtriangular, trapezoidal, rhomboid, and segmented forms. Both their broad surfaces were worked partially (5 specimens) or completely (2 specimens) by flat pressure retouch, which helped to remove the nodule cortex. The working edges of the tools were not completely formed and therefore have a crooked edge. The length of the blanks is 5.9 to 18.5 cm, the width 4.3 to 12.7 cm (Pl. 1:10). One of the blanks was broken during the process of being worked (Pl. 2:12).

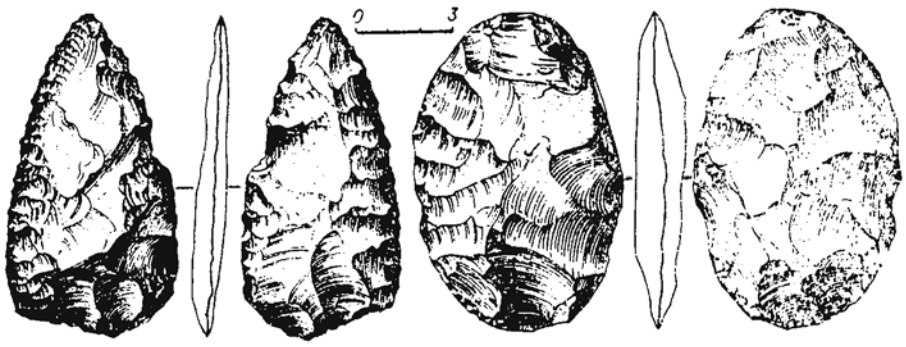

Plate 3. Dyuktai Cave. Stone assemblage from Layer VIIa.

The complete biface knife is oval in form. Its broad surfaces were worked by flat pressure retouch. Small amounts of nodule cortex were preserved only in areas adjacent to the butt. The plane of the butt, which is located on the lower part of the lateral edge of the tool, is also covered with cobble cortex. The working edge was trimmed with bifacial edge retouch. The longitudinal section of the knife is almond-shaped. The transverse section of the working edge is also almond-shaped, while the area at the butt is triangular. The length of the tool is 10.1 cm, the width 6.7 cm (Pl. 3:2).

The broken biface knives are represented by a fragment of a base of one tool and by a fragment of the lower half of another. These knives probably had a laurel-leaf form. Their broad surfaces were worked by flat retouch, while the edge was trimmed by secondary retouch. The transverse section of the tool is almond-shaped. The width of the preserved parts is 4.4 to 4.5 cm (Pl. 2:8, 10). The transverse plane of the break was subjected to partial working by edge retouch, suggesting an attempt to use the tools secondarily.

The dart (?) points were made of black flint and gray banded flint.

The point of black flint has a willow-leaf form. The transverse section of its working part is almond-shaped, the base is rhomboid. Both of its surfaces were carefully worked by pressure retouch, the edges trimmed by bifacial retouch. The length of the point is 5.7 cm, the width 1.2 cm (Pl. 2:1). Based on its dimensions and form, this artifact is very similar to a Neolithic arrowhead. It is possible that the bow was already known in the concluding stage of the Dyuktai culture by the Paleolithic inhabitants of the Aldan. Unfortunately, similar artifacts have not yet been found in other Pleistocene sites of the Aldan. The the above-described artifact has the clearest analogies among the cultural remains from Layers V and VI of the Ushki site (Pl. 30:1, 2, 7, 8, 14), which, in our view (Mochanov 1970a:63), can be assigned to the final stage of the Dyuktai culture. N. N. Dikov (1971b:191), who investigated the Ushki site, also agrees with this assumption.

The dart (?) point of gray banded flint was made from a flake. It has a laurel-leaf form. Its longitudinal and transverse sections are segmentlike. The dorsal side of the point is entirely worked by pressure retouch, with narrow parallel facets. A large part of the surface of the ventral side of the tool was worked by edge pressure retouch. The length of the point is 6.0 cm, the width 3.1 cm (Pl. 2:2).

The spear point was probably made from a slab (?) of black flint. The tool has a triangular form with almond-shaped longitudinal and transverse sections. The broad surfaces were worked by flat pressure retouch, the edges trimmed by secondary pressure retouch. The base was worked on both sides by the removal of large vertical spalls. The length of the tool is 10 cm, the width 5.2 cm (Pl. 3:1).

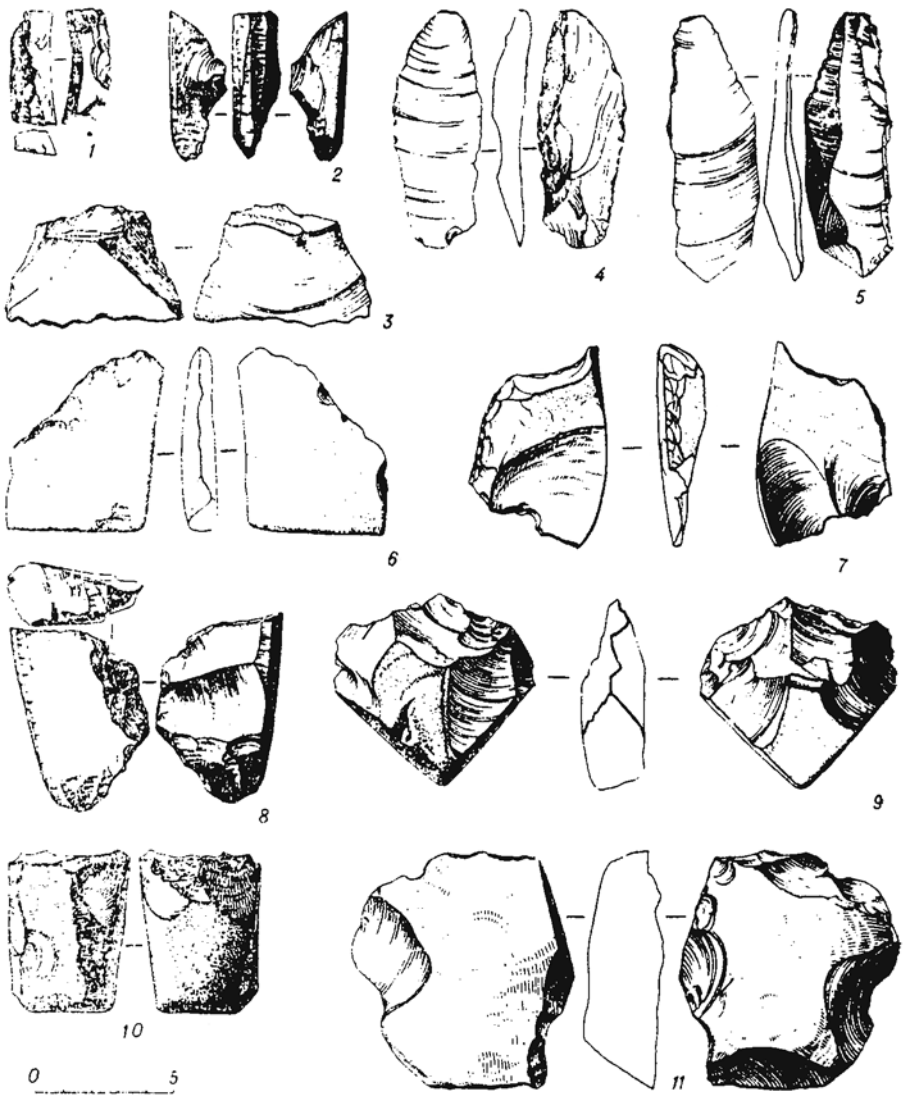

Plate 4. Dyuktai Cave. Stone assemblage (1, 2, 8, 10, 11 from Layer VIIb; 5 from Layer VIIa; 3, 4, 6, 7, 9 from Layer VIII).

The blades with a beveled edge were made on black (2 specimens) and pink (1 specimen) flint. Their beveled edges were formed by steep retouch directed from ventral to dorsal. The length of the tools is 2.1 to 2.7 cm, the width 0.8 to 1.1 cm.

Broken lamellar blades of black flint were used for making inset blades. Three lamellar blades had the bottom broken; one blade had both top and bottom broken. All the inset blades have one working edge, worked by unifacial fine retouch directed from ventral to dorsal (3 specimens) and from dorsal to ventral (1 specimen). The length of the tools is 1.8 to 5.4 cm, the width 0.6 to 0.8 cm (Pl. 2:3). One inset blade has a width of 0.4 cm.

The skreblos were made of flint flakes (2 specimens) and flint slabs (2 specimens).

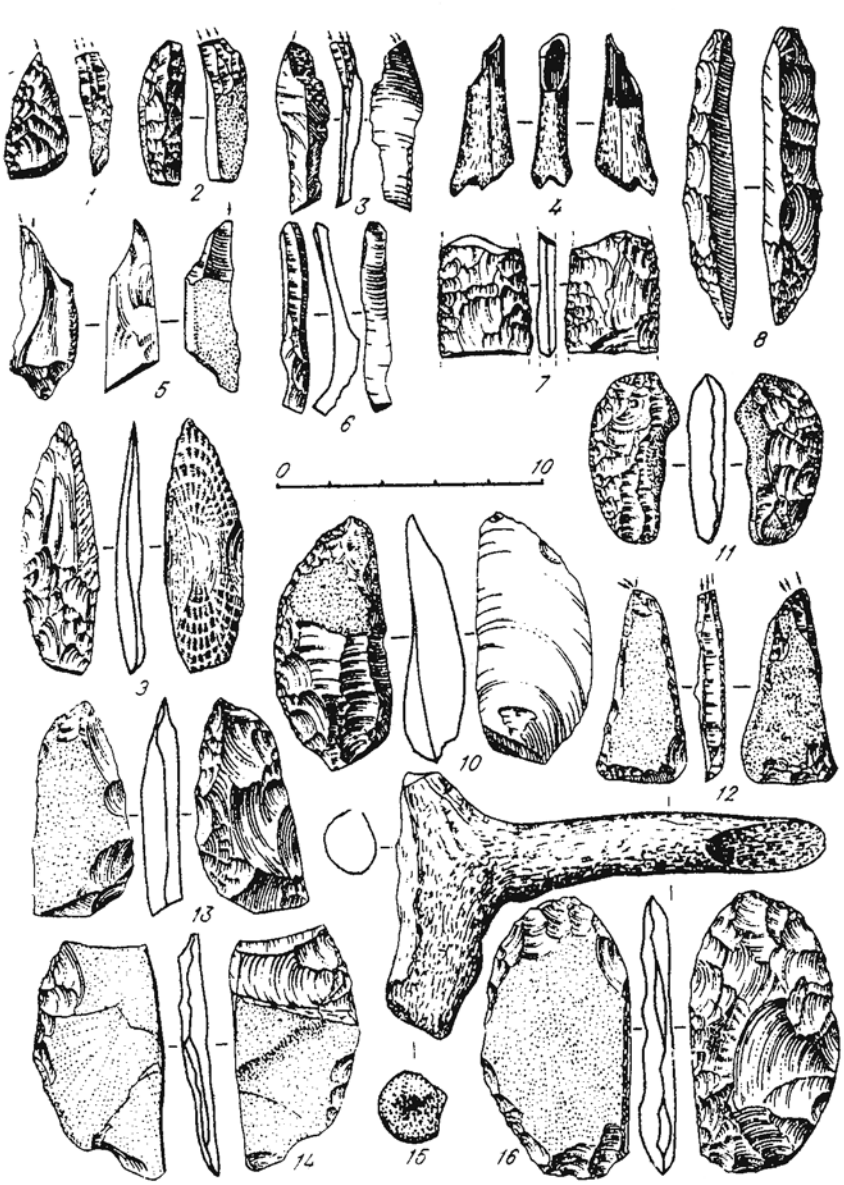

Plate 5. Dyuktai Cave. Stone and bone assemblage (1, 2, 8, 13, 16 from Layer VIIb; 4, 15 from Layer VIIa; 3, 5–7, 9–12, 14 from Layer VIII).

The skreblos on flakes have a semilunar and subtriangular form. The semilunar one is a lateral skreblo with a high back and an ovally convex working edge modified by stepped retouch directed from ventral to dorsal. The transverse section of the tool is triangular. The length of the skreblo is 7.1 cm, the width 5.3 cm (Pl. 1:6). The subtriangular skreblo was made on a flat primary flake. The tool has three working edges: two lateral and one end. The lateral working edges are straight, the end working edge is beveled. All the working edges were modified by unifacial steep retouch directed from ventral to dorsal. The length of the skreblo is 6.7 cm, the width 3.1 cm (Pl. 2:11).

The skreblos on flint slabs are triangular. One is lateral, the other is end. Both tools have straight working edges modified by steep unifacial retouch directed from ventral to dorsal. The length of the skreblos is 9.3 and 13.0 cm, the width of the end skreblo is 8.5 cm and of the lateral skreblo 4.1 cm.

Large-grained sandstone served as material for making the whetstone. The tool has both ends broken. The form of the preserved piece is trapezoidal, and the cross section is oval. On one of its broad planes can be seen deep longitudinal grooves—traces of sharpening. The length of the piece is 3.8 cm, the width 4.4 cm, the thickness 2.1 cm.

Modified animal bones are represented by four pieces of long-bones preserving traces of longitudinal and transverse cuts (Pl. 5:4), one small burned piece of a bone artifact in the form of a fish fin, a fragment of antler with longitudinal cuts, and three pieces of tools. One piece of a tool has the form of a thin bone rod, pointed toward the top and slightly flattened toward the bottom. Its surface is polished from use. The length of the rod is 5.1 cm, the width of the upper part 0.2 cm, the width of the lower part 0.6 cm. This is most probably a piece of a bone needle. A fragment of another tool is represented by a rod made from a bone of a small mammal. A third tool was made from deer antler (Pl. 5:15), and probably served as a mallet. Its working surface preserves traces of intense wear.

Cultural Layer VIIb

In Layer VIIb a total of 1,604 stone objects and 627 animal bones was found in the stratum. The identified bone belonged to mammoth (4 specimens, including 3 pieces of tusk), bison (1 specimen), horse (4 specimens), reindeer (1 specimen), moose (3 specimens), snow sheep (?) (6 specimens), cave lion or tiger (*Panthera* sp.) (3 specimens), fox (5 specimens), Arctic fox (12 specimens), ground squirrels (17 specimens), marmot (*Marmote* sp.) (1 specimen), beaver (*Castor fiber* L.) (2 specimens), hare (11 specimens), and various small rodents (12 specimens). Based on O. V. Egorov's conclusions, many pieces of large long-bone quite probably belonged to mammoths. This assumption was confirmed in some measure by the find in the layer of a large piece (weighing 5.5 kg) of mammoth humerus. On another fragment, of a tooth of a large predator, traces of transverse cuts were preserved.

The stone objects are represented by flakes (868 specimens), flint flakelets (503 specimens), flint slabs and pieces (115 specimens), knifelike blades (82 specimens), ski-shaped spalls (2 specimens), spalls from the ends of cores (5 specimens), cores and core blanks (13 specimens), and tools (16 specimens).

Absolutely predominant among the flakes are specimens of black, gray, and banded grayish-black flint, as well as grayish-yellowish argillaceous-siliceous slate. Isolated flakes of red and green flint also were noted. Sixteen diabase flakes were found. Based on dimensions, the flint and slate flakes can be divided in the following way: large (32 specimens), medium (157 specimens), and small (663 specimens); among the diabase flakes: large (1 specimen), medium (2 specimens), and small (13 specimens).

Slabs are primarily represented by black, gray, and banded grayish-black flint, as well as grayish-yellowish argillaceous-siliceous slate. There are also isolated specimens yellow and red flint and hornfels. The dimensions of the slabs are the same as in Stratum VIIa. Slabs are the initial blanks for cores and tools.

Based on material, knifelike blades can be subdivided into artifacts of black and black banded flint (51 specimens), gray and gray banded flint (22 specimens), whitish-gray flint (3 specimens), gray argillaceous-siliceous slate (3 specimens), pink flint (1 specimen), green flint (1 specimen), and red flint (1 specimen). In width, the blades are: 0.3 to 0.4 cm (11 specimens), 0.5 to 0.6 cm (19 specimens), 0.7 to 0.8 cm (23 specimens), 0.9 to 1.0 cm (15 specimens), 1.1 to 1.5 cm (10 specimens), and 1.6 to 2.0 cm (4 specimens).

The ski-shaped spalls were removed from cores of black banded (1 specimen) and red (1 specimen) flint. Their lengths are 6.6 to 6.7 cm, the widths 1.3 to 1.7 cm.

Spalls from the ends of cores are large three-sided ribbed blades with a bent arc-shaped longitudinal profile. They were removed from wedge-shaped cores of black flint and gray argillaceous-siliceous slate. Their lengths fluctuate from 4.4 to 11.0 cm, the widths from 1.0 to 2.0 cm (Pls. 4:1; 5:8).

Cores are represented by three types: subdiscoid (1 specimen), prismatic (2 specimens), and wedge-shaped (10 specimens).

The subdiscoid core was made from a cobble of black flint. Its longitudinal and cross sections are segmentlike. The convex side of the core was worked by the radial removal of spalls along the edge. The removal of one edge spall can be traced on the flat side. The length of the core is 8.8 cm, the width 8.2 cm, and the thickness 2.8 cm (Pl. 4:11).

Both prismatic cores were made from cobbles of black flint. The form of the cores is rectangular. Their longitudinal and cross sections are also rectangular. One core has the subrectangular pressure platform directed at a right angle to the long axis and worked by the removal of isolated spalls through flat retouch. Two irregular primary blades were removed from the platform. Working of the lateral edge is noticeable. The remaining surface of the artifact is covered with cobble cortex. The length of the core is 5.5 cm, the width 5.1 cm, the dimensions of the platform 4.4 x 3.8 cm (Pl. 4:10). On another artifact four irregular blades had been removed from the unformed platform, while the remaining surface was covered by cobble cortex.

The wedge-shaped cores are represented by blanks (6 specimens) and finished artifacts (4 specimens).

The blanks of cores were made from slabs of black, gray, and green flint. Their forms are subrectangular (2 specimens) and segmentlike (4 specimens). A blank of a boat-shaped core has the most finished form, which is segmented. Its longitudinal and transverse sections are triangular. The pressure platform of the artifact was formed by the removal of a small transverse spall 1.4 cm long and 1.2 cm wide. The working end was made even by the removal of a longitudinal spall, and from it were taken several short irregular blades. The back edge was sharpened by the removal of transverse bifacial spalls. The base on both sides was sharpened by the removal of large spalls of pressure retouch. One broad surface, next to the end, and the pressure platform beyond the edges of the removed spall were covered with cobble cortex. The length of the blank is 6.2 cm, the height 3.0 cm. The dimensions of the other blanks fluctuate in length from 3.9 to 10.3 cm, in height from 3.2 to 5.7 cm.

The finished wedge-shaped cores belong to a vertically high type. They all were made from slabs of black flint. One artifact was broken, the remainder whole. The form of the cores is subtriangular. Their longitudinal and transverse sections are triangular. Both broad surfaces of two cores were worked by retouch; one broad surface was completely worked on two cores, the other surface only partially worked. The back edge and the base of the artifact were sharpened. The pressure platforms of two cores are angular: on one core it is rectangular, and on one the platform is broken. The surfaces of the platforms are partially worked by retouch. The platforms are beveled toward the working end of the artifacts. Narrow regular blades were removed from the ends. The length of the cores fluctuates from 2.5 to 4.1 cm, the height from 5.4 to 7.5 cm (Pl. 4:2, 8).

The tools are represented by knives and knife blanks (5 specimens), burins (5 specimens), scrapers (2 specimens), inset blades (2 specimens), and skreblos (2 specimens).

The knives were made on a blade (1 specimen) and flint slabs (4 specimens).

The knife made on a blade—a primary blade of gray argillaceous-siliceous slate—had the working edge located on the long edge of the blade. It was worked by edge pressure retouch directed from ventral to dorsal. The length of the knife is 6.2 cm, the width 2.0 cm.

All the knives on flint slabs are bifacially retouched blanks. The forms of the blanks are subtriangular (1 specimen) and segmentlike (3 specimens). The transverse section of all the artifacts is triangular. The triangular blank has the broad surfaces covered with nodule cortex, while the working edge, with the exception of a small area in the middle, was worked by bifacial edge retouch. The length of the artifact is 12.4 cm, the width 7.9 cm, and the thickness 1.3 cm. The knife blanks of segmentlike form have one broad surface completely worked by flat pressure retouch, the other only partially worked. The working

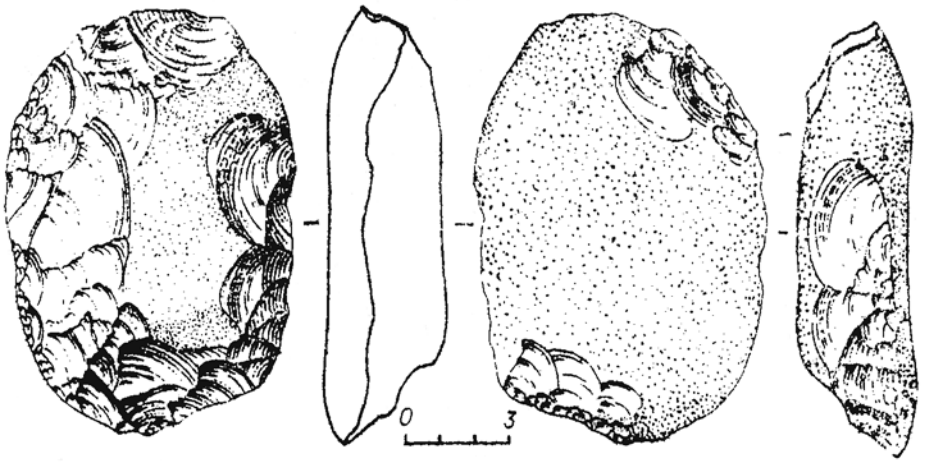

Plate 6. Dyuktai Cave. Stone tool from Layer VIIb.

edges of the tools were unformed. The length of the blanks was 8.2 to 10.6 cm, the width 3.6 to 5.5 cm (Pl. 5:13, 16).

The burins were made on blades (2 specimens) and pieces of slabs (3 specimens). The burins on blades were angle burins. Broken blades of black and gray flint were used for making them. The working edges of the tools were formed by the removal of burin spalls 0.2 to 0.8 cm long and 0.1 to 0.15 cm wide, directed at an acute angle to the transverse plane of the break of the blade. The length of the burins is 1.3 to 1.5 cm, the width 0.6 cm.

Burins on pieces of black flint slabs are represented by angle (1 specimen), lateral (1 specimen), and dihedral (1 specimen) types. The working edge of the angle burin was formed by the removal of a burin spall 2.3 cm long and 0.8 cm wide directed at an acute angle to the transverse plane of the slab. The length of the tool is 5.4 cm, the width 2.9 cm.

The lateral and dihedral burins are very similar. Their dorsal surfaces are completely worked by pressure retouch, while the ventral surface retains the natural surface of the initial flake. Burin spalls were removed from the ends of the tools and were directed at an acute angle to the plane of the tools. The working edges were formed by the removal of three parallel burin spalls situated in the same plane as the end of the tool. The dihedral burin differs from the lateral burin only by the fact that one short burin spall was removed from its retouched plane, directed at an acute angle to the preceding spalls. The lengths of the tools are 4.5 to 5.3 cm, the widths 1.5 to 2.3 cm; the lengths of the burin spall scars are 1.6 to 2.0 cm, the widths 0.4 to 0.6 cm (Pl. 5:1, 2).

The scrapers were made on a blade flake of brownish-red flint (1 specimen) and a broken slab of gray banded flint (1 specimen). Both are end scrapers. The ovally convex working edge of the scraper on the flake was partially worked by the finest retouch directed from ventral to dorsal. The length of the tool is 3.5 cm, the width of the working edge 2.8 cm. The scraper on the slab has a triangular form. Its ovally convex working edge was worked by small steep retouch directed from ventral to dorsal. The length of the scraper is 4.3 cm, the width of the working edge 2.5 cm.

Inset blades were made on midsections of blades or microblades of black flint and gray smokey chalcedony. They each have one working edge, which was worked by the finest edge retouch directed from ventral to dorsal. The length of the inset blades is 1.0 to 1.5 cm, the width 0.4 to 0.6 cm.

The skreblos were made from cobbles and slabs of gray flint. One skreblo, from an oval cobble, is trapezoidal in cross section. It has two working edges: a lateral and an end. The lateral working edge is ovally convex, the end is beveled. The lateral working edge was worked by flat pressure retouch directed

from ventral to dorsal that reached the middle of the dorsal surface. The end working edge was worked by bifacial flat retouch. The length of the skreblo is 12.5 cm, the width 8.5 cm (Pl. 6).

The form of the skreblo from the slab is crescent-shaped. The working edge is on an ovally concave longitudinal edge of the tool. It was worked by steep pressure retouch. The edge of the skreblo opposite the working edge is blunt. The length of the tool is 11.9 cm, the width 4.4 cm.

Cultural Layer VIIc

In Layer VIIc a total of 835 specimens of stone objects and 2,570 animal bones was found. The identified bone belonged to mammoth (7 specimens) (all represented by pieces of tusk, though according to O. V. Egorov, many pieces of large long-bone probably also belonged to mammoth), bison (3 specimens), horse (9 specimens), reindeer (2 specimens), Arctic fox (1 specimen), hare (20 specimens), ground squirrel (93 specimens), collared lemming (*Dicrostonyx torquatus*) (17 specimens), Ob lemming (*Lemmus obensis*) (7 specimens), various small rodents (98 specimens), and various birds (4 specimens).

The stone objects were represented by flakes (601 specimens), flint flakelets (93 specimens), slabs and pieces of slabs (31 specimens), blades (62 specimens), ski-shaped spalls (2 specimens), wedge-shaped cores (3 specimens), and tools (13 specimens).

Based on material, the flakes can be separated into flint (588 specimens) and argillaceous-siliceous slate (13 specimens). Among the flint flakes, specimens of black, gray, and grayish-black banded flint predominate, but isolated flakes of yellow and red flint also are encountered. There are large (28 specimens), medium (147 specimens), and small (426 specimens) flakes.

The blades were made of black (35 specimens), white (2 specimens), gray (15 specimens), and pink (2 specimens) flint, as well as yellowish-gray argillaceous-siliceous slate (8 specimens). They all are broken. Blade widths are: 0.3 to 0.4 cm (16 specimens), 0.5 to 0.6 cm (24 specimens), 0.7 to 0.9 cm (13 specimens), and 1.0 to 1.5 cm (9 specimens).

The ski-shaped spalls were taken from wedge-shaped cores of brown and gray flint. Their length is 5.7 to 5.9 cm, their width 1.6 to 1.8 cm.

Wedge-shaped cores are represented by blanks (2 specimens) and a fragment (1 specimen).

The blanks of wedge-shaped cores were made from slabs of black and gray flint. The blanks are for vertically high wedge-shaped cores. The artifact of black flint has a completely finished appearance, but no blades were removed from it, and the working end is covered with cobble cortex. Both broad surfaces of the blank were worked by flat pressure retouch. The ovally convex base was sharpened and trimmed along the edge by small bifacial retouch. The pressure platform was formed by the removal of a broad spall directed at an acute angle to the working end of the core. The platform was not retouched. The length of the blank is 3.9 cm, the width 5.8 cm, the dimensions of the pressure platform 1.1 x 3.3 cm (Pl. 7:5). The second blank is in the initial stage of work. Work had started on the working end by transverse spall removal, and the pressure platform was marked by the removal of a diagonal spall. One of its broad surfaces was completely covered with cobble cortex; the other is the plane of the longitudinal break of the slab. The length of the blank is 4.0 cm, the height 7.7 cm, the dimensions of the pressure platform 1.7 x 3.5 cm (Pl. 7:3).

A large spall represents a piece of a wedge-shaped core with its working end, on which can be seen facets left by the removal of regular knifelike blades and the remains of the base, bifacially-pointed by retouch. The core was made of a piece of black flint 7.3 cm high.

The tools are represented by a spear point (1 specimen), inset blades (9 specimens), burins (2 specimens), and a scraper (1 specimen).

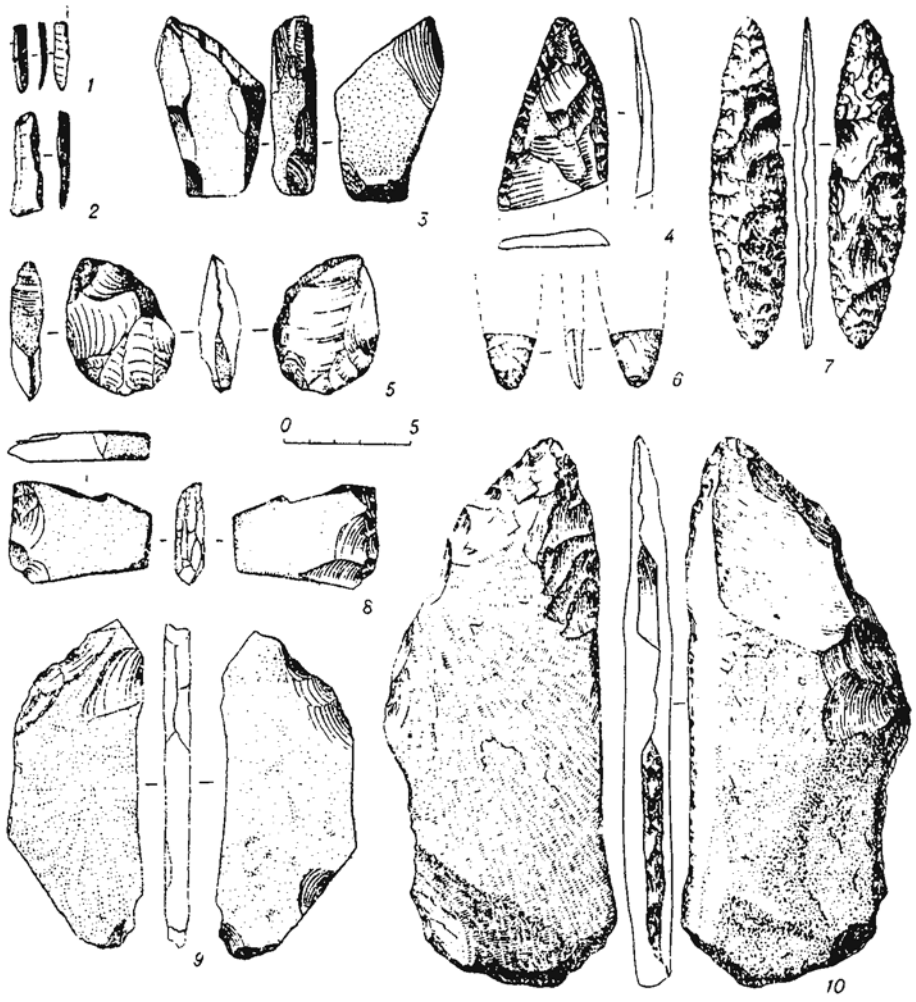

Plate 7. Dyuktai Cave. Stone assemblage (1–3, 5, 7 from Layer VIIc; 4, 6, 8–10 from Layer IX).

The spear point was made from a slab (?) of gray flint. It has a willow-leaf form and an almond-shaped cross section. Both broad surfaces of the tool were carefully worked by flat pressure retouch. The edges were additionally trimmed on both sides by small retouch. The length of the point is 13.5 cm, the width 3.0 cm (Pl. 7:7).

All the inset blades were made from broken knifelike blades of black flint. The working edges of the tools were made by the finest edge retouch directed from ventral to dorsal. The length of the inset blades is 1.4 to 3.8 cm, the width 0.6 to 0.8 cm. One inset blade has a width of 1.2 cm.

Both burins are angle burins. Blades of black and yellowish-gray flint served as material for making them. The working edges of the tools were formed by the removal of a burin spall 0.6 cm long and 0.15 to 0.2 cm wide, directed at an acute angle to the transverse plane of the section of the blade. The length of the burins is 2.6 to 2.8 cm, the width 0.5 to 0.9 (Pl. 7:1).

The end scraper was made on a blade of yellowish-gray flint. The working edge was situated at the lower end of the blade. It was worked by the finest edge retouch directed from ventral to dorsal. The length of the scraper is 2.4 cm, the width of the working edge 0.9 cm (Pl. 7:2).

Cultural Layer VIII

In Layer VIII were found 2,967 stone and 21 bone objects, as well as 3,771 animal bones. The identified bone belonged to mammoth (621 specimens) (all represented by pieces of tusk; however, according to O. V. Egorov, many pieces of large long-bone could belong to mammoth), bison (3 specimens), muskox (*Ovibos moschatus* Zimm.) (1 specimen), reindeer (3 specimens), moose (5 specimens), snow sheep (3 specimens), cave lion or tiger (6 specimens), wolf (4 specimens), Arctic fox (16 specimens), fox or Arctic fox (14 specimens), fox (3 specimens), hare (61 specimens), ground squirrel (6 specimens), collared lemming (1 specimen), Ob lemming (3 specimens), various small rodents (32 specimens), various birds (24 specimens), and various fish (7 specimens).

The stone objects are represented by flakes (2,466 specimens), flint flakelets (244 specimens), flint slabs and pieces of slabs (192 specimens), blades (35 specimens), ski-shaped spalls (2 specimens), cores (7 specimens), and tools (21 specimens).

The majority of flakes (2,459 specimens) were made from flint and yellowish-gray argillaceous-siliceous slate, though some were from diabase (7 specimens). Among the flint flakes, specimens of black, gray, and grayish-black banded flint predominate, but isolated flakes of pink, red, and green flint were also encountered. There are large (258 specimens), medium (723 specimens), and small (1,485 specimens) flakes.

Flint slabs, fluctuating in length from 9 to 15 cm and width from 4 to 9 cm, have traces of partial working. They were used as raw material for making cores and tools.

Blades were made of black, gray, and black banded flint, as well as yellowish-gray argillaceous-siliceous slate. All the blades except one are broken. The length of the whole large blade is 5.0 cm, the width 1.7 cm. It is similar to a spall from the forming of the end of a wedge-shaped core. Based on width, the blades are distributed in the following way: 0.3 to 0.4 cm (10 specimens), 0.5 to 0.7 cm (8 specimens), 0.8 to 0.9 cm (11 specimens), and 1.0 to 1.9 cm (6 specimens).

Ski-shaped spalls were removed from wedge-shaped cores of black and black banded flint. Their length is 6.8 to 7.8 cm, their width 1.1 to 2.9 cm (Pl. 5:6).

The cores can be subdivided into two types: wedge-shaped (6 specimens) and subdiscoid (1 specimen).

The wedge-shaped cores are represented by blanks made from slabs of black and gray flint (5 specimens) and a piece of the lower part of the working end of a core. Blanks have a subrectangular, subtriangular, and segmentlike form. The subrectangular and subtriangular specimens are blanks of vertically high wedge-shaped cores. Some artifacts had their bases sharpened by the bifacial removal of spalls, and removal of the nodule cortex from the broad surfaces had been started. One blank had the pressure platform marked by the removal of a broad diagonal spall and the base sharpened by the removal of unifacial spalls. The length of the blanks is 2.9 to 4.7 cm, the height 8.2 to 8.7 cm.

The artifact of segmentlike form is the blank of a wedge-shaped “Gobi” core of horizontal type. Both of its broad surfaces were almost completely worked by flat pressure retouch, but nodule cortex was preserved on both sides on parts adjoining the pressure platform. The base and ends were sharpened. The pressure platform was not worked. The length of the artifact is 5.3 cm, the height 3.7 cm, the thickness 1.3 cm. The discoid core was found in the lower horizon of this layer. It was made from a slab of black banded flint. The form of the artifact was not completely worked out, therefore almost half of its surface is covered with nodule cortex. The part of the core that was worked was covered by the bifacial removal of radially directed spalls. The length and width of the core is 7.1 cm (Pl. 4:9).

The tools include burins (6 specimens), scrapers (3 specimens), skreblos (2 specimens), knives (7 specimens), inset blades (2 specimens), and a retoucher (1 specimen).

The burins are of three types: angle (2 specimens), dihedral (1 specimen), and multifaceted (3 specimens).

Both angle burins were made on flakes of black banded flint. One was made using a large primary lamellar flake. The working edge of the tool was formed by the removal of a burin spall 2.5 cm long by 0.2 cm wide, directed at a right angle to the plane of the break of the top of the flake. The length of the burin is 3.1 cm, the width 1.7 cm. On the other tool, the whole dorsal surface was worked by flat pressure retouch. The working edge was formed by the removal of a burin spall 1.6 cm long by 0.4 cm wide, directed at an acute angle to the transverse plane of the bottom of the flake. The length of the burin is 3.4 cm, the width 2.5 cm.

The dihedral burin was made on a piece of a slab of black banded flint. Its working edge was formed by the removal of two burin spalls at an acute angle to each other. They were 2.1 cm long by 0.9 cm wide and 0.8 cm long by 0.4 cm wide. The length of the burin is 6.3 cm, the width 2.1 cm (Pl. 5:5).

The multifaceted burins were made on blades of black and gray flint (2 specimens), and on a piece of a slab of gray flint (1 specimen).

The working edges of the multifaceted burins on blades were formed on one tool by the removal of two and on the other by the removal of three parallel and diagonally-directed burin spalls 0.9 to 2.3 cm long by 0.2 to 0.4 cm wide. The longitudinal edges of the tools below the burin spalls were worked by small pressure retouch. The length of the burins is 4.6 to 6.2 cm, the width 2.0 to 2.2 cm (Pl. 5:3).

The multifaceted burin on a piece of flint slab has a triangular form. Its working edge was formed by the removal of four burin spalls. The length of the burin is 7.1 cm, the width of the base 3.5 cm, the width of the working edge 1 cm (Pl. 5:12).

All the scrapers found in the layer are end scrapers. One of them was made on a trapezoidal flake of yellowish-gray argillaceous-siliceous slate. The straight working edge of the scraper was worked by small edge retouch directed from ventral to dorsal. The length of the tool is 6.4 cm, the width 4.3 cm (Pl. 4:3).

A flake of black banded flint was used for making the second scraper. The form of the tool is subtriangular. Its ovally convex working edge was worked by pressure retouch directed from ventral to dorsal. The retouch has narrow parallel facets. The areas of the lateral sides adjacent to the working edge were formed by the smallest edge retouch, also directed from ventral to dorsal. The length of the scraper is 3.1 cm, the width of the working edge 1.8 cm.

The third scraper was made on a regular knifelike blade of black flint. The convexly arced working edge of the tool is located on the lower, curved end of the blade. It was worked by the smallest edge retouch directed from ventral to dorsal. The length of the scraper is 4.6 cm, the width of the working edge 0.9 cm.

The skreblos were made on pieces of slabs of yellowish-gray argillaceous-siliceous slate. They were found in the lower horizon of Layer VIII. The form of one skreblo is trapezoidal, the other, semilunar. The trapezoidal skreblo has two working edges. Its end working edge is concavely arced, the lateral working edge is convexly arced. Both working edges were worked by steep stepped retouch directed from ventral to dorsal. The ventral side of the tool was compressed by the removal of two vertical spalls. The length of the skreblo is 7.6 cm, the width 5.1 cm (Pl. 4:7). The semilunar skreblo has a lateral ovally convex working edge worked by unifacial pressure retouch directed from ventral to dorsal. Its length is 9.4 cm, its width 4.1 cm (Pl. 5:10).

The knives were made on a blade (1 specimen) and slabs of black and gray flint (6 specimens).

A large primary blade of black banded flint was used for making one knife. The working edge is located on the right longitudinal edge of the blade. It was worked by small pressure retouch directed from ventral to dorsal. The length of the blade is 8.8 cm, the width 3.2 cm (Pl. 4:4).

The knives on flint slabs are represented by blanks (2 specimens), whole tools (3 specimens), and a broken tool (1 specimen).

Slabs of gray banded flint were used for the blanks. They have a triangular form. Work on both blanks began with bifacial edge removal of spalls by flat retouch, while the remaining surface was covered by nodule cortex. The length of the blanks is 8.1 to 10.2 cm, the width 5.6 to 5.8 cm, the thickness 1.5 to 1.6 cm.

The whole knives have semilunar (2 specimens) and subtriangular (1 specimen) forms. One of them was made on a slab of black flint. Both of its broad surfaces were worked by flat pressure retouch, the ovally convex working edge trimmed by secondary bifacial retouch. Only on the large back of the knife was nodule cortex preserved. The cross section of the tool is triangular. The length of the knife is 6.3 cm, the width 3.4 cm (Pl. 5:11).

Another knife was made from a slab of gray banded flint. The cross section of the tool is triangular. Both of its broad surfaces were worked by the removal of wide flat spalls, but they still retained areas of nodule cortex.

The convexly arced working edge was not completely worked, but the worked parts were covered with small bifacial pressure retouch. The edge of the tool opposite the working edge was blunted. The length of the knife is 8.8 cm, the width 4.8 cm (Pl. 5:14).

The subtriangular knife was made on a slab of argillaceous-siliceous slate. The cross section of the tool is triangular. The working edge of the knife was worked by unifacial flat edge retouch, while the remaining surface is covered with nodule cortex. The length of the knife is 6.6 cm, the width 5.0 cm (Pl. 4:6).

Of great interest is a fragment of the middle part of a flint knife or spear point, which is represented by two pieces. The larger one was found in the lower horizon of Layer VIII; the other was found in the same quadrant, but in Layer IX. The longitudinal edges of the tool are parallel, the cross section almond-shaped. Both broad surfaces were worked by flat spreading retouch; the edge of the working edge was secondarily trimmed by small retouch. The preserved parts of the tool have a length of 4.5 cm, a width of 3.5 cm (Pl. 5:7).

Inset blades were made on pieces of knifelike blades of black flint and gray smoky chalcedony. They are tools with a single working edge worked by small unifacial retouch directed from dorsal to ventral. The length of the inset blades is 1.9 to 2.4 cm, the width 0.35 to 0.9 cm.

The retoucher was made on a piece of a flint slab of black banded flint. It has a triangular form. The tool was not subjected to special working, but one of its longitudinal edges is severely worn. The length of the retoucher is 8.1 cm, the width 5.0 cm.

In addition to the flint tools in the lower horizon of Layer VIII, a laurel-leaf point of a spear or dart made on a large flake of mammoth tusk was found. The dorsal surface of the point was almost completely worked by flat pressure retouch; the ventral surface preserves the smooth surface of the original flake. The cross section of the tool is almond-shaped. The length of the point is 8.9 cm, the width 2.8 cm (Pl. 5:9).

The remaining worked bones of animals are represented by 17 pieces of mammoth tusk, on which can be seen traces of flaking and edge modification; a vertebra of a mammal with numerous short cuts; a piece of a long-bone of a mammal that has transverse notches; and half of a longitudinally split canine of a large predator with deep longitudinal cuts.

Cultural Layer IX

A total of 688 specimens of stone and 4 specimens of bone items were found in Layer IX, as well as 1,346 animal bones. The identified bones belonged to mammoth (132 specimens—131 of them were pieces of tusk; 1 specimen was a large piece of humerus weighing 1.1 kg; in addition, based on O. V. Egorov's conclusion, many pieces of large long-bones in the "indeterminate" category also probably belong to mammoth), bison (6 specimens), horse (2 specimens), reindeer (4 specimens), fox (1 specimen), Arctic fox (6 specimens), hare (66 specimens), ground squirrel (10 specimens), Ob lemming (1 specimen), various small rodents (11 specimens), various birds (23 specimens), and various fish (3 specimens).

The stone items are represented by flakes (608 specimens), flint flakelets (19 specimens), flint slabs (23 specimens), blades (18 specimens), blanks and pieces of cores (4 specimens), and tools (16 specimens).

The flakes divided by material are flint (606 specimens) and diabase (2 specimens). All the flint flakes are represented by black, gray, and grayish-black banded flint. Isolated flakes of yellowish-gray argillaceous-siliceous slate also were encountered. Based on dimensions, the flakes of flint and argillaceous-siliceous slate can be divided into large (50 specimens), medium (317 specimens), and small (241 specimens). The diabase flakes are represented by 1 medium and 1 small specimen.

All the slabs have isolated spalls artificially removed, which attests to the fact that they are primary blanks of cores or tools. The upper and lower ends of one of the trapezoidal slabs are sharpened. This slab is evidently a knife blank (Pl. 7:9). The dimensions of the slabs are 5.5 to 13.0 cm long and 3.5 to 5.2 cm wide.

The blades were made from black flint (14 specimens), gray banded flint (3 specimens), and yellowish-gray argillaceous-siliceous slate (1 specimen); all are broken. The blade widths are: 0.3 to 0.4 cm (4 specimens), 0.5 cm (2 specimens), 0.6 to 0.8 cm (10 specimens), and 1.1 to 1.6 cm (2 specimens).

The cores are subdivided into subprismatic (1 specimen) and wedge-shaped (3 specimens). Only a small piece of the subprismatic core was preserved. The wedge-shaped cores are represented by blanks. They were made from slabs of black and gray banded flint. Two blanks are subrectangular in form. The working ends of the artifacts, from which blades would have been removed, were sharpened by bifacial spall removal. The pressure platform of one blank was formed by the removal of a diagonally directed spall. It has a triangular form and was directed at an acute angle to the working end (Pl. 7:8). On another blank the pressure platform was not worked, but in its place the removal of the nodule cortex was started. On the third blank the forming of the working end and compressing of the base was begun by the bifacial removal of spalls. The length of the blanks is 5.2 to 7.1 cm, the height 3.4 to 5.6 cm.

The tools are represented by knives (5 specimens), a piece of a spear or dart point (1 specimen), a scraper (1 specimen), burins (2 specimens), inset blades (5 specimens), and a piece of a milling stone (1 specimen).

The knives were made on flakes (2 specimens) and slabs (3 specimens). Among the first, one tool is whole, one broken. The whole knife was made on a lamellar flake of grayish-yellow argillaceous-siliceous slate. The tool has two working edges located along the long edges of the flake. One of them was worked by small edge retouch directed from ventral to dorsal. The upper half of the second working edge was worked by small retouch directed from ventral to dorsal, and the lower half from dorsal to ventral. The length of the knife is 7.1 cm, the width 4.4 cm. Only the base of the broken knife was preserved, made on a primary lamellar flake of green flint. The working edge is located on the longitudinal edge of the flake. It was worked by the smallest edge retouch directed from ventral to dorsal. The edge of the tool opposite the working edge is covered with cobble cortex. The length of the preserved part of the knife is 4.3 cm, the width 1.7 cm.

One knife was made on a slab of gray banded flint. Its surface is covered with nodule cortex and a patina of yellowish-gray color. This is a large tool with a triangular working end and a large ovally convex butt. The triangular working end of the knife was worked by bifacial pressure retouch. The base and parts of the longitudinal edges adjoining it were worked by steep blunting retouch. The cross section of the working point is almond-shaped; that of the base, rectangular. The broad surfaces in the middle and lower parts of the knife are covered with nodule cortex. The length of the knife is 22.5 cm, the width of the middle part 8.6 cm, the width of the base 7.6 cm (Pl. 7:10).

Two small pieces of bifacially retouched knives on slabs of black flint were also found in the layer. Judging by the material they might belong to one tool. The pieces were not much different, and it could be seen that the tool (or tools) was worked on both sides by pressure retouch, while its edges were trimmed by secondary bifacial retouch.

A basal fragment of a bifacially retouched spear or dart point permits judging that the tool most probably had a willow-leaf form (Pl. 7:6), similar to the spear point from Layer VIIc (Pl. 7:7), and made of black flint. Both broad surfaces were worked by flat pressure retouch, the edges trimmed by small secondary retouch. The length of the piece is 2.2 cm, the width in the upper part 2.2 cm, in the lower part 1.1 cm.

The scraper was made on the lower end of a knifelike blade of black flint. Its convexly arced working edge was made by small pressure retouch directed from ventral to dorsal. The length of the tool is 3.5 cm, the width of the working edge 0.8 cm.

A primary flake of black banded flint served as material for making the skreblo. The tool belonged to the type of convergent skreblos, with two lateral working edges running at an acute angle to each other. The form of the skreblo is triangular, the cross section trapezoidal. Almost the whole surface of the dorsal side was worked by flat pressure retouch, with the exception of a small area in the middle on which nodule cortex was preserved. The working edge was modified by pressure retouch with narrow parallel facets directed from ventral to dorsal. The length of the skreblo is 8.3 cm, the width 4.5 cm (Pl. 7:4).

Both burins are of the angle type. One of them was made on a flat lamellar flake of black flint, and the other on an inset blade of black flint. The working edge of the burin on a flake was formed by the removal of a burin spall 1.7 cm long and 0.2 cm wide, directed at an acute angle to the striking platform of the flake. The length of the burin is 3.7 cm, the width 2.2 cm. The other tool was made on the midsection of a blade—one longitudinal edge of which is the working edge of an inset blade—worked by small pressure retouch directed from dorsal to ventral. The working edge of the burin is on the opposite edge of the blade. It was formed by the removal of a burin microspall 0.4 cm long and 0.1 cm wide, directed at a right angle to the transverse plane of the break of the flake. The length of the burin is 1.3 cm, the width 0.5 cm.

The inset blades were made on broken knifelike blades of black and black banded flint. Three of them were made from the midsections of blades, and two on blades with a broken bottom. The working edges of all inset blades were worked by the finest unifacial retouch directed from ventral to dorsal. The length of the tools is 1.5 to 3.9 cm, width 0.6 to 1.0 cm.

The milling stone is represented by a small piece of a slab of gray diabase. On the preserved part of its working surface parallel scratches can be seen, in which the remains of red ocher were absorbed. The length of the piece is 3.7 cm, the width 2.0 cm.

The worked bones of animals are represented by one piece of mammoth tusk; one small piece of long-bone with two parallel rows of transverse cuts; one small piece of bone with traces of transverse notches and smoothing; and one piece of mammal vertebra worked along the edge by pressure retouch and reminiscent of an end scraper. The edge of the working edge of the scraper was polished through use.

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Stratigraphic observations and radiocarbon dates indicate that settlement of the cave and cave apron by Dyuktai people occurred during a period of accumulation of the alluvial floodplain facies of the second Aldan floodplain terrace. Subsequent research suggests that the accumulation of the floodplain alluvium of Terrace II began approximately 23,000 to 22,000 years ago and ended 13,000 to 12,000 years ago.

Technical-typological analysis of the assemblages found in the different Pleistocene layers of the cave and cave apron attests to its relative homogeneity. Characteristic of all the Pleistocene layers are identical types of cores, the combination of large flint slabs and small knifelike blades in one complex of tools, and the bifacial technique of working tools. At the same time, in spite of the fact that the majority of tools are represented by isolated specimens, it is now clear that the elongate willow-leaf spear points (Pl. 7:6, 7) lay significantly lower than the laurel-leaf dart points (Pl. 2:2) and the miniature willow-leaf points of darts or arrows (Pl. 2:1). Other individual differences in the assemblages emerge from the different layers. For example, multifaceted burins (Pl. 5:1–3) are presently recorded only in Layer VIIb and the lower parts of Layer VIII.

At present, considering the stratigraphic condition of the deposition of the finds, three Pleistocene cultural parcels can be distinguished: Parcels A, B, and C. To Parcel A belong materials from Layer VIIa and the upper horizon of Layer VIII; to Parcel B, Layer VIIb and the lower horizon of Layer VIII; and to Parcel C, Layers VIIc and IX.

With the refinement of radiocarbon dates from Dyuktai Cave, Parcel A is represented as most accurately dating to an age of 13,000 to 12,000 years; Parcel B, 15,000 to 13,000 years; and Parcel C, 16,000 to 15,000 years. However, the lower chronological boundary of Parcel C (16,000 years) is approximate and even provisional. It is substantiated chiefly by the fact that the leading diagnostic artifacts are confined to the upper part of geological Layer VIIc. With this, it is necessary not to lose sight of the fact that some flint flakes were also found in the lowest parts of this layer. One flake, for example, was recorded in Quadrant M_4 at a depth of 480 cm from the present ground surface, a total of 20 cm above the bedrock. The deposits from which it originates, judging by radiocarbon dates from the Verkhne Troitskaya site, should have an age beginning approximately 23,000 to 22,000 and ending 20,000 years ago. Unfortunately, the flakes from the bottom of Layer VIIc are of interest today only as evidence of the fact that people episodically appeared in the region of Dyuktai Cave by the beginning of Sartan times. The flakes by themselves cannot characterize the appearance of an archaeological culture. Therefore, the lowest chronological boundary for Parcel C, pending more extensive excavations of the cave apron and the acquisition of new materials, is provisionally limited to an age of approximately 16,000 years.

The greatest significance of the work conducted at present at Dyuktai Cave is that, with its aid, distinctive biface stone tools are revealed for the first time in Northeast Asia. They were deposited in indisputable Pleistocene deposits together with the remains of “mammoth” fauna. These artifacts distinguish a special Paleolithic culture, which received the name “Dyuktai” (Mochanov 1969b, 1969c).

The Ust' Dyuktai I Site

The Ust' Dyuktai I site was discovered at the same time as Dyuktai Cave. On the right-bank spit of the Dyuktai River, the site is situated on the 23-meter bedrock terrace (Terrace IV above the floodplain), with the following stratigraphy (Fig. 7):

1. Sod thickness 5–10 cm.
2. Humic brownish-reddish mantling loam 30–70 cm thick (Layer 10 in Figure 7).
3. Drift deposits of brownish loam with a large content of poorly rolled large rubble (Layer 11 in Figure 7). The thickness of the layer is 50 to 150 cm.
4. A horizontally laminated parcel consisting of interlayers of grayish-bluish sandy loam 1 to 2 cm thick and interlayers of yellowish inequigranular sands 0.5 to 3.0 cm thick (Layer 12 in Figure 7). The floodplain alluvium of Terrace IV is represented by these deposits. The overall thickness of the parcel is 30 to 110 cm.
5. The bedrock terrace composed of Cambrian dolomitic limestones. The apparent thickness is 20 to 21 m.

All the cultural remains (397 specimens of stone items and 1 fragment of ceramics) were found in the upper part of the humic loam at a depth of 10 to 25 cm from the present ground surface. Along with the artifacts widely known in various cultures of Holocene age, several stone objects were recovered here that have never been found on the Aldan in layers younger than 10,500 years. These objects include a ski-shaped spall (1 specimen), wedge-shaped cores (4 specimens), and a point (1 specimen).

The ski-shaped spall was removed from a wedge-shaped core of black banded flint. Its length is 6.7 cm, its width 1 cm.

The wedge shaped cores are represented by blanks (2 specimens) and finished artifacts (2 specimens). They all belong to the "Gobi" or wedge-shaped type of cores and were made from flint slabs.

One of the blanks has a form approaching semilunar. The artifact is in the primary stage of being worked. Both broad surfaces are covered with nodule cortex and the pressure platform has not been worked, but sharpening of the base at both ends can be seen in the bifacial removal of spalls. The length of the blank is 6.9 cm, the height 3.6 cm, the thickness 1.5 cm. The second blank is broken. Its beveled pressure platform and working end were partially preserved, from which short irregular knifelike blades had begun to be removed.

The finished cores are represented by an artifact from which regular blades were taken and an artifact made for the removal of blades. On the first, both broad surfaces were worked by flat pressure retouch. The base and back end were sharpened and additionally trimmed by secondary edge retouch. The subtriangular pressure platform was trimmed at a right angle to the working end of the artifact. The surface of the pressure platform was worked by retouch. One broad side of the core and part of the pressure platform are covered with a thin patina. The length of the core is 5.17 cm, the height 3.83 cm, the width 1.13 cm (Pl. 8:5). From the second core, several short irregular blades were taken from the working surface. Both broad surfaces of the artifact were worked by flat pressure retouch and the base secondarily trimmed by unifacial edge retouch. The pressure platform was formed by the removal of a diagonal spall, but its surface was not worked by retouch. The length of the core is 8.8 cm, the height 4.5 cm, the thickness 2.4 cm, the dimensions of the pressure platform 1.8 x 9.2 cm (Pl. 8:8).

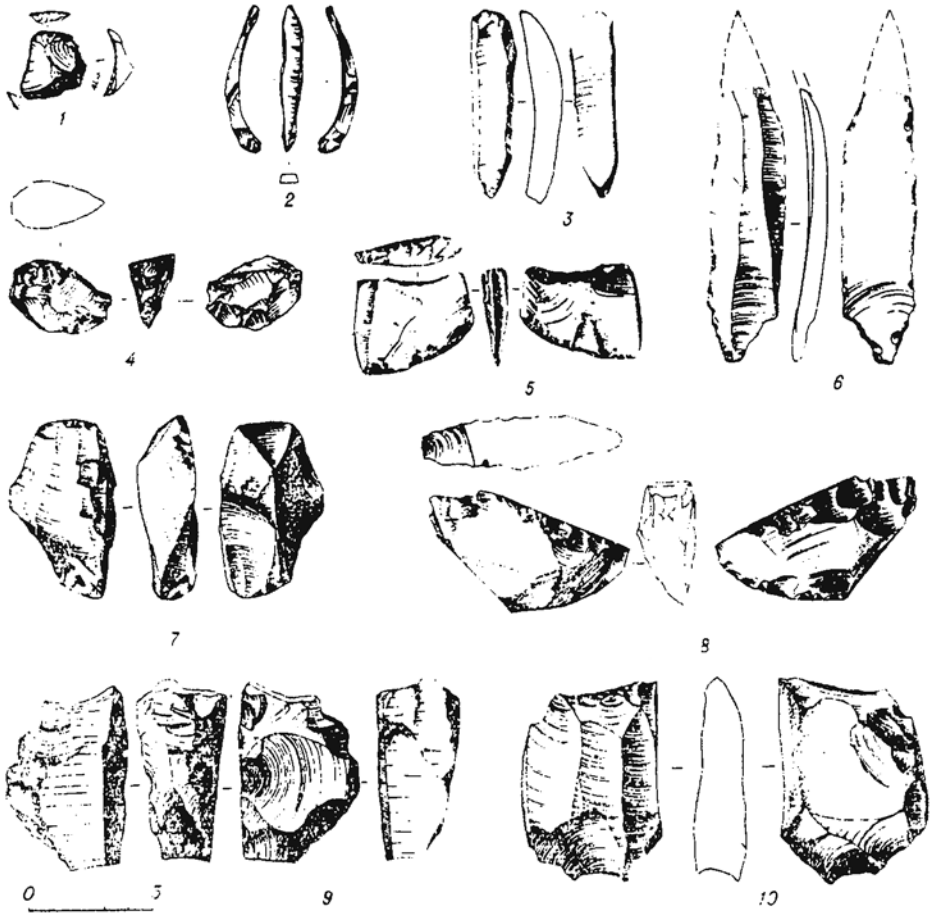


Plate 8. Stone assemblage from Paleolithic sites in the Aldan basin (1 from Ikhine I; 2, 4 from Ust' Bilir II; 3, 7 from Nizhne Troitskaya; 5, 6, 8 from Ust' Dyuktai I; 9 from Sumnagin III; 10 from Kyra Krestyakh).

The point is a very distinctive spear or knife point made on a large blade of black banded flint. Its tip, which was located at the lower, curved part of the blade, is broken. The base of the tool was sharpened and has a lateral groove that was formed by steep pressure retouch directed from dorsal to ventral. The longitudinal edges of the artifact were partially worked by small edge retouch directed from both ventral to dorsal and the reverse. Retouch is most noticeable on the broken end of the tool. Its tip possibly was formed by retouch. The length of the preserved part of the tool is 11.8 cm, the width 2.9 cm. The length of the groove is 2.1 cm, its depth 0.3 cm (Pl. 8:6). This tool does not have clear analogies in any Stone Age site of Siberia. However, several such large blades—but without such corresponding well defined working—are recorded in the Pleistocene deposits of the cave (Pl. 4:4, 5). Wedge-shaped cores also have analogies there.

The Ust' Dyuktai I site and Dyuktai Cave possibly were occupied at the same time. Evidently, during periods of flooding, when the cave was episodically inundated, its occupants moved their residence to the unflooded area of Terrace IV of the Aldan.

Further study of the Ust' Dyuktai I site may have great significance since it may reveal traces of the people who left the flint flakes at the bottom of Layer VIIc of Dyuktai Cave.

The Ust' Mil' II Site

The Ust' Mil' II site was discovered in 1968 during work of the PAE on the left bank of the Aldan, 961 km from its mouth. It is confined to the third terrace above the floodplain, which in this place has an elevation of 16 to 18 m.

The stratigraphy of the opened part of the terrace deposits has the following form (Figs. 8, 9):

1. Sod, 10 to 15 cm thick (Layer 1 in Figure 9). Cultural remains belonging to the Bronze and early Iron Ages were encountered in its lower part, at the contact with the lower-lying deposits.

2. Brownish-reddish mantling loam 40 to 60 cm thick (Layer 2 in Figure 9). In the upper part of the layer were the remains of different Neolithic cultures, and in the middle, the remains of the Sumnagin culture.

3. Horizontally-laminated alluvial yellowish-grayish sandy loam with distinct, almost black interlayers of temporary buried soils (Layer 3 in Figure 9). The thickness of the layer is 110 to 120 cm. In the middle part of the layer were isolated stone artifacts and the bones of mammoth, bison, horse, reindeer, and musk ox (?). A radiocarbon date of 12,200 ± 170 BP (LE-953) was obtained from wood taken from 25 cm above the bottom of the layer. The lower horizon of the alluvium was subjected to severe frost cracking, which has the form of filled soil veins that run into the lower deposits. Judging by the radiocarbon date LE-953, the frost crack most probably originated in the N'yapanskaya stage of the Sartan glaciation, the age of which is approximately 15,000 to 13,000 BP (Kind 1974). The cultural remains from geological Layer 3, which represents the superposed late Sartan alluvium on Terrace III, are assigned to separate Pleistocene cultural Horizon A.

4. Horizontally-laminated brownish-grayish alluvial loams 150 to 160 cm thick (Layer 4 in Figure 9). The top of the layer bears clear traces of erosion and is represented by an undulating interlayer of gray inequigranular sand 2 to 5 cm thick. The layered loams, with regard to facies, belong to the floodplain of Terrace III. A radiocarbon date of 23,500 ± 500 BP (LE-999) was obtained on wood for the upper part of these deposits. Several radiocarbon dates are determined on wood for the middle part of the deposits: 30,000 ± 500 BP (LE-1001); 33,333 ± 500 BP (LE-1000); and 35,400 ± 600 BP (LE-954). Considering the stratigraphic position of samples LE-1000 and LE-1001, it is likely that at three standard deviations, which for both samples amounts to 1,500 years, their true age is approximately 31,500 years. In the upper part of the deposits, which lay between the horizons containing sample LE-999 and sample LE-1000, were flint flakes together with flaked bones of mammoth and woolly rhinoceros. These deposits were placed in separate Pleistocene cultural Horizon B. In the middle part of deposit 4 of the geological layer, from which samples LE-1000, LE-1001, and LE-954 were collected for radiocarbon analysis, stone artifacts and split bones of mammoth, woolly rhinoceros, bison, and horse were found. These finds are assigned to Pleistocene cultural Layer C.

5. Horizontally-layered yellowish sands with thin lenticular interlayers of grayish loam (Layer 5 in Figure 9). The thickness of the opened deposit is approximately 2 m. For the upper part of the deposits, which lie at 55 cm below the top of the layer, a radiocarbon date of 35,600 ± 900 BP (LE-955) was obtained from wood. This date corresponds well with the age of sample LE-954. Judging by the character of the deposits, Layer 5 represents the facies of streambed shallows of Terrace III.

In this division only the cultural remains from the Pleistocene deposits that belong to Horizons A, B, and C are examined, as well as some surface finds typologically comparable to materials from other Pleistocene sites of the Aldan.

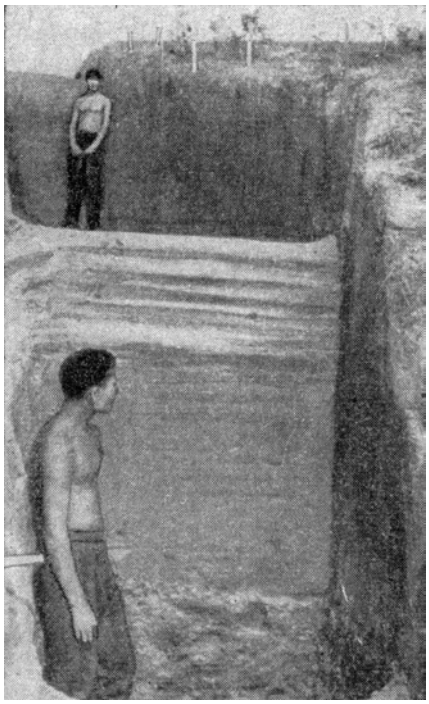


Figure 8. Stratigraphic trench in the Ust' Mil' II site.

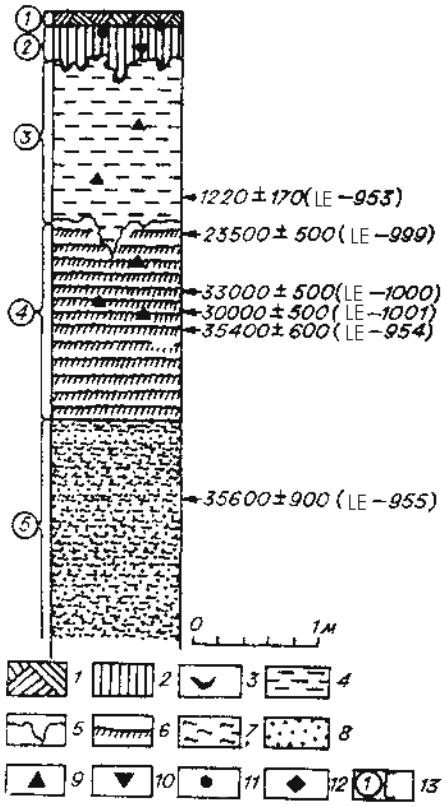


Figure 9. Stratigraphic profile of the Ust' Mil' II site. 1) sod; 2) covering loam; 3) traces of solifluction; 4) horizontally laminated sandy loam; 5) soil veins with fill; 6) horizontally laminated loam; 7) thin interlayers of loam; 8) inequigranular sands; 9) upper Pleistocene Paleolithic artifacts; 10) early Holocene Paleolithic artifacts; 11) Neolithic artifacts; 12) Bronze Age and early Iron Age artifacts; 13) number and boundary of the geological layer.

The following was found in cultural Horizon A: 13 flint flakes, 6 quartzite flakes, 2 diabase flakes, 3 broken flint blades 0.7 to 1.0 cm wide, and 1 core. The core was made from an oval diabase cobble 18 cm long, 9.5 cm wide. The striking platform, made by the removal of one transverse spall, is 9.2 cm long, 6.8 cm wide.

The base of the core and one of the lateral planes were trimmed by steep retouch. From the other lateral plane, which retained a large part of the cobble cortex, only one lamellar flake had been removed. Judging by stratigraphic position and radiocarbon date, the materials from Horizon A of the Ust' Mil' II site are approximately synchronous with Horizon A at Dyuktai Cave, but they are presently too few in number to characterize their cultural appearance.

Only 7 flint flakes were found in cultural Horizon B. They are important for proof that people lived on the Aldan during the approximate interval of 31,500 to 23,500 years ago, but at present nothing can be said about the appearance of the culture of that time.

The most important finds at the Ust' Mil' II site are confined to cultural Horizon C, the age of which is approximately 35,000 to 31,500 years. Here 12 stone objects and 1 artificially worked mammoth bone (Pl. 9:8) were found. This bone was sent to Professor S. A. Semenov for study at the experimental trace-analysis laboratory of the Leningrad division of the Institute of Archaeology (AN SSSR). Professor Semenov sent the following conclusion on 29 March 1972:

> Based on all characteristics, the epiphysis was cut off by small blows (notches) from a stone tool. The hollow in the spongy mass of the epiphysis on the dyaphysial side points to it being intentionally made with the aid of a sharp object, which executed the role of a chisel. The smoothing of the edge of the spongy mass and the absence of corners and projections says that the object obtained by this method was of service to a human, but in what capacity is unclear.

The stone assemblage of Horizon C is represented by flint flakes (5 specimens), flint blades (2 specimens), a core blank (1 specimen), a wedge-shaped core (1 specimen), a burin (1 specimen), an end scraper (1 specimen), and a blank of a knife or spear head (1 specimen).

All the flakes are represented by small primary specimens, the backs of which retained cobble cortex.

Of the two blades, one is whole, the other broken. The whole one is 6.3 cm long, 2.5 cm wide (Pl. 9:2). Cobble cortex was preserved on its back. The top and bottom of the other blade was broken. The length of the preserved part is 1.7 cm, the width 0.9 cm.

The core blank was made from a trapezoidal slab of black flint (Pl. 9:5). The plane of one of its lateral sides was worked by flat pressure retouch. The end of the artifact was also partially trimmed by the same retouch. The length of the blank is 6.8 cm, the thickness 1.8 cm, the height of the end part 4.1 cm. This artifact may not be a core blank, but a blank of a biface knife or spear point.

The wedge-shaped core (Pl. 9:3) was made from a large three-edged black flint flake. It was worked by flat retouch on all sides. The keel-shaped base of the core and the blunt end were additionally sharpened by the removal of the finest spalls. The pressure platform has an irregular oval shape. Its dimensions are 2.0 x 4.7 cm. The length of the core is 4.7 cm, the height 2.3 cm. Several small lamellar flakes had been removed from the end of the artifact. The core was evidently in the initial stage of manufacture. Based on the character of the work and the form of this wedge-shaped core, it is very reminiscent of a keel-shaped scraper.

The angle burin (Pl. 9:4) was made on a small flat slab of black flint. Its length is 7.0 cm, width 3.2 cm, thickness 0.7 cm. The working edge of the tool was formed by the removal of a burin spall directed at an acute angle to the naturally beveled edge of the slab. The length of the burin spall scar is 2.5 cm, the width 0.7 cm. One of the lateral sides of the tool was partially trimmed by pressure retouch near the burin spall and at the base.

The end scraper (Pl. 9:1) was made on a lamellar flake of black flint. Its working edge is almost completely broken away. Judging by the preserved part, it was worked by small pressure retouch directed from ventral to dorsal. The lateral edges of the tool were worked by the same kind of retouch. The length of its preserved part is 3.5 cm, the width 2.4 cm.

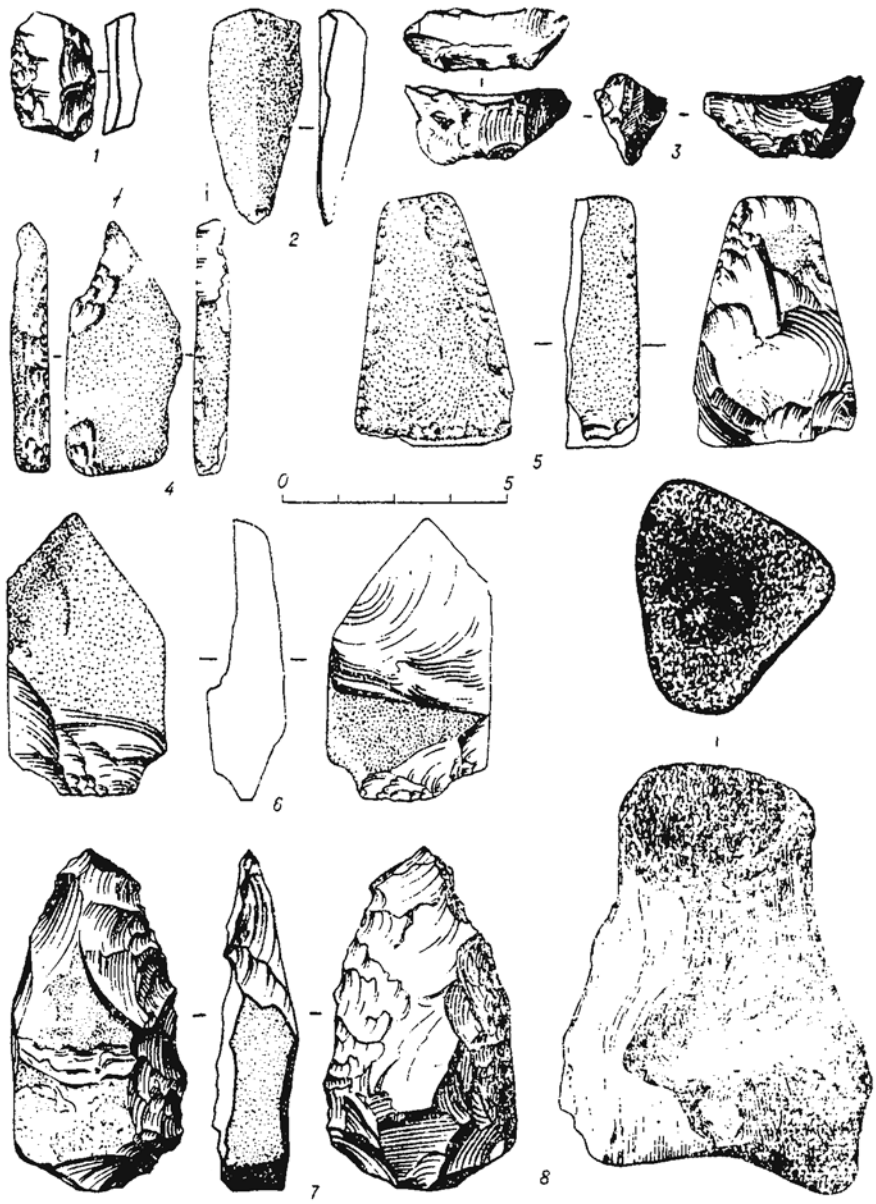


Plate 9. Ust' Mil' II site. Stone and bone assemblage from the lower cultural layer.

The blank of a knife or spear point (Pl. 9:6) was made on a flat slab of black flint, one end of which has a natural subtriangular point. The cobble cortex on one of the lateral sides of the artifact was completely cleared from this part by the removal of a broad transverse spall. The cobble cortex at the base of the artifact was also completely eliminated by the removal of small spalls on two sides. Through this modification it was additionally sharpened by edge retouch. The character of the work and form of the object attest to a blank of a biface knife or spear point. This supposition is corroborated, in our view, by the find of a flint knife or spear point almost completely worked by retouch (Pl. 9:7), which is very close

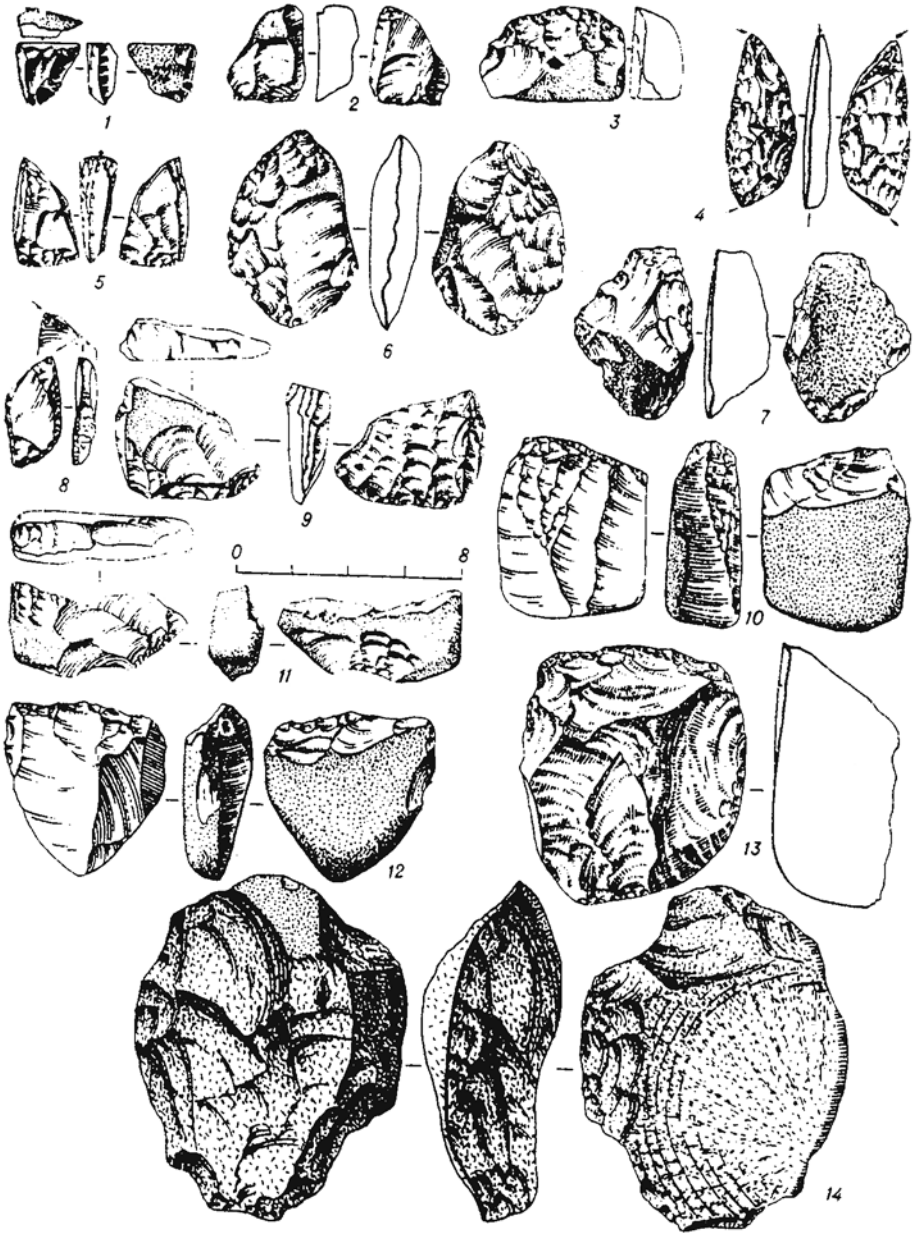


Plate 10. Ust' Mil' II site. Stone assemblage.

in its technical-typological features to the above-described artifact. The biface was found in one of the terrace blowouts, where the deposit of geological Layer 4 appeared on the surface. This observation, together with the great similarity of the two biface blanks, permits preliminarily assigning them to the same cultural complex.

In addition to the above-mentioned biface blank of a knife or spear, and judging by their technical-typological features, we can assign to the Pleistocene: 11 unifacial single-platform subprismatic flint cores and their blanks (Pl. 10:10, 12), 26 wedge-shaped flint cores and their blanks (Pl. 10:1, 5, 9, 11), 2 transverse flint burins (Pl. 10:4, 8), 2 flint skreblos (Pl. 10:3, 7), 2 diabase skreblos (Pl. 10:13, 14), 1 flint chisel-like tool (Pl. 10:2), and 14 biface knives and their blanks (Pl. 10:6). Almost all these artifacts have

clear analogies with materials from Dyuktai Cave, while some of them are close to materials of earlier sites such as Ezhantsy, Ikhine I, and Ikhine II. Therefore, it would be premature to tie the surface material from the Ust' Mil' II site to separate cultural Horizons A, B, or C.

The most important result from the study of the Ust' Mil' II site is that, based on radiocarbon dates reinforced by stratigraphic observations its excavations provide convincing materials, which attest that hunters of mammoths, woolly rhinoceroses, bison, and horses lived on the Aldan 35,000 to 31,500 years ago. That the bifacial working of flint knives or spear points, so characteristic of the Dyuktai Paleolithic culture, already appears in cultural Horizon C.

The Ikhine I and Ikhine II Sites

The Ikhine I and Ikhine II sites are located on the right bank of the Aldan, 284 km from its mouth. The Ikhine I site is confined to a point on the left bank at the mouth of Ikhine Creek, and the Ikhine II site is on a point on the right bank.

The *Ikhine I site* was discovered in July 1963 during a trip by S. A. Fedoseeva and the author of the present work to Mamontova Gora (Mochanov and Fedoseeva 1968). Later, the Ikhine I site was studied by the PAE. Significantly, this site is the first Paleolithic site of Yakutia in which traces of hunters of mammoths, woolly rhinoceroses, bison, horses, and reindeer were found in indisputably Pleistocene deposits.

The cultural remains in the Ikhine I site are confined to the third terrace above the Aldan floodplain, which has an elevation here of 16 to 18 m. During the process of excavation the following stratigraphy of the site was revealed (Fig. 10:1):

1. Sod (Layer 1 in Figure 10). The thickness is 5 to 10 cm. In the sod were isolated fragments of early Iron Age ceramics.

2. Reddish-brown drift-manteling loam (Layer 3 in Figure 10) 30 to 40 cm thick. This loam penetrates into lower-lying deposits through frost cracks in some places. In the upper part of the loam, directly under the sod, were several fragments of early Iron Age ceramics. A small quantity of stone objects and bones of Pleistocene animals was found in the middle and lower horizons of the loam.[4] These finds were assigned to Paleolithic Layer I.

3. A horizontally-laminated parcel, consisting of interlayers of grayish-bluish and yellowish-brownish loams 2 to 5 cm thick and gray inequigranular sands 0.1 to 4.0 cm thick (Layer 4 in Figure 10). The total thickness of the parcel is 75 to 90 cm. Isolated pieces of gravel were encountered in some interlayers of loam at various depths from the top and to the bottom of the parcel. Judging by the character of the deposits, this parcel represents alluvia of the floodplain facies of Terrace III. The sand interlayers are clearly reflected only in the lower part of the parcel 30 to 40 cm thick. In the upper part, 45 to 50 cm thick, the inequigranular sands lie in only very thin (0.1 to 0.3 cm) lenses, which suggests that the accumulation of alluvium was ceasing.

   In the two lower interlayers of grayish-bluish loam, lying above an upper clear interlayer of sand 4 cm thick, were various stone items and bones of Pleistocene animals. These finds were assigned to Paleolithic Layer II. The depth of its deposition from the present ground surface was 65 to 80 cm.

[4] Identification of the faunal remains was conducted by E. A. Vangengeim and O. V. Egorov. Some bones were identified by P. A. Lazarev.

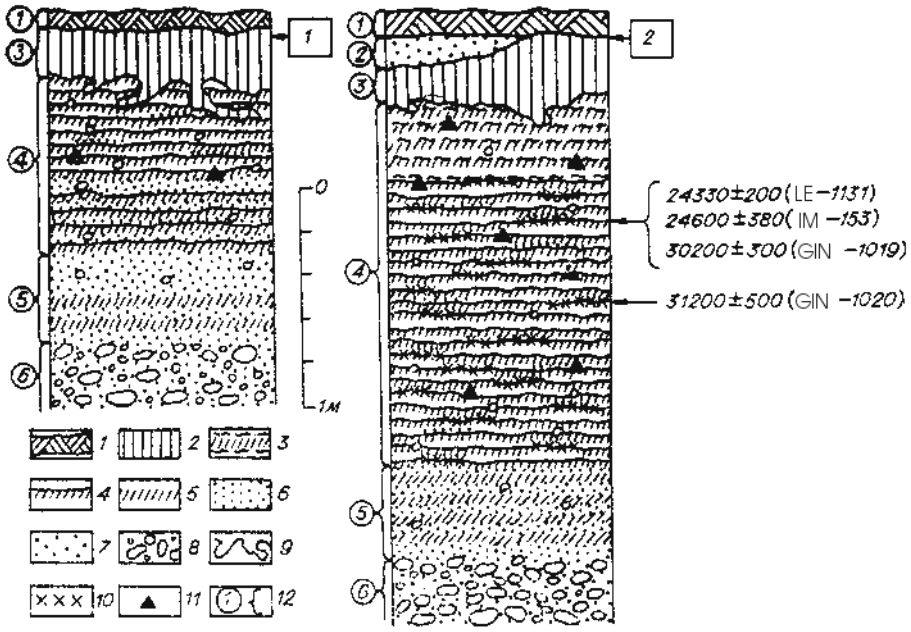


Figure 10. Stratigraphic profile of the Ikhine I and Ikhine II sites. 1) sod; 2) covering loam; 3) vaguely laminated loam; 4) horizontally laminated loam; 5) some interlayers of loam; 6) inequigranular sands; 7) large-grained sands; 8) pebbles and gravels; 9) traces of solifluction; 10) plant remains; 11) upper Pleistocene Paleolithic artifacts; 12) number and boundary of the geological layer.

4. Inequigranular gray sand with isolated pebbles and gravels (Layer 5 in Figure 10). The total thickness is 40 to 45 cm. In the lower part of the parcel were two closely lying interlayers of bluish loam 3 to 4 cm thick. Thin (0.1 to 0.3 cm) lenses of the same loam were encountered throughout the whole thickness of sand, giving it a poorly defined horizontally undulating lamination. The deposits of this parcel can be facially assigned either to alluvium of the stream shallows or to the bottom of the floodplain alluvium of Terrace III. In the bottom loam interlayer, at a depth of 143 cm below the present ground surface, lay the bones of Pleistocene animals, one of which has clear traces of artificial working. These finds were assigned to Paleolithic Layer III.

5. Pebbles and gravels cemented by sand (Layer 6 in Figure 10). These deposits represent stream alluvium. The thickness of its visible part is 15 to 16 m.

In Paleolithic cultural Layer I were found a total of 2 flint (Pl. 11:2, 3) and 2 diabase flakes and 1 flint cobble with traces of artificial impacts (Pl. 11:9). This cobble was probably initially intended to be made into a core. However, judging by the stellate hammering of one of its areas, it was used instead as a baton. In addition to the stone items, the layer contained 3 bison bones, 1 mammoth bone, 1 horse bone, 2 reindeer bones, and 1 indeterminate piece of bone of a large mammal with artificial (?) cuts. The finds from Layer I are clearly insufficient to precisely date them or to determine their cultural association. Nevertheless, Layer I , judging by the stratigraphic position of the stone objects and the composition of the fauna, can be placed to the very end of the Pleistocene.

Paleolithic Layer II contained 20 stone items and 30 animal bones. The identified bones belong to mammoth (3 specimens), woolly rhinoceros (1 specimen), bison (8 specimens), horse (4 specimens), and reindeer (5 specimens).

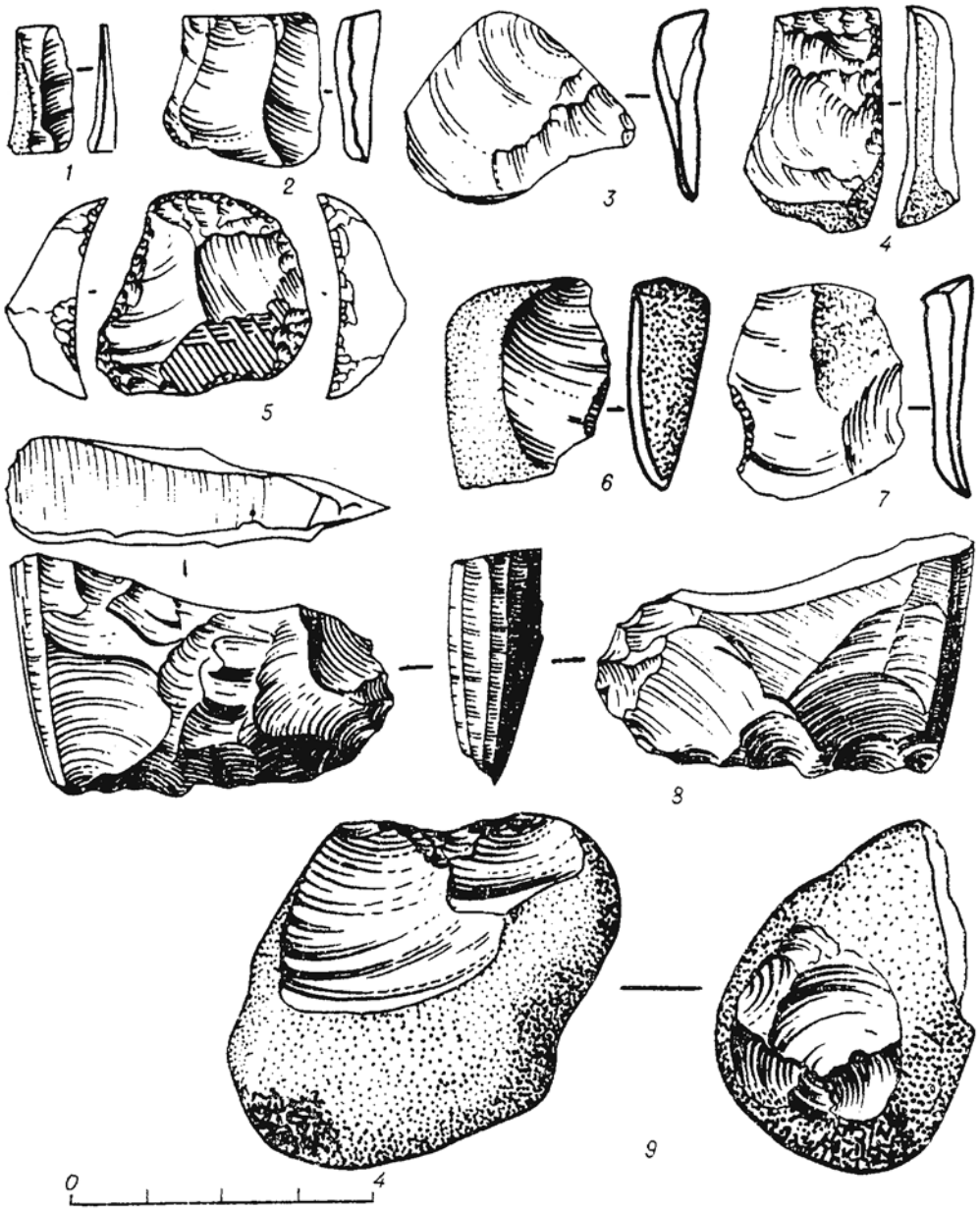


Plate 11. Ikhine I site. Stone assemblage (2, 3, 9 from Layer I; 1, 4–8 from Layer II).

The stone assemblage is represented by flakes (14 specimens), a blade (1 specimen), a core (1 specimen), and tools and their blanks (4 specimens). The flakes are small, not exceeding 3 cm in length (Pl. 11:6, 7). Only one primary flake of green flint has a length of 3.8 cm. Based on material, the flakes are divided in the following way: green flint (2 specimens), black flint (1 specimen), black argillite (5 specimens), and diabase (5 specimens).

The blade is a fragment of midsection, and made of black flint. Its dorsal side partially preserves cobble cortex, and traces of calcareous incrustation are visible. The length of the fragment is 1.6 cm, the width 0.7 cm (Pl. 11:1).

The most interesting find is an elongate wedge-shaped core made of grayish-green strongly patinized flint (Pl. 11:8). The longitudinal and transverse sections of the core have a subtriangular (wedge-shaped) form. Both of its broad lateral sides were carefully worked by pressure retouch. The pressure platform has the shape of an almost regular isosceles triangle, the base of which reaches 1.2 cm in width. The platform is situated diagonally, at an angle of about 60º to the plane of the ventral side. It was formed by the removal of one longitudinal spall and not subjected to additional work. The rib-shaped base of the core is strongly calcified. The length of the core is 4.9 cm, the height of the end part from which microblades were removed is 3.3 cm. This core is a typical specimen of a "Gobi" wedge-shaped (horizontal) core.

The tools are represented by a scraper (1 specimen), a chisel (1 specimen), and knife (?) blanks (2 specimens). The scraper was made on a bluish-green flint flake, and is rounded in form. Its working edge occupies almost the whole circumference of the flake. It was formed by the smallest edge pressure retouch directed from ventral to dorsal. Some parts of the working edge, where the retouch came around to the dorsal plane, were especially carefully worked. Traces of calcareous incrustation appear on the tools. The length of the scraper is 3.0 cm, the width 2.8 cm (Pl. 11:5).

The chisel-like tool was made on a subrectangular flake of greenish flint. Its straight working edge was worked by steep pressure retouch directed from ventral to dorsal. Cobble cortex was partially preserved on the lateral edges. A large part of the dorsal side was flattened by pressure retouch, the facets of which are partially covered with a calcareous incrustation. The length of the tool is 3.0 cm, the width of the working edge 1.4 cm (Pl. 11:4).

The first blank was made from an oval diabase cobble (Pl. 12:2). The cobble cortex on one broad surface and partially on the opposite one was entirely cleared by the steep removal of spalls. It is reminiscent in form and method of work of oval biface knife blanks from Dyuktai Cave. However, flint slabs served as the raw material for the latter, and as a consequence they have a more finished form. The length of the blank is 16.2 cm, the width 8.8 cm.

The second blank was made from a transversely flaked diabase cobble (Pl. 12:1). Its length is 15.4 cm, its width 8.2 cm. It does not have a clear form since it was subjected only to the most primary working.

Initially, cultural Layer II was tentatively dated to Sartan times (Mochanov 1966a, 1966b, 1966c; Mochanov and Fedoseeva 1968), and hence no younger than 15,000 years (Mochanov 1966d). Later, the age of the Ikhine I site was estimated to be younger, at 18,000 to 20,000 years (Mochanov 1973b). When dating such a site, we observed that it is confined to Terrace II of the Aldan. Later work indicated that the Ikhine I site was confined to Terrace III of the Aldan. On this basis its cultural Layer II was dated to an age of 34,000 to 31,000 years (Mochanov 1975). The radiocarbon dates obtained on samples from the Ust' Mil' II site and the Ikhine II site played the primary role for such an increase in the age of the Ikhine I site. As previously noted, it was also confined to Terrace III. At present, until the radiocarbon dating of the Ikhine II site is made more precise (see below), it is better to limit the chronological framework of Layer II of the Ikhine I site to an age of 30,000 to 25,000 years.

With regard to the cultural association of the finds in Layer II, the supposition that they belong to a special Ikhine culture is not corroborated by new data, as we previously noted (Mochanov 1973a, 1973b). Rather, considering the character of the work on the "Gobi" core and the knife (?) blank, these materials belong to the Dyuktai culture. However, this supposition should be confirmed through further fieldwork.

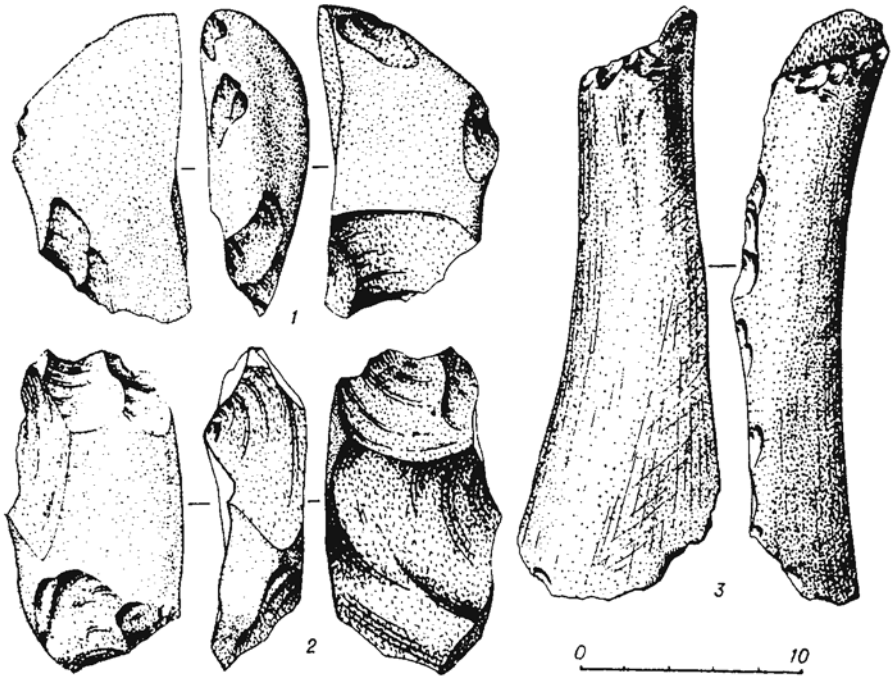


Plate 12. Ikhine I site. Stone and bone assemblage (1, 2 from Layer II; 3 from Layer III).

The study of cultural Layer III of the Ikhine I site is very significant for clarifying the time of appearance of people in Northeast Asia. A longitudinally flaked humerus of a young mammoth was found in it. Both transverse ends and one longitudinal edge of the bone were artificially worked by the removal of small spalls (Pl. 12:3). On one broad transverse edge can be seen traces of work in the form of scratches and small areas of smoothing. The bone was possibly used as a polisher (?). With it were found 3 bison bones, 2 horse bones, 1 moose bone, and 3 pieces of unidentified bone.

Judging by the radiocarbon dates obtained for the Ust' Mil' II site, the worked bone, lying at the bottom of the flood-plain alluvium of Terrace III, in contact with stream pebbles, should have an age of approximately 35,000 years. This find, along with materials from the Ezhantsy site, attest that people lived on the Aldan by the beginning of the Upper Paleolithic.

The *Ikhine II site* was discovered in 1965 during work by the PAE. In the first years of investigation, because of the high location of the site (12 m above the Aldan River level) and the presence above the drift-mantling loam of late Holocene stream sand (Layer 2 in Figure 10), it was supposed that the Ikhine II site was confined to the alluvium of Terrace I above the floodplain and had an age of approximately 12,000 years. Further work showed that in the 1965 and 1966 exploratory trenches that were excavated on the flattened part of Terrace III, on the surface of a large part of the terrace, Holocene stream deposits were absent. The exploratory trenches contained very poor archaeological and faunal materials. The rearward projection of Terrace III reached a height of 15 to16 m. In 1974, ten radiocarbon dates were obtained from specimens of wood and bone taken from the middle of the flood-plain alluvium. The "youngest" of them has an age of 24,330 ± 200 BP, the "oldest," an age of 31,200 ± 500 BP. These dates corroborated the assignment of the Ikhine II site to the deposits of Terrace III above the floodplain.

Figure 11. General view of the excavation at the Ikhine II site.

The broad excavations carried out in 1973 and 1974 (Fig. 11) revealed the following stratigraphy of the site (Fig. 10:2):

1. Sod 10 to 15 cm thick (Layer 1 in Figure 10).
2. Large-grained light-gray alluvial sand (Layer 2 in Figure 10). The thickness is 5 to 50 cm. This sand, which lies only on the flattened part of the terrace at an elevation of 12 m above mean river level of the Aldan, represents the "late Holocene alluvial assault." Judging by the radiocarbon dates obtained at several Aldan sites, the alluvial sand was deposited earlier than 1,000 years ago.
3. Reddish-brown drift-mantling loam (Layer 3 in Figure 10), 35 to 45 cm thick. In some areas the loam penetrates by way of the frost cracks into the lower deposits. In the upper part of the loam, directly under the sod, were found several fragments of early Iron Age ceramics. In the lower horizon of the loam were found several stone items and the bones of Pleistocene animals. The finds from the lower horizon were assigned to Paleolithic Layer I.
4. A horizontally-laminated parcel consisting of interlayers of grayish-bluish and yellowish-brownish loams 0.5 to 2.0 cm thick (Layer 4 in Figure 10). The total thickness of the parcel is 1.5 to 1.7 m. Sometimes thin (0.1 to 0.3 cm) interlayers of inequigranular sand and isolated gravels lie between the loams. Some interlayers of loam were saturated with wood remains. Judging by the character of the deposits, this parcel is represented by the alluvium of the Terrace III flood-plain facies. At depths of 75, 110, 145, and 195 cm lay rather clear interlayers of

light-gray loam 1 to 5 cm thick. These layers permitted preliminarily dividing the whole parcel into five individual horizons (A, B, C, D, and E). The upper Horizon A is characterized by the least clear lamination and the absence of wood remains. Wood remains are primarily confined to the loams of Horizon D. In many parts of the terraces, 3 to 5 m from the point, rather thick veins of ice are found in the parcel of deposits being described. At some depths from the present ground surface in Horizons A, B, C, and D were isolated stone items and the bones of Pleistocene animals. Meanwhile, only the bones of animals (mammoth, bison, horse, and reindeer) have been recorded in Horizon E. The stone items and fauna were assigned to Paleolithic Layer II, which was subdivided into cultural Horizons IIa, IIb, IIc, and IId.

5. A horizontally-laminated parcel consisting of interlayers of beigish-grayish loam 1 to 2 cm thick and inequigranular gray sands 0.5 to 1.0 cm thick (Layer 5 in Figure 10). The total thickness of the parcel is 25 to 45 cm. Its deposition belongs facially either to alluvium associated with a stream shallows or to the very bottom of the floodplain alluvium of Terrace III.
6. Pebbles and gravels, cemented by sand (Layer 6 in Figure 10), representing fluvial alluvium. The thickness of its visible part is 11 to 14 m.

In Paleolithic cultural Layer I a total of 2 small diabase flakes, 6 bison bones, and 5 horse bones was found. These finds are clearly insufficient to precisely date them or determine their cultural association. They can be tentatively assigned the very end of the Pleistocene and correlated with finds from Layer 1 of the Ikhine I site.

In cultural Horizon IIa a total of 11 stone items and 254 animal bones was found. The identified bones belonged to mammoth (7 specimens), woolly rhinoceros (4 specimens), bison (50 specimens), horse (71 specimens), reindeer (16 specimens), and moose (1 specimen).

The stone assemblage is represented by flakes (4 specimens), a knifelike blade (1 specimen), flint and diabase cobbles with traces of artificial hammering (3 specimens), a blank of a wedge-shaped (?) core (1 specimen), and tools (2 specimens).

Among the flakes are 3 small primary ones of diabase (their length is 2.5 to 3.0 cm) and 1 large primary flint flake with a length of 6.1 cm.

The knifelike blade was made of brown hornfels, and has a regular form. The lower end of the blade is broken. The length of the preserved part is 2.6 cm, the width 0.7 cm (Pl. 13:1).

In the layer were three cobbles with traces of artificial working: granite, diabase, and flint. The granite cobble is represented by a fragment on which traces of the removal of two flakes were preserved. The cobble of gray diabase has a near segmentlike form. One of its transverse ends was transformed with the aid of bifacial blows to the short sharp working edge. The opposite end of the cobble has traces of dotted hammering. It was evidently used both as a chopping tool and as a baton. Its length is 14.2 cm, the width of the middle is 9.3 cm, the width of the working edge is 5.0 cm (Pl. 13:10). Two primary flakes were removed from the small cobble of black flint.

The blank of the wedge-shaped (?) core was made on a cobble of black hornfels. From one lateral side of the artifact the cobble cortex was taken off by the removal of a broad spall. Work on the core's platform was begun by pressure retouch. One primary blade of irregular form was taken from the platform. The pressure platform is directed at an acute angle to the end of the blank. The length of the artifact is 7.6 cm, the width 5.6 cm, the dimensions of the pressure platform are 4.0 x 4.0 cm (Pl. 13:9).

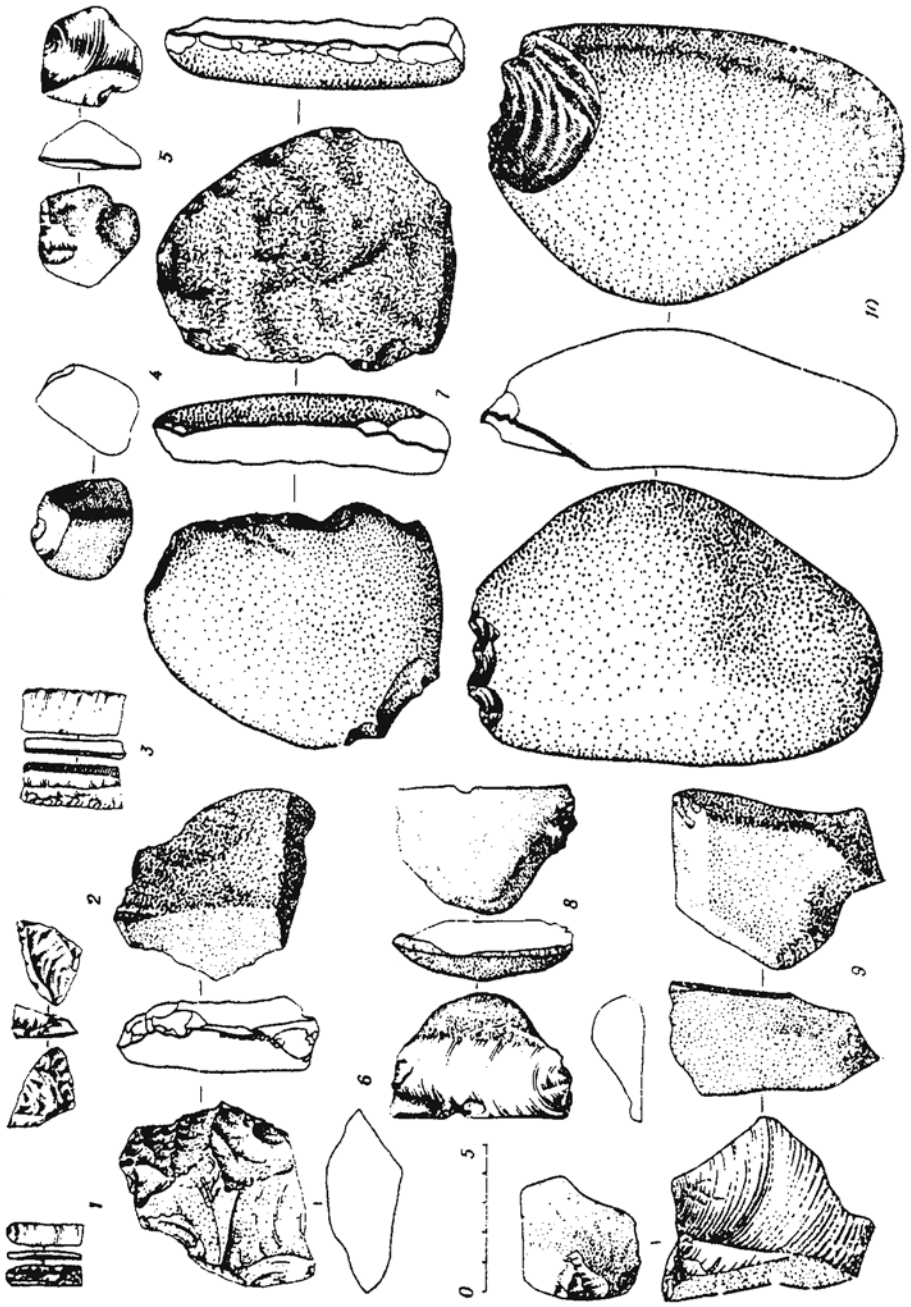


Plate 13. Ikhine II site. Stone assemblage (1, 3, 6, 10 from Layer IIa; 2, 5, 7, 8 from Layer IIb; 4 from Layer IId; 9 from surface collection).

The tools are represented by a knife (1 specimen) and a scraper (1 specimen). The knife was made on a midsection of a blade of black flint. One side of the back of the blade was covered with cobble cortex. The longitudinal edge was worked by pressure retouch directed from ventral to dorsal. The facets of retouch partially approach the broad edge of a blade. On the working edge can be seen traces of wear, appearing in the form of the smallest notching of the edge. The length of the knife is 3.67 cm, the width 1.4 cm (Pl. 13:3).

The skreblo was made on a piece of a cobble of black argillite. It has a triangular cross section. The triangular working edge is located on the longitudinal edge of a piece of the cobble. It was worked by unifacial stepped retouch. The opposite working edge of the tool was additionally pointed by retouch. The length of the skreblo is 7.9 cm, the width 5.35 cm (Pl. 13:6).

Judging by the stratigraphic position of the finds and the radiocarbon dates from the lower-lying deposits, Horizon IIa most probably has an age of 25,000 to 23,000 or 22,000 years.

In the cultural Horizon IIb were 6 stone items and 202 animal bones. The identified bones belonged to mammoth (4 specimens), woolly rhinoceros (5 specimens), bison (58 specimens), horse (50 specimens), reindeer (6 specimens), Arctic fox (1 specimen), fox (1 specimen), and fish (2 specimens).

The stone assemblage is represented by flakes (3 specimens), a wedge-shaped core (1 specimen), a cobble with spalls removed (1 specimen), and a skreblo (1 specimen). The flakes were made from black flint, argillite, and diabase. The flake of black flint is large and primary, with a length of 4.2 cm, width 4.0 cm (Pl. 13:5). The flake of black argillite has a length of 3.4 cm, width 1.7 cm. The diabase flake possesses a very well defined lamellar form. Its length is 5.0 cm, its width 2.2 cm.

The wedge-shaped core was made from a flake of black hornfels, and is in the beginning stage of modification. The artifact has a triangular form, as well as triangular longitudinal and transverse sections. The triangular pressure platform is directed at an acute angle to the end of the core. One irregular short blade was taken from it. Only the edge of the base of the core was trimmed by unifacial edge retouch. The height of the core is 2.4 cm, the length 3.2 cm, the dimensions of the pressure platform 3.2 x 1.1 cm (Pl. 13:2).

The massive subtriangular cobble of diabase is probably a blank for a cobble core. Its upper end is a natural subrectangular platform, beveled toward its longitudinal axis. The platform was slightly modified by edge retouch. The cobble is smoothly narrowed and rounded toward the lower end. The length of the blank is 16.0 cm, the width in the upper part is 10.9 cm, in the lower 6.1 cm. The dimensions of the platform are 10.9 x 10.2 cm. The width of the edge, covered by retouch, is 9.0 cm.

The skreblo was made from half of a longitudinally flaked diabase cobble of oval form. Both longitudinal edges of the tool were partially worked by unifacial retouch directed along one edge from dorsal to ventral and along the other edge from ventral to dorsal. The length of the skreblo is 10.3 cm, width 7.9 cm (Pl. 13:7).

A total of two stone objects and 64 animal bones was found in cultural Horizon IIc. The identified bones belonged to woolly rhinoceros (2 specimens), bison (14 specimens), horse (14 specimens), and reindeer (2 specimens).

The stone assemblage is represented by only one small flake of black hornfels and half of a longitudinally flaked cobble of diabase, whose longitudinal edge was partially worked by small retouch. This artifact could have been used as a skreblo. Its length is 11.7 cm, its width 6.7 cm.

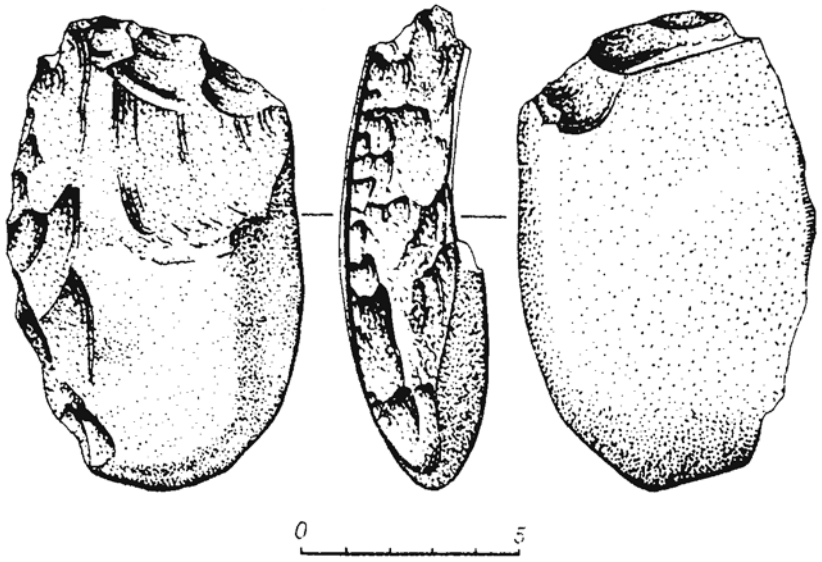


Plate 14. Ikhine II site. Stone tool from Layer IId.

Based on samples of wood taken from a depth of 1.5 m, two dates were obtained for the middle part of Horizon IIc: 26,600 ± 900 BP (IM-201) and 31,200 ± 500 years (GIN-1020). At three standard deviations the age of these specimens is determined to fall between 23,900 and 32,700 BP. Considering the stratigraphic position of the specimens, it presently is best to date them to approximately 30,000 years. Based on wood and rhinoceros bones taken from a depth of 1.3 m, radiocarbon dates of 26,500 ± 540 BP (IM-202) and 26,030 ± 200 BP (IM-239) were obtained for the lower part of Horizon IIc. At three standard deviations their age is established at 25,000 to 28,000 years. However, judging by the stratigraphic position, the age of the sample should be made younger, most probably no less than 30,000 years.

In cultural Horizon IId a total of 127 animal bones, 1 bone tool, and 2 stone items was found. The identified bones belong to mammoth (9 specimens), woolly rhinoceros (1 specimen), bison (29 specimens), horse (43 specimens), red deer (?) (1 specimen), reindeer (10 specimens), and wolf (1 specimen).

Both worked stone items were found in the lower interlayer of Horizon IId, at a depth of 1.75 and 1.8 m below the present ground surface. The first item is a skreblo made from a flat oval cobble of black small-crystal diabase. The skreblo has an ovally convex working edge worked by unifacial stepped retouch, which reaches one broad surface of the tool. One transverse edge of the cobble was sharpened on two sides by flattening retouch. The skreblo could have been used also as a chopping tool. The length of the skreblo is 11.0 cm, its width 6.6 cm (Pl. 14).

Besides the skreblo, a calcified cobble of black flint with two spalls artificially removed (Pl. 13:4) was found in the layer at a depth of 1.8 m. Here in the same place a mammoth rib was found; on both broken ends worn depressions can be seen. A special study of the traces of wear on this tool has not yet been conducted, but it possibly was used as a part of a bow drill.

Based on a specimen of wood taken from a depth of 1.6 m below the present ground surface, a radiocarbon date of 27,800 ± 500 BP (IM-206) was obtained for the upper part of Horizon IId. However, we believe it is younger. Though at three standard deviations the age of the specimen falls between 26,300 and 29,300 years, judging by the stratigraphic position, Horizon IId, like Horizon C at the Ust' Mil' II site, most probably has an age of 31,500 to 35,000 BP.

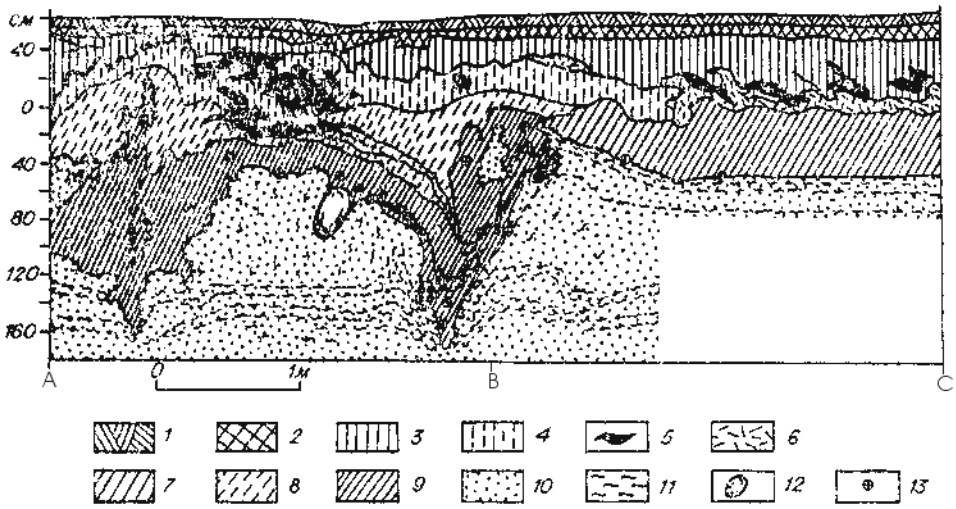


Figure 12. Stratigraphic profile of the Ezhantsy site. 1) sod; 2) ploughed layer; 3) compact covering loam; 4) friable covering loam; 5) humic interlayers; 6) podzolic layer; 7) grayish-beige compact alluvial loam; 8) grayish friable loam; 9) clay; 10) sand; 11) thin interlayers of loam; 12) pebbles; 13) cultural remains; a–b–c is lines of the profile.

The materials from the Ikhine II site are still too small in number to determine their cultural affiliation. At the moment we can suppose that the sites of Ikhine II (Horizons IIb and IIc) and Ikhine I (Layer II)—synchronic by stratigraphic, faunal, and palynological data—were left by groups of the same people. If this is so, then at least 30,000 to 25,000 years ago, bearers of the Dyuktai culture likely lived at the Ikhine II site. However, these suppositions can be confirmed or rejected only with further work. At present the primary significance of the Ikhine II site is the fact that, like the sites of Ikhine I, Ezhantsy, and Ust' Mil' II, it irrefutably attests to the settlement of the Aldan valley in pre-Sartan times.

The Ezhantsy Site

The Ezhantsy site was discovered during work of the PAE in 1970 on the right bank of the Aldan, 784 km from its mouth. It is located on Terrace III above the floodplain, with an elevation of 16 to 18 m. The following profile of the deposits was revealed at the site (Fig. 12):

1. Sod 5 to 10 cm thick.
2. Reddish-brown mantling loam 50 to 60 cm thick. Three horizons of buried soils were noted in it in places, the thickest of which was in the lower part of the loam. The upper part of the loam lying under the sod had been disturbed by modern tilling.
3. Grayish-beige alluvial loam with poorly accumulated horizontal lamination. The thickness is 50 to 60 cm. The floodplain facies of the alluvium of Terrace III is represented by this loam. A large quantity of Pleistocene animals and stone tools was found in the layer.
4. Grayish-yellowish sands with thick interlayers of silt. The opened layer reached a thickness of about 1.5 m. The parcel is evidently represented by deposits of an alluvial shoal of Terrace III on the Aldan.

All the layers under the sod were damaged in several places by thick frost cracks in the form of epigenetic soil veins of fill (Fig. 12). The cracks begin in the middle part of the mantling loam, cut through

the alluvial loam, and go into the lower-lying sands to a depth up to 2.5 m below the present ground surface. Based on charcoal samples taken from humic interlayers slipping from the mantling loam into the frost cracks, two radiocarbon dates were obtained: 9,000 ± 100 BP (LE-997) and 10,500 ± 300 BP (LE-964). The first is most probably too young since analysis of the other sample, taken from the same deposit as sample LE-997, gave a date of 10,940 ± 100 BP (GIN-737), which corresponds well with the age of sample LE-964. The radiocarbon dates suggest that the frost cracking of the surface of Terrace III occurred during the Noril'sk stage of the Sartan glaciation, which has an age of approximately 11,400 to 10,300 BP (Kind 1974). Interestingly, no such thick frost cracks as in the Ezhantsy site have been recorded in any other archaeological site on the Aldan.

The large frost cracks, as well as the almost complete covering of the Ezhantsy site by modern houses, hinders the study of this important Paleolithic site of Northeast Asia in significant degree. A total of about 90 m^2 of the site's area has been opened. The recorded finds, as a rule, were confined to the bottom of the grayish-beige loam (geological Layer 3). Sometimes some stone items and bones, together with alluvial loam, were forced upward almost to the bottom of the mantling layer due to frost mixing, or conversely, they were introduced downward approximately 1 m into the sandy deposit. Especially important for more precise dating of the site is that away from frost cracks, one portion of some stone artifacts is situated in the upper part of the deposit of the fluvial shoal and the other portion in the lower part of the deposit of the floodplain alluvium. This observation corroborates the fact that the first people settled at the site when the lower floodplain first began to be formed. Judging by the radiocarbon dates of 35,400 ± 600 BP (LE-954) and 35,600 ± 900 BP (LE-955), obtained from the deposit of the floodplain alluvium and the fluvial shoal of Terrace III of the Aldan at the Ust' Mil' II site, the age of the Ezhantsy site should be approximately 35,000 BP.

A total of 622 stone items and 415 animal bones was found in the site. Almost all the bones were split. Based on identification by E. A. Vangengeim, a large part of them belonged to young animals. The composition of the fauna was determined on 55 specimens of bone; 360 specimens of bone were indeterminate. The identified bones belonged to horse (20 specimens), woolly rhinoceros (9 specimens), reindeer (10 specimens), bison (8 specimens), and mammoth (8 specimens).

The stone items are represented by flakes (438 specimens), flakelets (79 specimens), blades (35 specimens), ski-shaped spalls (6 specimens), burin spalls (2 specimens), cores and their blanks (32 specimens), and tools (30 specimens).

Based on the material, the flakes were subdivided into hornfels (205 specimens), flint (99 specimens), diabase (130 specimens), and quartzite (4 specimens). Among the hornfels flakes, 16 specimens are large (with cobble cortex), 76 are medium, and 113 are small. Among the flint flakes, 5 specimens are large (all with cobble cortex), 25 are medium, and 69 are small. Of the diabase flakes, 26 specimens are large in size, 49 are medium, and 55 are small. The quartzite flakes are all large. Partial edge retouch can be seen on some medium-size flint and hornfels flakes.

The flakelets, based on material, are divided into flint (36 specimens), hornfels (15 specimens), and diabase (28 specimens).

The knifelike blades were made from hornfels and flint (Pls. 15:1–4, 8; 17:4). Almost all are broken. Only two whole blades were preserved: 3.8 cm long by 0.7 cm wide and 3.3 cm long by 1.4 cm wide. Microblades (2 specimens) were found, with blades 0.5 to 0.7 cm wide (9 specimens), 0.8 to 1.0 cm wide (11 specimens), and width greater than 1 cm (8 specimens). Among the blades, 5 specimens are ribbed (Pl. 15:9, 14).

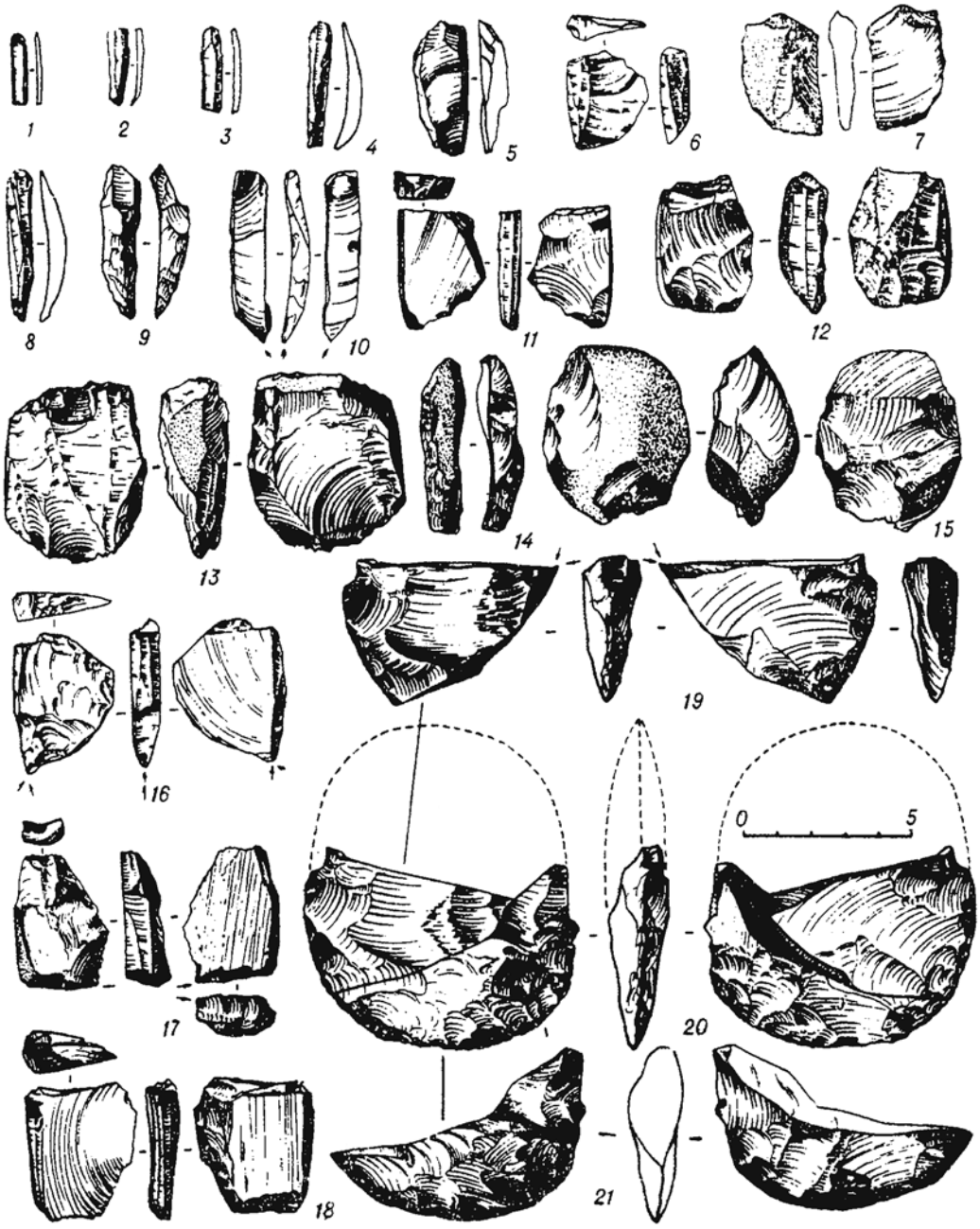


Plate 15. Ezhantsy site. Stone assemblage.

The ski-shaped spalls have a length of 4.3 to 4.7 cm with a width of 1.0 to 1.8 cm (Pls. 15:10; 16:6).

There are three types of cores: subprismatic, tortoise-shell, and wedge-shaped.

Fourteen subprismatic cores and their blanks were found. Large oval cobbles of diabase (13 specimens) and flint (1 specimen) served as material for making them.

Chief attention was given to forming the striking platform when cores of this type were made. To make the cores, as a rule, cobbles were transversely split into halves. Two core blanks made from the two halves of one cobble were found in the layer (Pl. 17:11, 13, 14). The striking platforms were worked either by stepped retouch and trimmed by edge pressure retouch (Pl. 17:14), or by flat pressure retouch and trimmed by edge retouch (Pl. 17:8). They have a subrectangular, subtriangular, and oval form, depending on the initial form of the blank. The majority of the platforms are directed at an angle of 35 to 70º to the longitudinal axis of the blank (Pl. 17:9–11). In individual cases the platforms are almost perpendicular to the long axis of the artifact (Pl. 17:14).

Besides the striking platform, longitudinal ribs were formed on three cobble cores by the removal of transverse retouch spalls (Pls. 17:7; 18:7).

The cores vary in length from 7.7 to 25.0 cm, in width from 5.1 to 12.3 cm. The dimensions of the smallest platform are 3.4 x 5.8 cm; of the largest platform, 7.4 x 8.0 cm.

The tortoise-shell cores are represented by one finished artifact (1 specimen) and a blank (1 specimen). The single-platform tortoise-shell core was made from a cobble of green hornfels (Pl. 17:6). It was worked almost completely on all sides by the removal of radially-directed spalls. Only two irregular flakes were removed from the platform. The height of the core is 7.0 cm, the width 6.0 cm, the thickness 3.3 cm.

The blank of a tortoise-shell core has one broad surface well worked by retouch. Only three spalls were removed from the second surface (Pl. 15:15).

The wedge-shaped cores are represented by finished artifacts (10 specimens) and blanks (6 specimens). The blanks were made from cobbles of flint and hornfels (5 specimens) and from a large flake of small-crystal gray diabase (1 specimen).

All the wedge-shaped cores are vertically elongated. The material for making them was flint and hornfels cobbles (5 specimens) and flint and hornfels flakes (5 specimens). The cores can be divided into three subtypes based on the method of work on their lateral surfaces.

The first subtype consists of five cores on which both lateral surfaces were worked by flat pressure retouch. The artifacts were made from cobbles and have a subrectangular or trapezoidal form. Cobble cortex was preserved on some parts of their lateral edges. The longitudinal and transverse sections of the cores are either subtriangular or subrectangular. The rectangular pressure platforms are beveled toward the working end of the artifacts. The pressure platforms were worked by the removal of small spalls of flat pressure retouch. Thin regular knifelike blades were removed from the end of the cores. The length of the cores is 2.0 to 3.7 cm, the height of the working part 3.6 to 4.5 cm, the dimensions of the smallest platform 1.3 x 1.5 cm, the largest platform 1.2 x 2.4 cm (Pl. 15:12, 13).

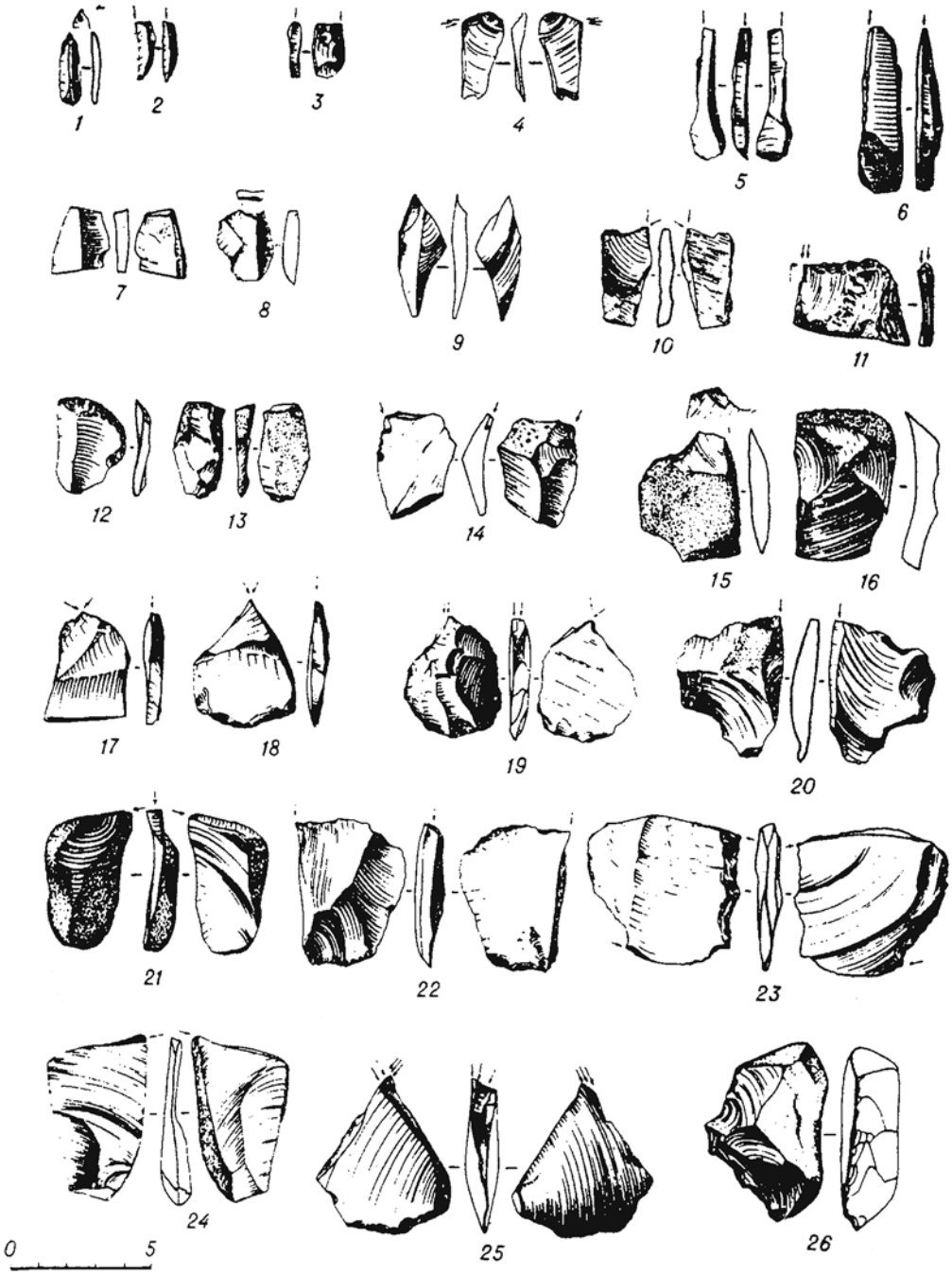


Plate 16. Ezhantsy site. Stone assemblage.

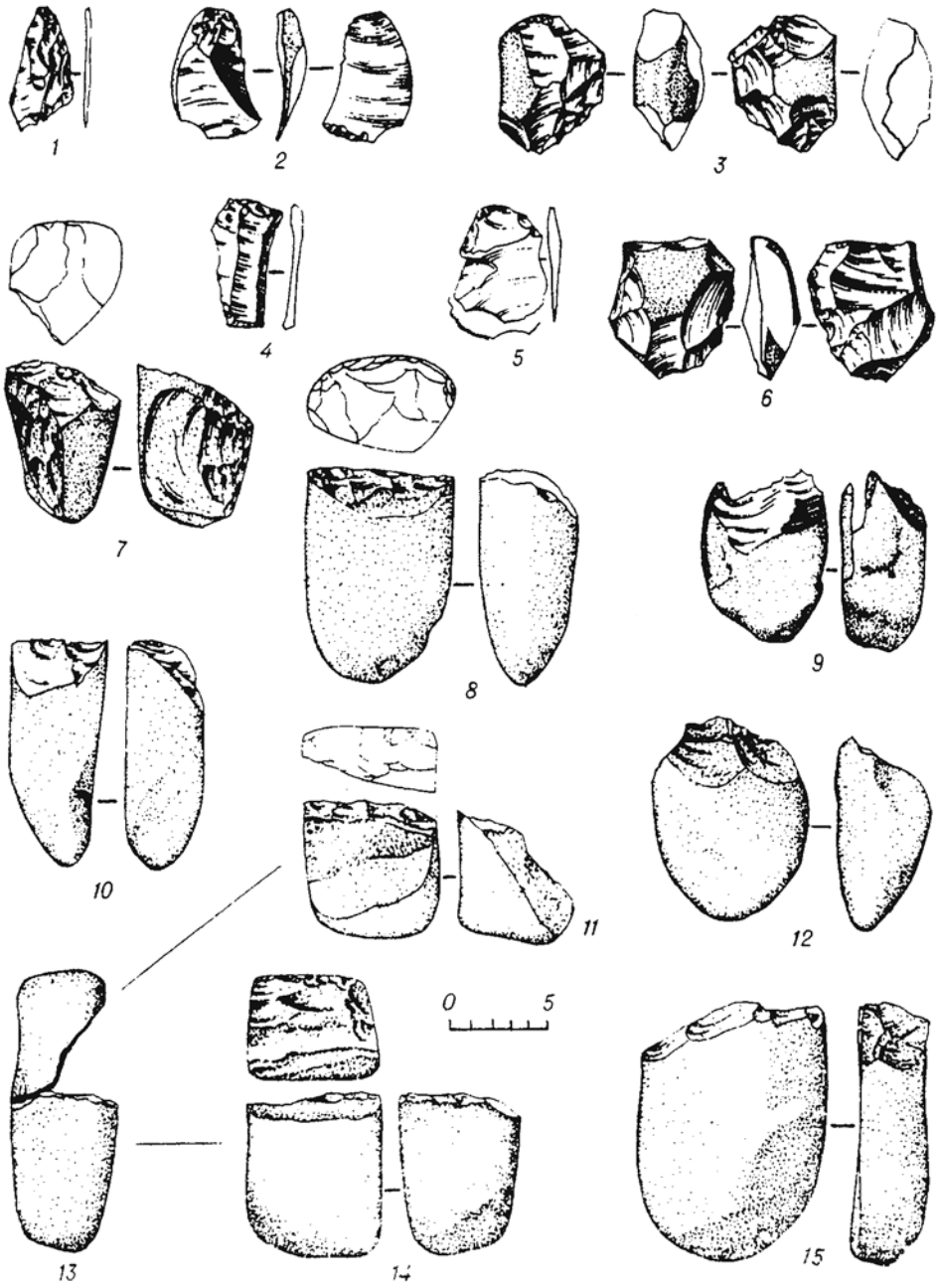


Plate 17. Ezhantsy site. Stone assemblage.

The second subtype contains four cores on which one lateral surface was worked completely by flat pressure retouch, while the second was entirely unworked (Pl. 15:11, 16, 17). On one core of this subtype one surface was not worked, while the second was worked partially along a lateral rib and base (Pl. 15:18). All the cores of this subtype were made from large flakes. The form of the artifacts is trapezoidal and subtriangular. Their longitudinal and transverse sections are subtriangular. The lateral ribs were sharpened. The triangular and subrectangular pressure platforms are slightly beveled toward the longitudinal axis of the artifacts. The subrectangular platform was completely worked by flat pressure

retouch, and the triangular one partially—only in the place of blade removal. Regular knifelike blades were removed from the end of the cores. One burin spall was removed from the base of each of two cores (Pl. 15:16, 17). The length of the cores is 2.6 to 3.5 cm, the height 3.7 to 4.1 cm. The dimensions of the subrectangular platform are 0.8 x 1.7 cm, of the triangular platforms 0.9 x 3.2 cm and 1.9 x 3.2 cm.

The third subtype is represented by one core made from a flake on which neither lateral surface had been worked. The form of the artifact is subsegmentlike. The base and back edge are sharpened. The triangular pressure platform was not trimmed by retouch. Regular knifelike blades were removed from the end of the core. The length of the core is 2.3 cm, the height 2.9 cm, the dimensions of the platform 0.8 x 1.0 cm (Pl. 15:6).

Upon examining the wedge-shaped cores from the Ezhantsy site, one notices that the flattest and smallest of them are very similar by their technical-typological indexes to multifaceted dihedral and lateral burins. A multifaceted burin could be one of the prototypes of the simplest wedge-shaped cores with a narrow pressure platform. Keel-shaped or boat-shaped scrapers (scrapers with a high back) also could be prototypes of the wedge-shaped cores with wide oval platforms (so-called keel-shaped or boat-shaped cores), similar to the specimen from Horizon C of the Ust' Mil' II site. These observations, from our point of view, may be very important in explaining the genesis of various Upper Paleolithic cultures for which wedge-shaped cores were characteristic from an early period.

In addition to cores, the Ezhantsy site is characterized by varied and rather numerous stone tools, represented by burins (21 specimens), knives (4 specimens), scrapers (3 specimens), skreblo (1 specimen), and punch (1 specimen).

Burins make up the largest group of tools. Flakes and blades of flint and hornfels served as materials for making them. The burins can be typologically separated into angle (7 specimens), lateral (6 specimens), dihedral (4 specimens), and transverse (4 specimens).

The angle burins were made on a blade (1 specimen), ski-shaped spalls (3 specimens), and flakes (4 specimens). The working edge of the angle burin on a blade was formed by the removal of a burinating microspall, 0.2 cm long and 0.2 cm wide, directed at an acute angle to the plane of the break at the top of the blade. The length of the tool is 1.9 cm, the width 0.7 cm (Pl. 16:2).

The burins on ski-shaped spalls are similar to the burins on blades. The length of the burins is 4.8 to 6.3 cm, the width 0.9 to 1.3 cm, the length of the burin spall scars 1.1 to 2.1 cm, the width 0.4 cm (Pl. 16:5, 6). Among them is a double angle burin on a ski-shaped spall on which the working edges are at the lower left and the upper right corners of the tool. Its length is 4.0 cm, width 1.5 cm, length of the burin spall scars 0.3 and 0.7 cm, width 0.15 and 0.3 cm.

The working edges of the angle burins on flakes were formed by the removal of burin spalls directed at an acute angle to the plane of the break of the flake. The working edge of one burin was formed by the removal of two burin spalls, one of which was on the longitudinal plane of the flake and the second on the transverse plane (Pl. 16:10). The length of the burins is 2.1 to 3.6 cm, the width 1.8 to 2.9 cm, the length of the burin spall scars 0.8 to 3.6 cm, the width 0.3 to 0.6 cm (Pl. 16:14).

The lateral burins were made on a ski-shaped spall (1 specimen) and flakes (5 specimens).

The working edge of the burin on a ski-shaped spall was formed by the removal of a short burin spall 0.47 cm long and 0.2 cm wide, directed at an acute angle to the retouched plane of the bottom of the ski-shaped spall. The length of the burin is 5.1 cm, the width 1.3 cm (Pl. 15:10).

The working edges of the lateral burins on flakes were formed by the removal of burin spalls 4.0 to 5.1 cm long and 0.6 to 0.7 cm wide, directed at an acute or right angle to the retouched plane of the flake. The length of the tools is 4.1 to 5.2 cm, the width 3.8 to 4.0 cm (Pl. 16:11, 20, 22). Among these artifacts is a double lateral burin on a flat flake. The longitudinal edges of the tool were worked by steep retouch,

along the right edge directed from ventral to dorsal, and along the left edge from dorsal to ventral. The working edges of the tool were formed by the diagonal removal of burin spalls from the upper and lower transverse planes of the tool. The length of the burin is 5.3 cm, the width 5.2 cm, the length of the spall scars 2.1 to 4.8 cm, the width 0.4 to 0.6 cm (Pl. 16:23).

The dihedral burins were made on flakes (3 specimens) and a piece of a biface (1 specimen). They all have a rather consistent subtriangular form. The working edges were formed by the removal of two (2 specimens) and three (1 specimen) burin spalls running at an acute angle to the middle part of the tools. The length of the burin spall scars is 0.4 to 4.4 cm, the width 0.3 to 0.6 cm. The convexly arced bases of the burins were worked by edge retouch and formed the working edges of scrapers (Pl. 16:18). The whole back of one of the dihedral burins was worked by the removal of radially directed spalls of flat retouch, and the base by edge retouch directed from dorsal to ventral. This burin was probably used also as a chisel (Pl. 16:19). The length of the burins is 4.2 to 4.4 cm, the width 3.4 to 3.7 cm.

A multifaceted dihedral burin was made on a large flake. The burin's broad working edge was formed by the removal of six burin spalls running at an acute angle to each other. The convexly arced base of the tool was worked by steep retouch directed from ventral to dorsal. It was used as the working edge of a scraper, which is attested by the polish of the edge. The length of the tool is 5.6 cm, the width 4.9 cm, the length of the burin spall scars 1.0 to 2.6 cm, their width 0.2 to 0.8 cm, the width of the working edge of the scraper 3.2 cm (Pl. 16:25).

A dihedral burin on a piece of a biface has a subtriangular form and ovally convex base. The working edge was formed by the removal of two burin spalls running at an acute angle to each other in the middle of the tool. Both broad surfaces were worked by flat pressure retouch. The length of the burin is 6.6 cm, the width of the base 4.6 cm, the length of the burin spall scars 2.1 and 3.9 cm, their width 0.9 and 1.0 cm (Pl. 15:19).

The transverse burins were made on lamellar flakes (4 specimens). A tool on a small lamellar flake has a working edge formed by the removal of three parallel burin spalls directed at an acute angle to the longitudinal lateral edge. The length of the burin is 2.2 cm, the width 0.9 cm, the length of the burin spall scars 0.6 to 0.7 cm, their width 0.1 to 0.2 cm (Pl. 16:4).

The working edges of the transverse burins on large lamellar flakes were formed by the removal of diagonal burin spalls from the transverse plane of the tools and directed at an acute angle to the longitudinal edges (Pl. 16:21, 24). The working edge of one burin was formed by the removal of two burin spalls: diagonal spalls that were short and straight. Beyond the short burin spall scar, the edge of the tool was worked by steep retouch directed from ventral to dorsal. This tool was probably initially a lateral burin and, after wear on the blade, was trimmed by the removal of an additional burin spall (Pl. 16:17). The length of the transverse burins on flakes is 4.0 to 6.1 cm, the width 2.8 to 3.6 cm, the length of the burin spall scars 2.3 to 3.5 cm, their width 0.2 to 0.6 cm.

Scrapers were made on flakes of flint and hornfels. Based on the arrangement of the working edge, they were separated into end (2 specimens) and side (1 specimen) scrapers. The working edges of both end scrapers are convexly arced and the back high. They were worked by edge pressure retouch directed from ventral to dorsal. The retouch on one scraper comes to the edge of the tool in some places. The length of the scrapers is 3.4 to 5.4 cm, the width of the working edge 2.9 to 3.6 cm (Pl. 16:12, 16). The side scraper has an arc-shaped indented working edge worked by steep retouch directed from ventral to dorsal. Next to the working edge of the scraper, the short straight edge of the tool was worked by the smallest retouch directed from dorsal to ventral. The length of the tool is 4.7 cm, the width 3.5 cm, the length of the working edge of the scraper 2.0 cm, of the knife 1.1 cm (Pl. 16:15).

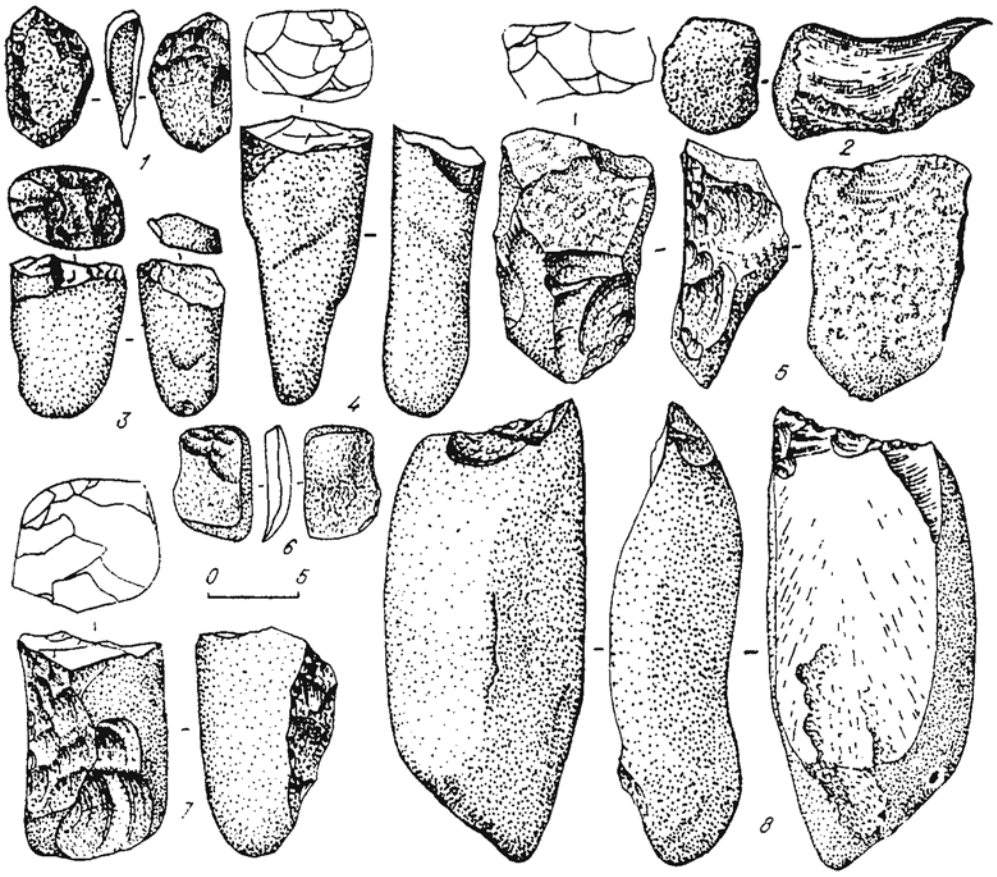


Plate 18. Ezhantsy site. Stone and bone assemblage.

Knives are represented by pieces (3 specimens) and a whole tool (1 specimen). The form of two pieces of the tools could not be established since only part of the cutting edges, worked by edge retouch directed from ventral to dorsal, was preserved (Pl. 16:9). A knife of subrectangular form with a convexly arced working edge was made on a flat primary flake of hornfels. The working edge was worked by unifacial retouch, directed from dorsal to ventral, that partially comes to the broad surface of the tool. The length of the knife is 7.4 cm, the width 6.9 cm.

A piece of a biface knife of black flint is of special interest. It was found in two pieces during excavations in 1970 and 1971. The tool was broken in antiquity. One fragment was reworked into a dihedral burin, described above. The tool was initially an oval knife (Pl. 15:20, 21). Both broad surfaces were worked by flat pressure retouch, while the edge was trimmed by secondary retouch. The longitudinal and transverse sections of the tool are almond-shaped. The width of the knife is 8.1 cm, its length was about 9.5 cm.

The skreblo was made from a flat, oval hornfels cobble. Its working edge, having a characteristic extended “beak,” was worked by unifacial flat retouch, while the edge was trimmed by small secondary retouch directed from ventral to dorsal. The length of the skreblo is 6.4 cm, the width 4.3 cm (Pl. 16:26).

The punch was made on a flint blade 2.6 cm long and 0.8 cm wide. Its point was worked by unifacial edge retouch directed from ventral to dorsal (Pl. 16:1).

A tool of red deer (?) antler also was found at the site. One transverse plane of the artifact reveals dents made by hammering, which attests to its use as a mallet (Pl. 18:2).

The Ezhantsy site is today the earliest Paleolithic site in Northeast Asia containing a well defined cultural complex. Judging by the stratigraphic data, its age is approximately 35,000 years. The cultural complex of the site is rather distinctive compared with other Paleolithic sites of Northeast Asia. This is especially emphasized by the large variety of burins that make up 70% of all tools. The find of a bifacially worked oval flint knife in the Ezhantsy site is exceptionally important for clarification of the genesis of the Dyuktai culture, the knife being analogous by its technical-typological characteristics to bifacially worked oval flint knives from Dyuktai Cave.

The Verkhne Troitskaya Site

The Verkhne Troitskaya site was discovered in August 1969 during work of the PAE on the right bank of the Aldan, 851 km from its mouth. The site was confined to deposits of Terrace II above the floodplain, the elevation of which reaches 12 to 13 m in the middle part, while toward the outer (eroded and sliding) point it is reduced to 9 to 10 m. During the process of excavation the following stratigraphy of the site was revealed (Fig. 13):

1. Sod (Layer 1 in Figure 13). The thickness is 30 to 40 cm.
2. A horizontally-laminated parcel consisting of interlayers of humic dark-brown sandy loam 1 to 4 cm thick and yellowish-brownish silt 0.5 to 2.0 cm thick (Layer 2 in Figure 13). These deposits lie only on the slipping part of the terrace, on its outer point. Their thickness fluctuates from 10 to 75 cm. Isolated Neolithic cultural remains were recorded in the lower part of this parcel. The superimposed alluvium of the floodplain facies of the high floodplain is represented as sandy-silty deposits and is probably analogous to Layer 3b of Dyuktai Cave. Its accumulation began on the eroded surface of Terrace II no earlier than 6,000 years ago.
3. Dark-gray humic loam (Layer 3 in Figure 13). Its thickness in different areas fluctuates from 20 to 40 cm. Thin (0.1 to 0.3 cm) lenses of grayish-yellowish inequigranular sand are encountered in the loam. The loams contain rather numerous (87 specimens) diabase flakes. The genesis of this parcel is not entirely clear. It possibly represents the buried soil of Terrace II, eroded and reworked by solifluction processes, that is analogous to Layer 5 at Dyuktai Cave.
4. A horizontally-laminated parcel consisting of interlayers of grayish-brownish sandy loam 0.5 to 3.0 cm thick and yellowish-brownish small-grained sands 0.2 to 3.0 cm thick (Layer 4 in Figure 13). The total thickness of the parcel is 1.8 to 2.0 m. The lower part of the deposits in many places is pierced by buried ice veins 35 to 45 cm wide and 60 to 70 cm high. This parcel represents the alluvium of the floodplain facies of Terrace II. Isolated bones of mammoth, bison, and horse are encountered in it here and there.
5. A horizontally-laminated parcel consisting of interlayers of grayish-violet silt 0.5 to 3.0 cm thick and grayish-brownish inequigranular sands 0.5 to 5.0 cm thick (Layer 5 in Figure 13). Its thickness is 0.8 to 1.0 m. The parcel changes in structure and hue from those layers lying above to those below. Isolated bones of mammoth and bison were encountered in it. The silty interlayers contained plant remains.
6. A horizontally-laminated parcel consisting of interlayers of grayish-violet silt 0.5 to 3.0 cm thick, loams (the number of interlayers increasing downward) 1 to 4 cm thick, and grayish-brownish inequigranular sands 0.3 to 5.0 cm thick (Layer 6 in Figure 13). Isolated pieces and lenses of gravel are encountered in some interlayers of sand and loam, the number of which increases toward the bottom of the parcel. The interlayers of silt and loam were enriched with plant remains. The total

thickness of the parcel is 1.6 to 1.8 m. Its deposits represent the lower part of the alluvium of the floodplain facies of Terrace II. The upper part of the deposits in most places is penetrated by buried ice veins 40 to 55 cm wide and 75 to 80 cm high. Four radiocarbon dates were obtained on samples of wood taken from depths of 12, 31, 56, and 84 cm from the mantle of the parcel: 14,530 ± 160 BP (LE-864); 15,950 ± 250 BP (GIN-626); 17,680 ± 250 BP (LE-906); 18,300 ± 180 BP (LE-905). Isolated bones of mammoth, woolly rhinoceros, bison, horse, and reindeer were noted at all depths in the deposits of this parcel. In addition to the faunal remains found in the loams and silts, from the bottom of the parcel (that is, from the contact with the fluvial alluvium) to the interlayers lying 5 cm above this (from which the sample LE-905 was taken), were hand-worked stone items and a bone needle. They are confined to six interlayers of loams and silts, the upper and lower of which are separated from each other by 80 to 90 cm. Because of the small amount and homogeneity of the materials from the different interlayers, they are all presently combined in one Paleolithic cultural layer of the Verkhne Troitskaya site.

7. Pebbles and gravel cemented by light-gray inequigranular sand (Layer 7 in Figure 13). The control trench runs through the parcel at 1 m, but judging from the denuded area of the terrace, it goes below the waterline of the Aldan. This parcel represents the fluvial alluvium of Terrace II. In the upper part of the 50 to 80 cm thick parcel isolated interlayers of grayish-brownish loam and gray silt 0.5 to 2.0 cm thick lie between

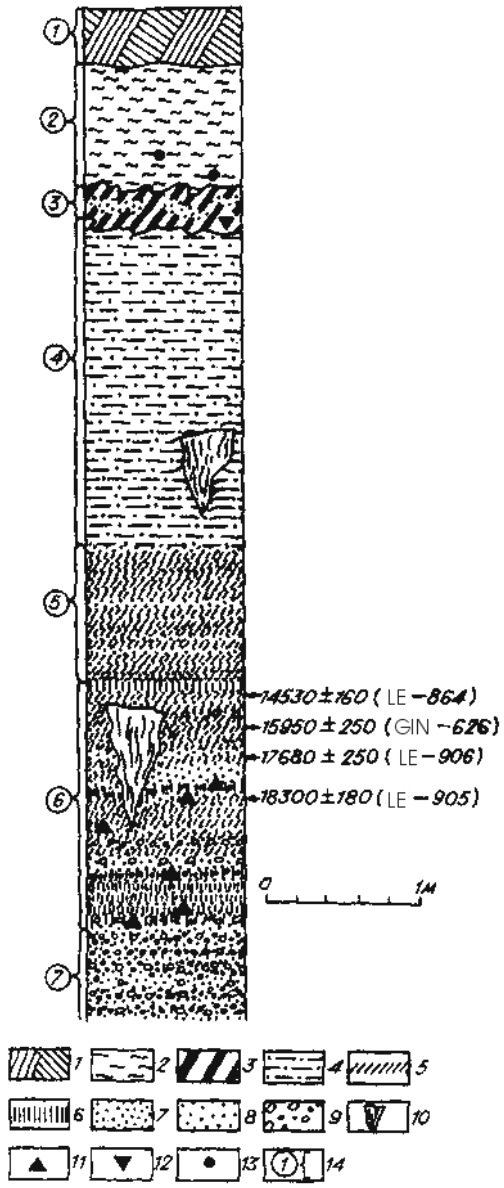


Figure 13. Stratigraphic profile of the Verkhne Troitskaya site. 1) sod; 2) horizontally laminated sandy loam; 3) humic loam with traces of solifluction; 4) horizontally laminated sandy loams and sands; 5) some interlayers of silty aleurites; 6) some interlayers of silt; 7) small-grained sands; 8) inequigranular sands; 9) pebbles and gravels; 10) ice veins; 11) upper Pleistocene Paleolithic artifacts; 12) early Holocene Paleolithic artifacts; 13) Neolithic artifacts; 14) number and boundary of the geological layer.

the pebbles. They accumulated possibly on an episodically dry cover of fluvial alluvium. Judging by the radiocarbon dates obtained on samples from deposits in Terraces II and III, the cut of the Aldan, with which the end of accumulation of fluvial alluvium and the start of accumulation of floodplain alluvium of Terrace II in the region of the Verkhne Troitskaya site are connected, took place at the end of Lipovsk-Novoselovsk stage of the Karginsk Interglacial, that is, approximately 23,000 to 22,000 years ago (Kind 1974).

At present, the Verkhne Troitskaya site has been subjected to intensive damage because of lateral erosion of the Aldan and the thawing of emerging ice veins. The damage has been going on for a long time. Below the site is a rather level sand-pebble towpath about 50 m wide. During low water level, when the surface of the towpath is bared, it was almost all—prior to the beginning of PAE work—covered by a large quantity of bones of mammoth, woolly rhinoceros, bison, horse, and other animals, as well as numerous hand-worked stone items. This was the picture that we observed for the first time on 14 August 1969. The stripping of the denuded area of the terrace indicated that the layers contained significantly fewer artifacts than the towpath. Evidently, only the outlying parts of the site were preserved within the terrace, while its primary part, which was apparently located in the place of the modern towpath, has irrevocably perished.

During work of the PAE, a total of 52 stone items, 1 bone artifact, and 49 flaked animal bones were found in the Paleolithic cultural layer.

The animal bones consisted of bison (23 specimens), horse (9 specimens), mammoth (8 specimens), woolly rhinoceros (3 specimens), reindeer (2 specimens), wolf (1 specimen), and unidentified bones (3 specimens).

The stone objects are represented by flint flakes (34 specimens), flint blades (5 specimens), wedge-shaped cores (2 specimens), and tools (11 specimens).

The flint flakes are divided into medium sized (27 specimens) and small (7 specimens). Partial edge retouch can be traced on 8 medium flakes. They were probably used as chopping tools.

All of the blades except one are broken. The whole blade is 5.2 cm long and 1.2 cm wide. The width of the broken blades is 1.4 to 1.9 cm. The exception is a piece of a microblade 0.35 cm wide.

The wedge-shaped cores have a triangular and subrectangular form. The longitudinal and transverse sections of one core are triangular, the base sharpened. Both broad surfaces were worked by flat retouch. The pressure platform is diagonally beveled and its bottom is joined to the base. The artifact lacks a lateral rib. The surface of the pressure platform was not worked by retouch. Narrow regular blades were removed from the end. The height of the end is 2.15 cm, the length of the core 2.5 cm, the dimensions of the platform 1.3 x 3.2 cm (Pl. 19:9).

The transverse section of the second wedge-shaped core is triangular. The base is sharpened, while on a lateral rib is a flat area covered with cobble cortex. The pressure platform is subrectangular. It is partially worked by retouch and set at a right angle to the end of the tool. Small regular microblades were removed from the core. One lateral side of the core was worked by retouch. The height of the core is 2.1 cm, the length 2.4 cm, the dimensions of the platform 1.0 x 2.2 cm (Pl 19:10).

The stone tools are represented by an inset blade (1 specimen), burins (2 specimens), knives (3 specimens), scrapers (2 specimens), skreblo (1 specimen), a chisel (1 specimen), and a baton (1 specimen).

The inset blade was made on the midsection of a lamellar flint blade. Its longitudinal edges were partially worked by small edge retouch directed from dorsal to ventral. The length of the tool is 2.35 cm, the width 0.9 cm (Pl. 19:2).

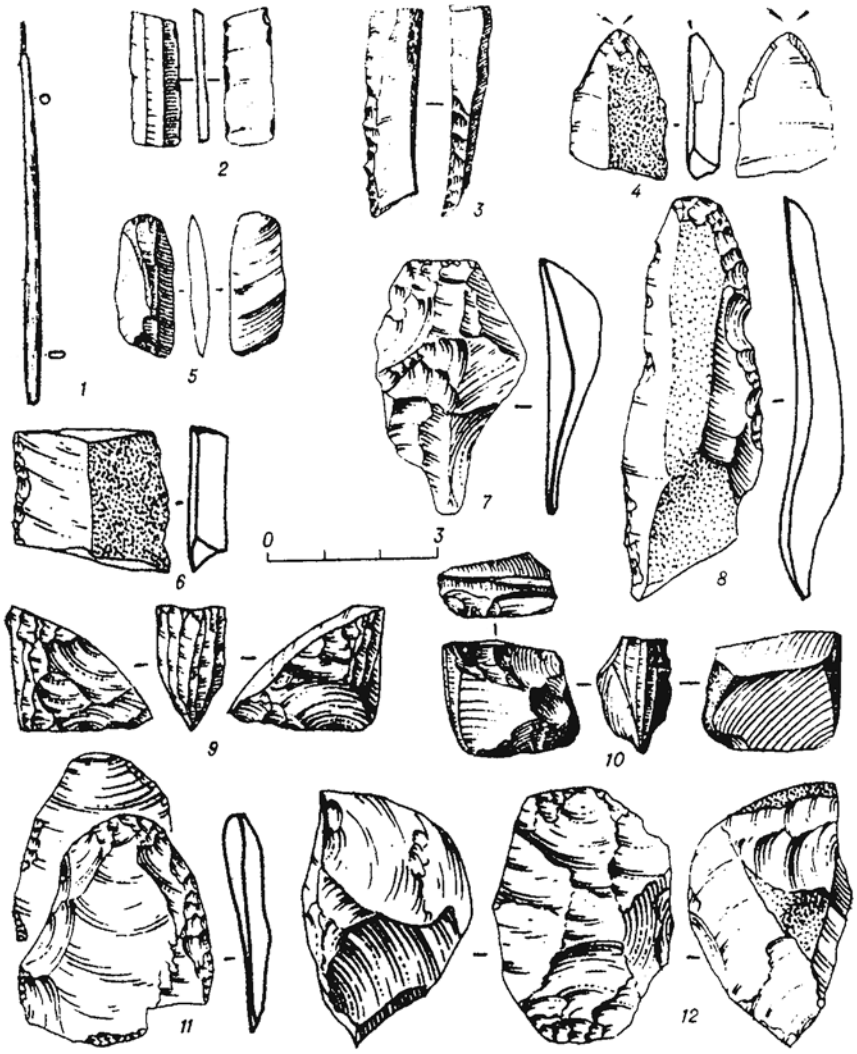


Plate 19. Verkhne Troitskaya site. Stone and bone assemblage of the Paleolithic cultural layer.

The burins are dihedral (1 specimen) and lateral (1 specimen). The dihedral burin has a triangular form. It was made on a piece of primary blade of black flint. The working edge was formed by the removal of two burin spalls that run at an acute angle to the upper part of the tool. The length of the burin is 2.35 cm, the width of the base is 1.6 cm, the length of the burin spall scars 1.25 and 1.4 cm, the width of the spall scars 0.2 and 0.3 cm (Pl. 19:4).

The dihedral burin was made on a large subtriangular flake black flint. The working edge was formed by the removal of a burin spall 0.7 cm long and 0.2 cm wide, directed at an acute angle to the retouched lower transverse edge of the flake. The length of the tool is 3.3 cm, the width 1.9 cm.

A flint ski-shaped spall (1 specimen), a flint blade (1 specimen), and a flint flake (1 specimen) were used for making the knives.

The knife on a ski-shaped spall has a convexly arced working edge located on the longitudinal side of the tool. It was worked by steep pressure retouch directed from ventral to dorsal. Below the retouched

area, the edge of the working edge was quite polished, which attests to the use of the knife also as a scraper. The length of the tool is 3.7 cm, the width 1.0 cm (Pl. 19:3).

The knife on the broad primary blade of green flint is broken. Only its middle part was preserved. The working edge of the tool was worked by small pressure retouch directed from ventral to dorsal. The length of the piece is 2.4 cm, the width 2.8 cm (Pl. 19:6).

The knife on the flat flake of black banded flint is partially broken. The working edge is located on the convexly arced longitudinal side of the tool. It was worked by small edge retouch directed from ventral to dorsal. The length of the knife is 4.1 cm, the width 3.4 cm (Pl. 19:11).

Both end scrapers were made on blades of black flint. The convexly arced working edges of the tools were worked by steep retouch directed from ventral to dorsal. The scraper on the longer blade also had the longitudinal edges worked by edge retouch, directed from ventral to dorsal, one of which served as the working edge of a knife. The length of the tools is 2.6 and 7.2 cm, the width of the working edges 0.8 and 1.2 cm, the width of the bases 1.1 and 2.3 cm (Pl. 19:5, 8).

The skreblo was made on a subtriangular piece of a slab of grayish-pink flint. The straight working edge of the tool was worked by edge retouch directed from ventral to dorsal. The length of the skreblo is 3.8 cm, the width 3.5 cm.

A lamellar flake of black banded flint was used for making the chisel. The concavely-arced working edge is located on the transverse edge of the flake. It was worked by retouch directed from ventral to dorsal. Retouch also was applied in part from dorsal to ventral. The length of the tool is 4.4 cm, the width of the middle part 2.6 cm, the width of the working edge 1.2 cm (Pl. 19:7).

A piece of an oval diabase cobble 9.5 cm long and 5.0 cm wide was used as a baton. The edge of the tool, covered with cobble cortex, has traces of repeated dots from blows.

The bone needle has the form of a rod, is rounded, with a point on the upper part and subrectangular at the base. Its surface is well ground and polished. Deep concentric notches can be traced on its tip. The length of the needle is 6.6 cm, the diameter of its cross section in the upper part 0.2 cm, the width of the base 0.3 cm, the thickness of the base 0.2 cm (Pl. 19:1).

As already noted, a substantial number of artifacts and animal bones were in the towpath near the site. A total of 1,202 bones of various mammals, 874 stone items (of them 134 tools and cores), and 41 fragments of ceramics was found here.

The animal bones were confined to horse (202 specimens), bison (201 specimens), woolly rhinoceros (60 specimens), mammoth (46 specimens), moose (42 specimens), reindeer (25 specimens), tiger (3 specimens), and wolf (2 specimens). The remaining, very shattered, bones could not be identified.

The ceramics belong to various stages of the Neolithic, as well as to the Bronze and Iron Ages. The most important of the stone items for characterizing the Paleolithic site were tools and cores, since the flakes, blades, and split cobbles in most cases are dated very broadly—from the Neolithic to the early Iron Age. The tools and cores (a total of 134 specimens) can be separated by their technical-typological characteristics into 78 artifacts, which have no analogies in any Holocene cultural complex and can be compared only with Pleistocene materials of the Aldan and other regions. Unfortunately, the majority of them presently have no analogies in the very poor Paleolithic layer of the Verkhne Troitskaya site, but several indirect factors attest that they originate precisely from this layer.

First, in spite of the large volume of work, not one Paleolithic artifact was found in any Pleistocene interlayer lying above the cultural layer (if isolated objects that were thrust downward from the Holocene deposits through the frost cracks are not considered).

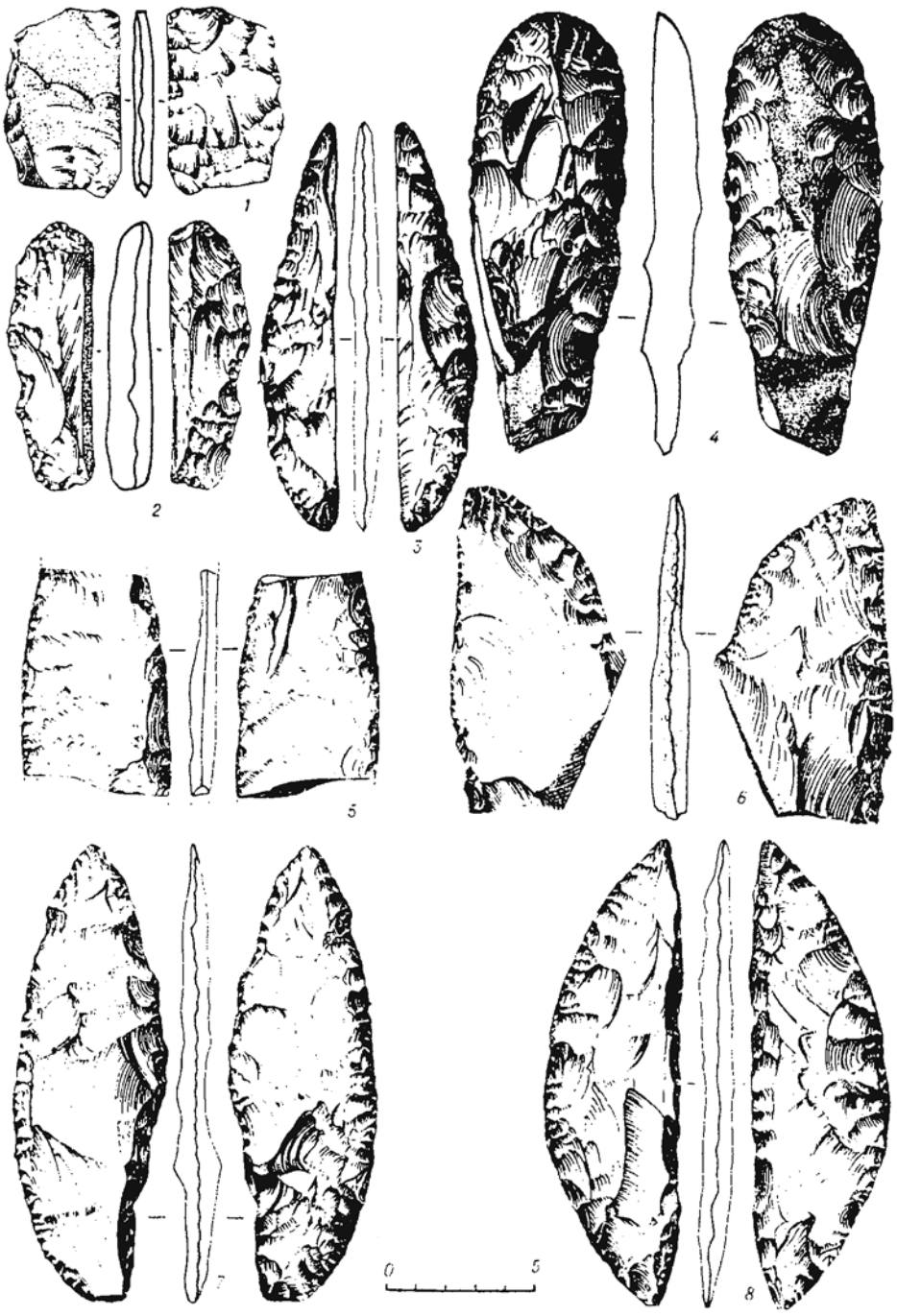


Plate 20. Verkhne Troitskaya site. Stone assemblage.

Second, the majority of objects that we assigned to the Paleolithic have no complete analogies in their technical-typological features with materials from Dyuktai Cave that are confined to the upper part of the alluvial deposits of Terrace II of the Aldan, which have an age of 16,000 to 12,000 years. The Verkhne Troitskaya artifacts (especially the bifaces) differ in most cases by the cruder work (even though they are finished tools, and not blanks) from the forms close to them from Dyuktai Cave. For example, we can compare the Verkhne Troitskaya laurel-leaf biface knife blade (Pl. 20:7) with the willow-leaf biface knife

blade from Dyuktai Cave (Pl. 7:7). The latter differs by being more perfectly worked. Though we take into account how precarious is the purely typological basis for determining the age of finds, this observation is *one of the indexes* (isolated by me—Yu. M.) for assigning parts of the surface material to the lower parcel of the alluvium of Terrace II, which has an age earlier than 18,000 years.

And, finally, some Verkhne Troitskaya cores are analogous to materials from Paleolithic sites confined to the alluvium of Terrace III of the Aldan, earlier than Terrace II. This is graphically seen in a comparison of the Verkhne Troitskaya "Gobi" wedge-shaped core (Pl. 21a:2) with the Ikhine "Gobi" wedge-shaped core (Pl. 11:8).

All of these observations together compel us to combine the Paleolithic surface finds with artifacts from this layer in one Verkhne Troitskaya Paleolithic cultural complex. Future fieldwork will show how correct this observation is.

At present 20 cores, 58 tools, and 4 ski-shaped spalls from the surface material, which are not encountered in Holocene deposits, can be assigned to a Paleolithic complex.

The cores are represented by three types: tortoise-shell (1 specimen), subprismatic (10 specimens), and wedge-shaped (9 specimens).

The tortoise-shell core is in the blank stage. It was made from a cobble of black flint. The form of the core is oval. A flat side of the artifact was completely worked by retouch, while the convex side was partially worked by the radial removal of spalls. The unworked surface was covered with cobble cortex. The length of the core is 5.2 cm, the width 4.7 cm.

The subprismatic cores were made from small flint cobbles (3 specimens) and rather large diabase cobbles (7 specimens). The first flint core (Pl. 19:12) has two striking platforms and is strongly beveled in relation to the longitudinal axis of the artifact. The side of the artifact, from which short irregular blades were removed, is flat, while the opposite side is convexly arced. It is completely worked by the removal of radially-directed spalls. The length of the core is 4.5 cm, the width 3.0 cm.

The second flint core (Pl. 21a:3) also has two strongly beveled striking platforms, worked by the removal of small spalls. It is rather close in form to the first core. The difference is in the fact that on its convexly arced side—the side opposite the working side—the cobble cortex is almost completely preserved, and therefore, short irregular blades were removed from only one platform. The length of the core is 5.0 cm, the width 4.3 cm.

The third flint core (Pl. 21a:5) has a rounded form. Blades were removed from the flat surface of the artifact. Its convex opposite side was worked by the radial removal of spalls. The length and width of the core is 5.3 cm, the thickness 3.3 cm.

The subprismatic diabase cores were made from large oval cobbles. Their length is 10 to 12 cm, the width 8 to 10 cm. Almost all the cores are in the blank stage. They had one or several spalls removed from only one platform, and in most cases the one platform beveled with regard to the longitudinal axis of the artifact. The edge of the platform of one core was trimmed by the removal of small spalls. This core was probably used as a large skreblo (Pl. 21a:8).

Large lamellar flakes were removed from only one core (Pl. 21a:10). The form of the core is subrectangular. Its striking platform was almost completely worked and the base and one end were sharpened by the removal of large spalls. The length of the core is 11.7 cm, the width 9.7 cm, the dimensions of the striking platform 6.3 x 7.4 cm.

The wedge-shaped cores are represented by blanks (2 specimens), fragments (2 specimens), and whole finished artifacts (5 specimens). They were made of black, green, and red flint. The blanks for the wedge-shaped cores were flint slabs that had their sharpened bases partially worked by retouch and had pressure platforms formed.

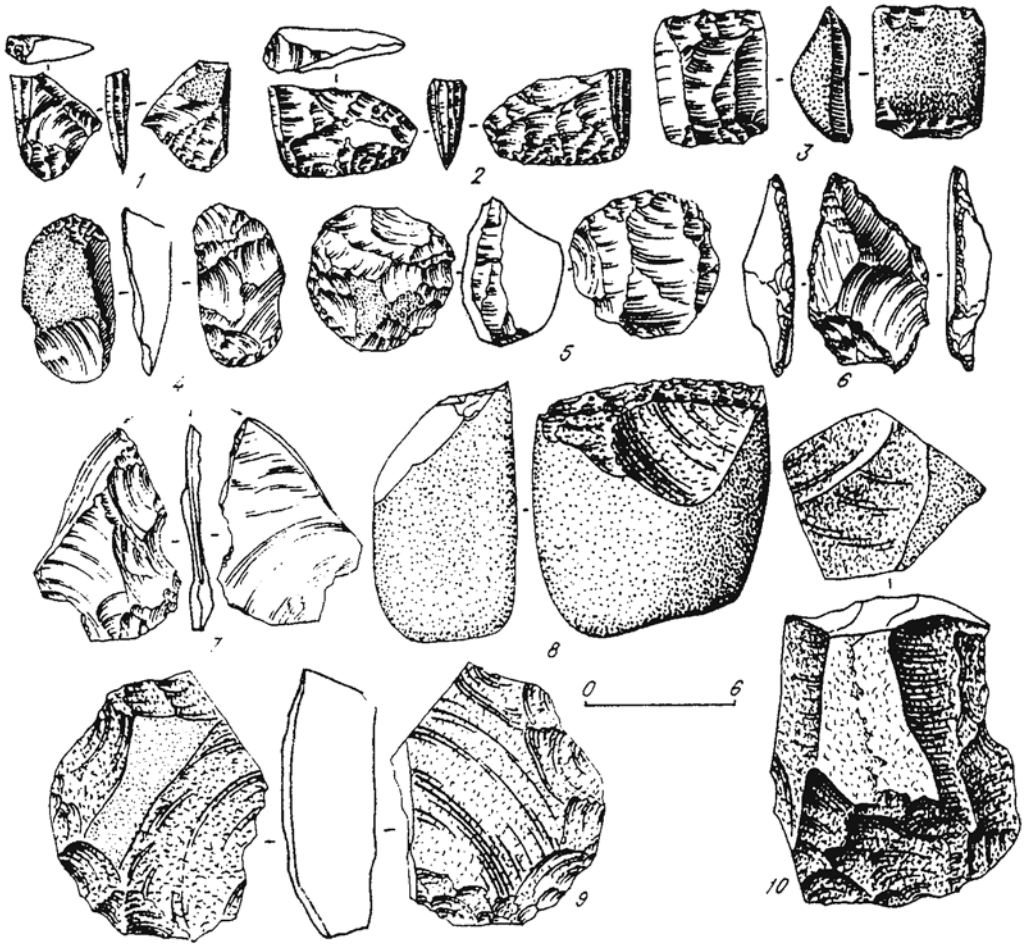


Plate 21a. Verkhne Troitskaya site. Stone assemblage.

The whole artifacts include two specimens of elongated “Gobi” cores and three specimens of high wedge-shaped cores. The “Gobi” cores have a boat-shaped form. Their longitudinal and transverse sections are triangular. Both broad surfaces were worked by flat retouch, and the bases and lateral ribs were sharpened and trimmed by secondary retouch. The triangular pressure platforms were beveled and worked by retouch. Thin regular blades were removed from the end. The height of the end part of the cores is 1.6 to 3.3 cm, the length 4.2 to 5.8 cm, the dimensions of the platforms 1.2 x 4.1 cm to 1.5 x 3.4 cm (Pl. 21a:2).

The high wedge-shaped cores have a triangular form. Their longitudinal and transverse sections are triangular. The base and lateral rib were sharpened. Both broad surfaces were worked by retouch. The triangular pressure platforms were beveled and partially worked by retouch on the part adjoining the end. Thin regular blades were removed from the end. The height of the cores is 3.9 to 4.5 cm, the length 3.4 to 3.6 cm, the average dimensions of the platforms 1.2 x 3.7 cm (Pl. 21a:1).

The stone tools include knives (30 specimens), scrapers (11 specimens), skreblos (12 specimens), burins (4 specimens), and a pointed tool (1 specimen).

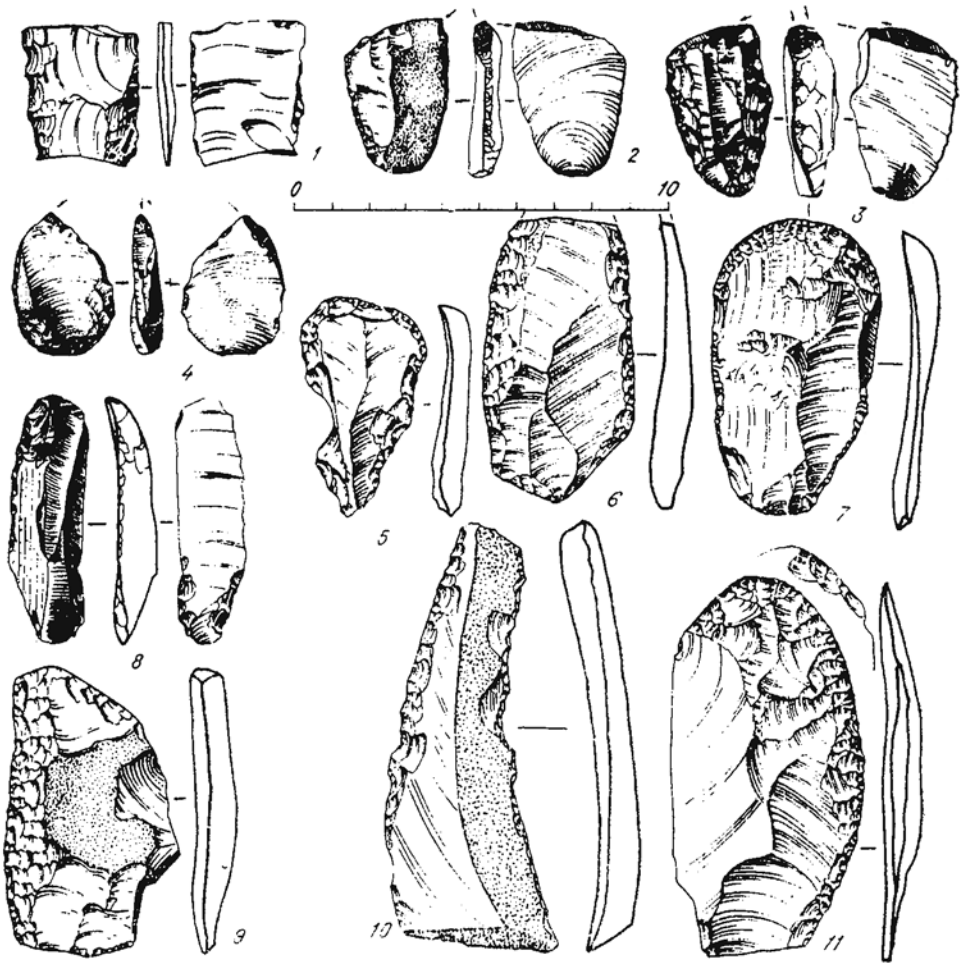


*Plate 21b.*Verkhne Troitskaya site. Stone assemblage.

Based on the form of the blank and the technique of work, the knives are subdivided into tools from flakes with a worked edge (11 specimens), tools from blades with worked edge (2 specimens), and bifacially worked biface tools (16 specimens). Five of the knives of the first group are broken and five are whole specimens. Lamellar flint flakes served as material for making them. The form of the knives is semilunar (4 specimens), segmentlike (2 specimens), and subtriangular (2 specimens). The forms of three knives, based only on pieces of their middle part, cannot be established (Pl. 21b:1). The knives of semilunar form are double-bladed. They include two whole specimens and two pieces. The knives have straight and convexly arced working edges that were worked by edge pressure retouch directed from ventral to dorsal. The length of the tools is 4.5 to 6.4 cm, the width 2.6 to 2.8 cm.

The working edge of the segmentlike knives is convexly arced, while the edge opposite the working edge is covered with cobble cortex. The working edge and areas of the back adjacent to the working edge were worked by retouch directed from the ventral. The ventral sides of the tools were also partially worked by edge retouch. The length of the knives is 7.4 and 9.9 cm, the width 4.1 and 5.1 cm (Pl. 21b:11).

One of the subrectangular knives is broken, the other is whole. The working edge and point on the whole knife were worked by edge retouch directed from ventral to dorsal. The length of the knives is 7.5 and 8.3 cm, the width of the bases 4.4 and 5.4 cm (Pl. 21b:6).

The knives of the second group are represented by fragments (2 specimens) and a whole tool (1 specimen). They were made on large broad flint flakes. The whole knife was made on a curved primary blade. The knives have two working edges. The knifelike blades were worked by edge retouch directed from ventral to dorsal. The length of the whole knife is 11.2 cm, the width 4.1 cm (Pl. 21b:10).

The bifacially worked knives (bifaces) are represented as whole tools (6 specimens) and pieces (10 specimens). Among the biface fragments not only are knives present but also evidently spear and dart points (Pl. 20:5). Unfortunately, the assignment of fragments of tools with broken points and bases cannot be reliably determined. All the bifaces were made of flint. By the unworked areas of some preserved tools, it was possible to identify the primary form of their blanks as flint slabs.

The whole biface knives are divided by form into three types: segmentlike (3 specimens), laurel-leaf (1 specimen), and subtriangular (2 specimens).

The segmentlike knives have ovally convex working edges and blunted longitudinal butts, which on two tools were covered with nodule cortex. On the third tool the butt was worked by blunting retouch. The longitudinal section of the knives is almond-shaped, the transverse section triangular. Both broad surfaces were worked by flat pressure retouch, and the working edges were secondarily trimmed by edge retouch. The length is 8.8 to 15.7 cm, the width 2.7 to 4.6 cm (Pl. 20:2, 3, 8).

The laurel-leaf knife is double-bladed. Both working edges are convexly arced. The longitudinal section of the knife is almond-shaped. The transverse section of the working part of the tool is almond-shaped, the base triangular. There is a small lateral groove on the base of the knife that is worked by blunting retouch. Both broad surfaces were worked by flat retouch, while the edges were trimmed by secondary retouch. The knife, judging by the work on the tip, also could have been used as a spear point. Its length is 15.3 cm, the width of the middle part 5.0 cm, the width of the base 3.1 cm (Pl. 20:7).

The subtriangular knives are also double-bladed. The lateral edge at the base is blunt. The transverse section of the working edge is almond-shaped, the base triangular. Both broad surfaces of one knife were worked by flat retouch, while the edges of the working edges were trimmed by secondary retouch. The edge of the base of the second knife is broken, the dorsal surface worked completely by retouch, and on the ventral surface the retouch is in areas adjoining the working edge (Pl. 20:6). The length of the knives is 8.7 to 10.8 cm, the width 4.4 to 5.8 cm. Lamellar flint flakes (9 specimens), a flint blade (1 specimen), and a flint slab (1 specimen) served as material for making the scrapers.

The end scrapers with ovally convex working edges were made on flakes. The form of the tools is oval, subrectangular, and subtriangular. The working edges and lateral sides of the tool were worked by edge pressure retouch directed from ventral to dorsal. The length of the scrapers fluctuates from 2.7 to 7.6 cm, the width of the working edges 1.7 to 4.1 cm (Pl. 21b:7). One tool, made on a crude primary flake, has the surface of the ventral side completely worked by flat retouch, while on the back only the working edge was trimmed by retouch (Pl. 21a:4). A scraper with a double working edge and subtriangular form has an ovally convex end working edge and an indented lateral working edge. The edge opposite the latter was used as the working edge of a knife (Pl. 21b:5).

The scraper on a blade has an ovally convex working edge on the end, worked by small edge retouch from ventral to dorsal. The left edge of the tool was trimmed by the same retouch. Its base was worked by retouch directed from dorsal to ventral. The length of the scraper is 6.5 cm, the width of the working edge 1.3 cm, the width of the middle part 1.9 cm (Pl. 21b:8).

A bifacially worked end scraper with an ovally convex working edge was made on a flint slab. The working edge was secondarily trimmed by edge pressure retouch directed from ventral to dorsal. The

transverse section of the working edge of the tool is segmentlike, the middle part almond-shaped. The length of the scraper is 15.0 cm, the width of the working edge 4.0 cm, the width of the base 3.0 cm (Pl. 20:4).

Large flint flakes (2 specimens), as well as diabase fragments and large diabase flakes (10 specimens) were used for making skreblos. The skreblos on flint flakes have an oval and a segmentlike form. The oval skreblo has four working edges: two ovally convex end working edges and two lateral indented working edges. The end working edges and one of the lateral ones were worked by edge retouch directed from ventral to dorsal. The second lateral working edge was trimmed by edge retouch directed from dorsal to ventral. The length of the skreblo is 6.8 cm, the width 5.7 cm. The segmentlike skreblo has an end working edge. Its ovally convex working edge was worked by edge retouch directed from ventral to dorsal. The dorsal side is covered with cobble cortex. The lateral side of the tool, opposite the working edge, was used as a pressure flaker. The length of the skreblo is 4.8 cm, the width of the working edge 5.7 cm.

The diabase skreblos, made on fragments and flakes, have oval, segmentlike, subrectangular, and subtriangular forms. As a rule, the working edges of the tools are lateral, but some specimens have additional end working edges that are more poorly expressed than the lateral ones. The working edges were worked by unifacial retouch, partially reaching the broad surface of the back of the tool. The working edge of one skreblo was worked by bifacial retouch (Pl. 21a:9). The collection contains a skreblo with a working edge worked by stepped retouch directed from ventral to dorsal. The length of the skreblos is 6.0 to 14.8 cm, the width 5.0 to 10.5 cm.

All the burins were made on flat flint flakes, and are represented by two types: an angle burin (1 specimen) and transverse burins (4 specimens).

The working edge of the angle burin was formed by the removal of a burin spall 6.5 cm long and 0.4 cm wide directed at an acute angle to the longitudinal axis of the flake. The length of the burin is 8.0 cm, the width 4.9 cm (Pl. 21a:7).

The transverse burins have a truncated-oval form (2 specimens) and a leaf-shaped form (1 specimen). The lateral edges and bases of the truncated-oval burins were worked by retouch directed from ventral to dorsal. The working edges were formed by the diagonal removal of burin spalls directed at an acute angle to the retouched longitudinal edges of the tools. The length of the burins is 4.0 and 4.5 cm, the width 2.6 and 2.8 cm, the length of the burin spall scars 2.3 cm, their width 0.5 cm (Pl. 21b:2, 3). The leaf-shaped burin also was worked by small pressure retouch directed from ventral to dorsal. The working edge was formed by the diagonal removal of a burin spall directed at an acute angle to the retouched longitudinal edge of the tool. The length of the burin is 3.7 cm, the width 2.5 cm, the length of the burin spall scar 2.9 cm, its width 0.5 cm (Pl. 21b:4).

The pointed tool was made on a subtriangular flake of brownish-greenish jasper. The tool was worked by small unifacial retouch directed from ventral to dorsal. Its length is 7.7 cm, the width of the middle part 4.3 cm, the width of the base 2.3 cm. The lateral sides of the pointed tool were used as the working edges of a skreblo (Pl. 21a:6).

The Verkhne Troitskaya site occupies an important place in Paleolithic Northeast Asia. Its materials represent a rather early stage of the Dyuktai culture, which is dated to approximately 23,000 or 22,000 to 18,000 years. Already the most diagnostic feature of the Dyuktai culture—the wide use of bifacially worked stone tools—is characteristic for this stage.

The Tumulur Site

The Tumulur site was discovered in July 1964 by the Aldan Expedition on the left bank of the Aldan, 1,449 km from its mouth. The site was confined to the 13-meter-high second terrace above the floodplain. Excavations revealed the following stratigraphy of the site:

1. Sod 5 to 10 cm thick.
2. A horizontally-laminated parcel composed of interlayers of sand 5 to 7 cm thick and humic sandy loam 1 to 3 cm thick. The total thickness of the parcel is 20 to 35 cm. In a large part of the excavation the stratum was damaged by cultivation. Where it was preserved in undisturbed form, two to three humic interlayers can be traced that most probably represent buried shallow sods. The parcel has an alluvial origin. Judging by the radiocarbon dates, this alluvium, noted in the upper part of many profiles of the high floodplain and Terraces I–III above the Aldan floodplain, was deposited prior to 1,000 years ago. It is provisionally called a "late Holocene alluvial assault."
3. Orangish-yellow sandy loam 12 to 20 cm thick. It is the soil layer of Terrace II. A large quantity of small pieces of charcoal and various cultural remains of the early Iron Age, Bronze Age, and Neolithic were encountered in it. In general, the pre-Neolithic Sumnagin cultural remains were confined to the bottom of the sandy loam. The lower horizons of the sandy loam were subjected to severe frost cracking in the form of ground veins that contain fill and run into the lower layers.
4. A horizontally-laminated alluvial parcel of Terrace II that extends to 2.5 m below the present ground surface. This parcel can be distinctly separated into two horizons. The lower one (apparently 180 cm thick) is represented by series of inequigranular sands 1.0 to 7.0 cm thick, which alternate with interlayers of bluish silty-sandy loams 0.1 to 2.0 cm thick. These deposits evidently represent the alluvial facies of a fluvial shoal. The upper horizon, 25 to 30 cm thick, is represented by orangish-reddish loams and sandy loams interlayered with yellowish-brown inequigranular sands. The thickness of the interlayers of loams and sandy loams is 0.5 to 3.0 cm, that of the sand 0.1 to 2.0 cm. These deposits evidently mark that stage of terrace formation when the fluvial shoal moved into a regime of the high floodplain being episodically silted.

In the upper dense reddish loam, which in some areas of the excavation is represented by one interlayer 0.5 to 3.0 cm thick and in other areas by two to four interlayers 0.5 to 1.0 cm thick, significant cultural remains were noted. They are analogous to materials of the upper part of the Pleistocene deposits at Dyuktai Cave.

No cultural remains have been found in the deposits underlying the upper reddish loam, with the exception of individual artifacts introduced into the lower part through frost cracks. However, they might be found later at least in the upper horizon of the alluvium. Meanwhile, we assigned the finds from the reddish loam to the lower cultural layer of the Tumulur site.

In this layer was found a total of 57 flint flakes, 16 pieces of flint nodules, 3 wedge-shaped cores, 6 blanks of wedge-shaped cores, 8 bifacially-worked knives or spear points, 2 bifacially-worked knives, 1 partially-worked knife, and 1 angle burin.

Platy nodules of yellowish-gray and yellow banded flint with a subrectangular, subtriangular, or segmentlike form served as blanks for wedge-shaped cores. They are found in all the various stages of work. On some, the pressure platform was only partially trimmed; on others the lateral rib and base were partially sharpened; on still others the lateral surfaces were partially worked and primary blades removed from the end. The lengths of the blanks vary from 3.8 to 7.9 cm, the height of the working end from 2.9 to 4.5 cm.

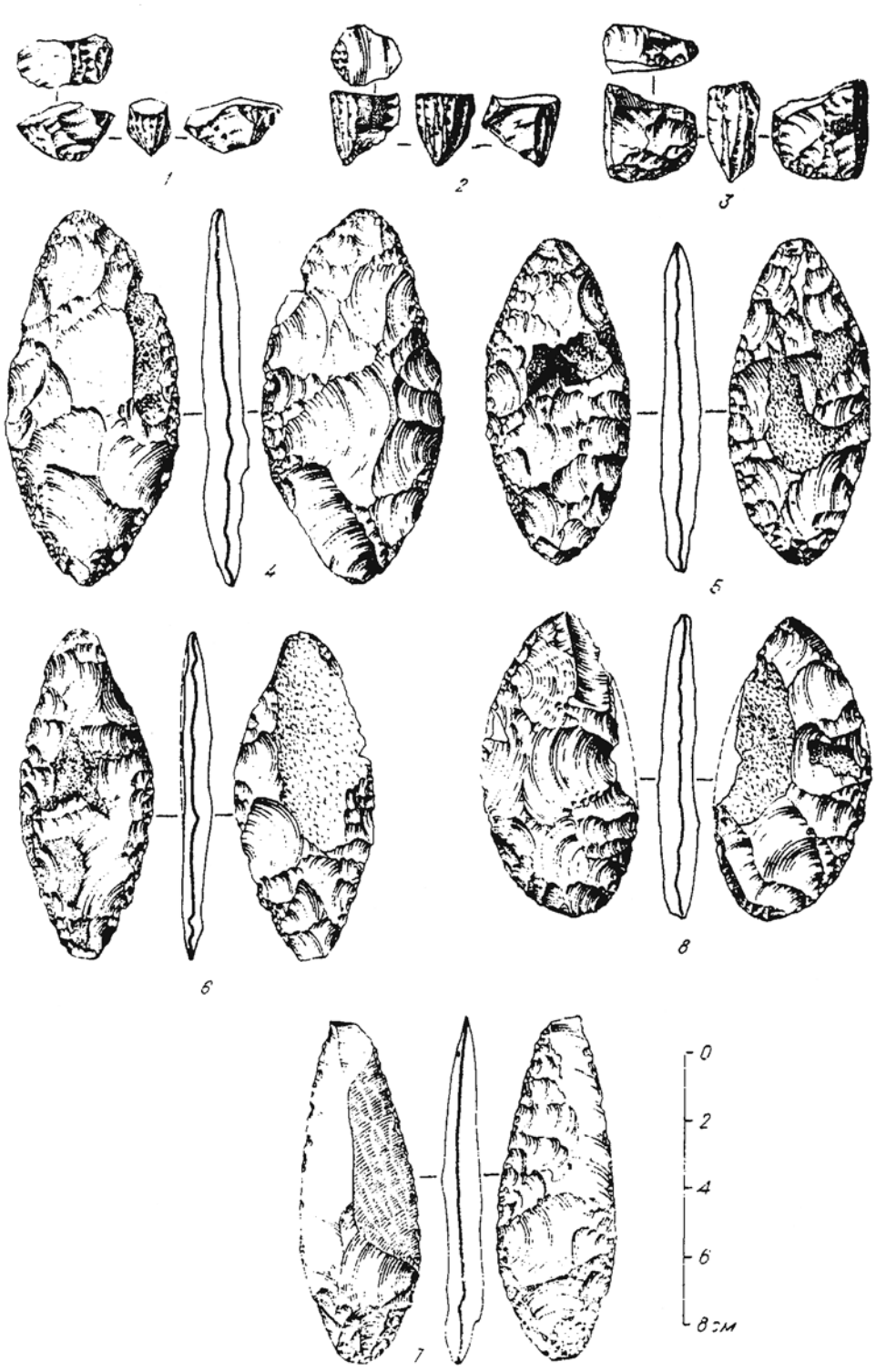
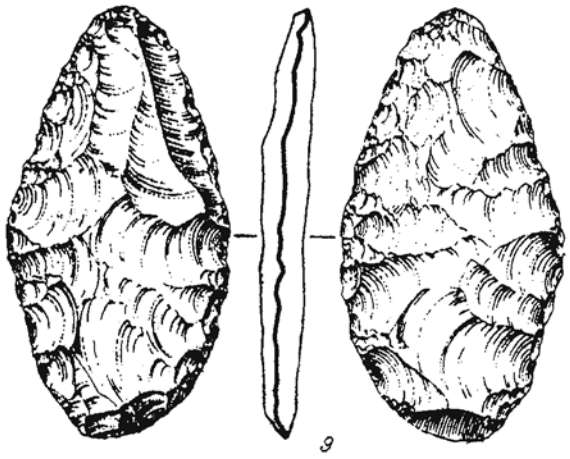


Plate 22. Tumulur site. Stone assemblage of the Paleolithic cultural layer.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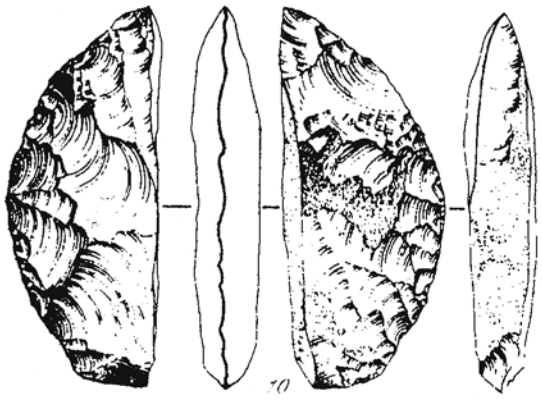
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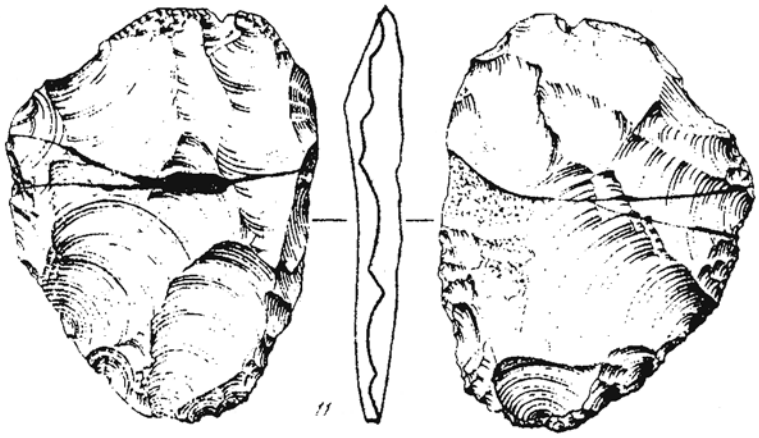
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Yellow and gray flint served as material for making the wedge-shaped cores. The artifacts have a subtriangular form (Pl. 22:1–3). Their bases and lateral ribs are sharpened and the broad surfaces are in large part worked by flat pressure retouch. The pressure platforms are beveled toward the longitudinal axis of the artifacts. The form of the platforms is oval and subrectangular. Their surface is partially trimmed by edge retouch. Thin regular blades were removed from the end. The length of the cores is 2.1 to 2.9 cm, the height of the end 1.4 to 2.8 cm, the dimensions of the oval platforms 1.4 x 1.6 cm and 1.8 x 2.0 cm, and dimensions of the subtriangular one 1.1 x 2.8 cm.

Bifacially worked laurel-leaf knife blades or spear points were made from platy siliceous gray slate (Pl. 22:4–6, 8, 9). Some were found in a split form, and then cemented. The completeness of three tools could not be established. Some parts of the split bifaces have an exfoliating surface. They are marked by spots, which usually attest to cobble or nodule cortex (Pl. 22:4–6, 8).

Both broad surfaces of the laurel-leaf knife blades were carefully worked by a flat pressure retouch of large facets, while the edges were additionally trimmed by small pressure retouch. The longitudinal and transverse sections of the tools are almond-shaped. Their length fluctuates from 8.8 to 11.4 cm, their width from 4.0 to 5.8 cm.

The bifacially worked knives are represented by a finished specimen (Pl. 22:10) and an incompletely worked specimen (Pl. 22:11). Both knives were made from platy gray siliceous slate.

The first knife has a semilunar form, a pointed-oval longitudinal section, and subtriangular cross section. Both broad surfaces of the tool are completely worked by flat pressure retouch with large facets. The working edge is additionally trimmed by small pressure retouch. The flat butt of the knife in large part preserves the nodule cortex. The cortex was removed only on the sharpened ends of the butt. The length of the knife is 10.1 cm, the width in the middle part 4.2 cm.

The second knife is irregularly oval, with an oval longitudinal cross section and an almond-shaped transverse cross section. Though the artifact was worked on all sides by pressure retouch, its lateral surfaces are not flat, but rather slightly humped. The ovally convex, partially worked (by secondary retouch) working edge has a zigzagging form, attesting that the work on it was not finished. The length of the artifact is 10.9 cm, the width in the middle part 8.2 cm.

One knife was made on a large, three-edged willow-leaf blade of siliceous slate (Pl. 22:7). The blade was almost completely worked by flat retouch on the ventral side but only partially—in the vicinity of the striking platform—on dorsal surface. This artifact possibly was initially a blank of a biface knife or spear point. For some reason, the work on it was not finished and, judging by the character of the wear on the sharp edges, it was used as a knife.

The angle burin was made on a large subtriangular flint flake 5.0 cm long and 4.0 cm wide. The working edge of the tool was formed by the removal of a burin spall 1.2 cm long and 0.7 cm wide directed at an acute angle to the lower transverse plane of the flake.

The bifacially-worked leaf-shaped semilunar and oval bifaces have their closest analogies in materials from the upper part of the alluvial Pleistocene deposits at Dyuktai Cave, with radiocarbon dates of 12,100 ± 120 BP (LE-907) and 13,200 ± 250 BP (GIN-405). Significantly, such sites as distant from the Aldan River as Verkholenskaya Gora on the Angara River and Berelekh on the lower reaches of the Indigirka River, where laurel-leaf bifaces were found similar to those from Tumulur, have an age of 13,000 to 12,000 years based on radiocarbon dates. This age is completely acceptable for the Dyuktai Paleolithic Tumulur site as well, corroborated by the fact that the Dyuktai finds in it are confined to covering alluvium of Terrace II above the floodplain, the accumulation of which was completed 13,000 to 12,000 years ago.

For correct interpretation of the correlation of the many types of artifacts in the Dyuktai stone assemblage, we note that at the Tumulur site all bifaces lay in a cluster in a small area measuring 20 x 25 cm. No

hearth or house remains were noted there. The cluster of bifaces is evidently a forgotten "cache" of an early artisan. Not a single biface was found in all the remaining area of the excavation, which amounted to 460 m^2.

At present, the number of bifaces at the Tumulur site is 83% of all tools. Considering that the willow-leaf knife could be a blank of a biface, the number increases to 91.5%. However, these calculations hardly satisfy the true correlation of the various types of tools in the Tumulur complex. We do not oppose a statistical elaboration of the archaeological complexes, but it should be done very carefully with historical syntheses, and only when a sufficient quantity of material is present. Indeed, scrapers, punches, and many burins, as well as other tools, were certainly at the disposal of the inhabitants of the Tumulur site.

After distinguishing the Dyuktai Paleolithic culture the question arises: How many bifaces were found in this or that Dyuktai site? This numerical index is not really so important in the identification of the cultural appearance of a site. Indeed, biface knives and spear points were probably considered the most valuable tools by virtue of the labor in making them. People preserved them and tried not to forget them when leaving the sites. Also later, in the Neolithic, ground stone tools were preserved; and in the early metal ages, bronze and iron artifacts. Therefore, bifaces represent a great rarity in Paleolithic sites.

Meanwhile, the Tumulur "cache" of bifaces is the rarest exception in Siberia. But indeed, if just one leaf-shaped biface had been discovered instead of the cache, would the Tumulur site not be assigned to the Dyuktai culture? Of course not. The Tumulur site would be a Dyuktai site all the same. From our point of view, in the present stage of study of the Stone Age of Northern Asia, the most reliable indicator for assigning a Paleolithic site to the Dyuktai culture is not a larger or smaller number of bifaces, nor the fact of their presence or absence. All the other technical and typological features of the stone assemblage must be considered, especially the character of the working and form of wedge-shaped cores.

The Leten Novyi Site

The Leten Novyi site was discovered by N. D. Arkhipov in 1970 during work of an archaeological expedition from Yakutsk State University. The site was excavated on the points at the mouth of the Leten Novyi River, which empties from the left into the Olekma River 287 km from its mouth. The cultural remains were confined to the upper part of the deposits of the bedrock terrace 17 m above the floodplain. In 1971, in the lower horizon of the site, covered by deposits containing the remains of the Bel'kachi and Ymyyakhtakh cultures, were found flint "Gobi" cores, semilunar knives, scrapers, and skreblos. Arkhipov concluded that "based on these tools the lower horizon of the site can be dated to the Mesolithic of Yakutia, that is, eight to five millennia B.P." (Arkhipov 1972:258). Later Arkhipov noted that "these materials have no analogies in known Paleolithic and Mesolithic cultures of Yakutia" and that typologically (especially by the form of the wedge-shaped and "Gobi" cores) they are "possibly synchronic with the lower horizons of the Upper Paleolithic sites of the Yenisei—Kokoreva I–III and Tashtyk I, II" (Arkhipov 1973:198).

The age of these diachronic sites, assigned by Z. A. Abramova (1972a) to the Kokoreva and Afontova Paleolithic cultures, is determined at approximately 15,000 to 12,500 years. More recently Arkhipov returned to his previous assumption that the earliest finds at the Leten Novyi site represent a "pure Mesolithic complex" (Arkhipov 1975:189). Such chronological discord evidently can be explained by the fact that the researcher excavated the site not by individual geological horizons, but "with the spade." This led to the fact that multicultural and diachronic materials were combined in one complex, which without detailed typological analysis were clearly impossible to separate or date. And Arkhipov did not do this.

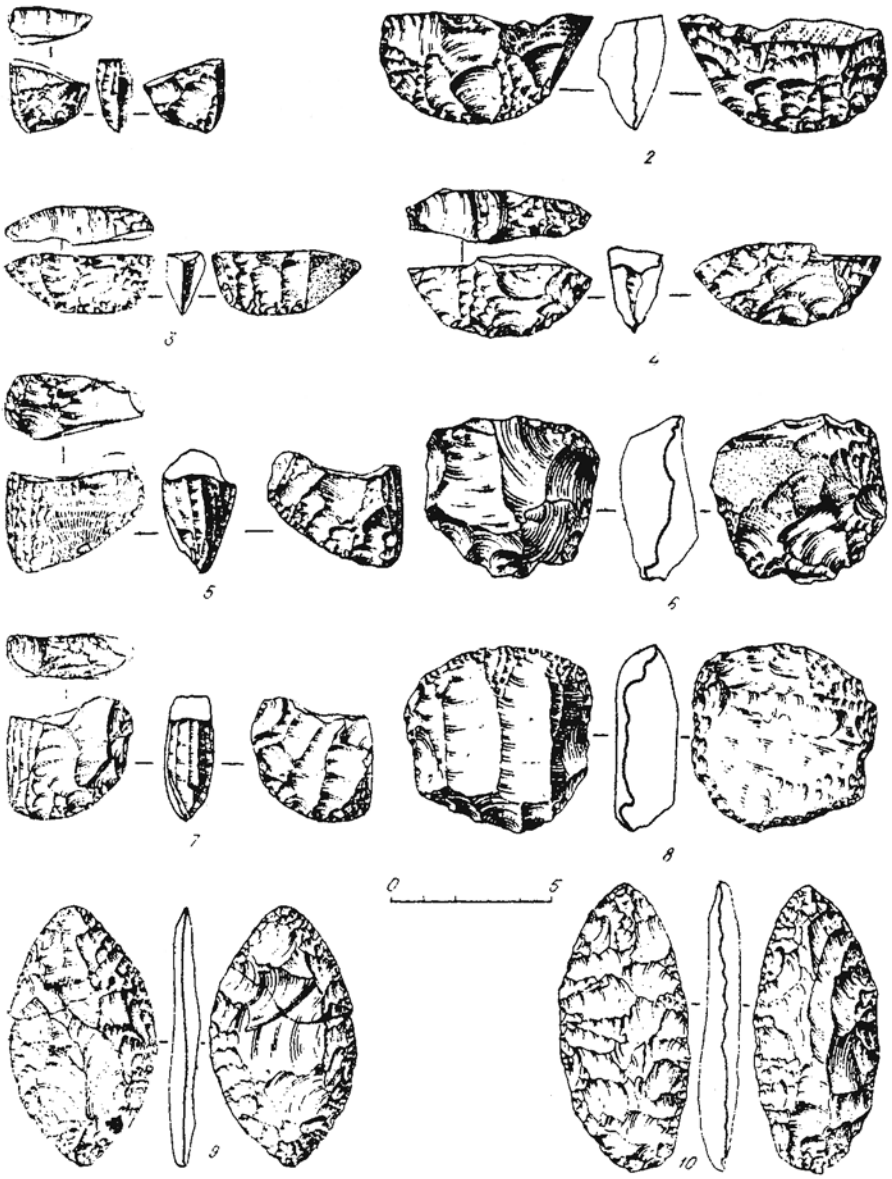

Plate 23. Leten Novyi site. Stone assemblage of the Paleolithic layer (based on materials of A. N. Alekseev).

This gap in the study of the Leten Novyi site was filled in 1975 by A. N. Alekseev, the head of the Olekma Archaeological Detachment of Yakutsk State University. Based on his data (Alekseev, personal communication), an alluvial horizontally-layered parcel of large-grained sands 10 to 50 cm thick and humic sandy loam 2 to 5 cm thick lie on the bedrock terrace. The artifacts in cultural Layer IV were confined to the three upper layers. The total thickness of the parcel is 1.0 to 1.5 cm. Above it lies a reddish-brown covering sandy loam 20 to 50 cm thick, to which the finds of cultural Layer III were confined. Above this is a gray sandy loam 10 to 30 cm thick (cultural Layer II) covered by humic sandy loam 2 to 6 cm thick (cultural Layer I), and then sod. The whole parcel of loose deposits bears traces of substantial frost deformation, which often caused the cultural remains of the different layers to shift into the

lower-lying or upper-lying deposits. Alekseev, like Arkhipov, noted that no ceramics were encountered in cultural Layers III and IV. However, careful typological analysis of materials from the lower layers permitted him to suppose diversity in the finds represented here. Alekseev identified the complex of stone artifacts that, in his opinion, have the clearest analogies in the late Pleistocene layers at Dyuktai Cave and the Tumulur site and belong to the terminal stage of the Dyuktai culture on the Aldan River. He noted that artifacts of Dyuktai appearance, together with split bones of horse (identified by P. A. Lazarev), were confined primarily to the top of the alluvium of the terrace, but because of frost mixing were introduced into some areas of the covering sandy loam as well.

According to Alekseev, bifacially worked leaf-shaped flint points of spears and darts (Pl. 23:9, 10) 8 to 9 cm long and 4 to 5 cm wide (4 whole specimens and 2 broken ones) belong to the Dyuktai complex, as well as 2 subdiscoid flint cores (Pl. 23:6), a single-platform uniface subprismatic flint core (Pl. 23:8), 6 elongated wedge-shaped flint cores of the "Gobi" type (Pl. 23:2–4), and 20 shorted wedge-shaped flint cores (Pl. 23:1, 5, 7). Some of those with retouched lateral edges are probably exhausted "Gobi" cores. Examination of the artifacts enumerated above permits one to agree with Alekseev regarding their association with the terminal stage of the Dyuktai culture. Until refinement of the question of which terrace (I or II) of the Olekma River the Leten Novyi site belongs, the most probable date of its lower level, in our view, is about 13,000 to 10,500 BP.

The Berelekh Site

The Berelekh site was found on the upper course of the Berelekh River (a left tributary of the Indigirka River), at approximately 71º north latitude. It was discovered at the location of the well-known "Berelekh mammoth graveyard." The first scientific report on this "graveyard" was made by permafrost expert N. F. Grigor'ev (1957), who in 1947 collected several mammoth bones there and photographed the locality.

In 1970, the Yakutsk branch of the Northern Division of the Academy of Sciences, USSR, sent a geological expedition under the leadership of B. S. Rusanov for study of the "mammoth graveyard." A Leningrad paleontologist, Professor N. K. Vereshchagin, also took part in it.

The bone-bed area of the 12-meter terrace on the left bank of the Berelekh River was washed by the expedition with the aid of hydropumps. The total number of bones collected on the surface of the slope and artificially washed from the ground amounted to 7,614 specimens. Based on Vereshchagin's identification, 98.6% of the bones belonged to mammoths, while the remaining 1.4% were of woolly rhinoceros, bison, horse, reindeer, cave lion, wolf, wolverine, and hare.

Based on Rusanov's observations, the lower horizon of the 8-meter thick terrace was composed of silty alluvial deposits of Karginsk age, while the upper 4-meter thick horizon was represented by a mantling loess of Sartan age. In 1970, Rusanov and Vereshchagin expressed the supposition that the "original bone horizon" was initially confined to the base of the loess deposits, but was then reformed by permafrost processes and earth slides. The bones of mammoths lay in the horizon in chaotic disorder and in the most varied positions alternately with fossilized earth-slide sods, willow shoots and roots, and the hair of mammoth manes. Some bones and tusks had been cracked by ice veins. The find in the so-called loess stratum of the whole back of a mammoth leg with the flesh and wool is very interesting. According to Rusanov's observations, the leg had been artificially separated from the body in antiquity.

Two radiocarbon dates were obtained, one from a sample of wood taken at a depth of 160 cm below the ground surface and one from a mammoth tusk taken at a depth of 255 cm. The dates are 11,830 ± 110 BP (LU-147) for the first specimen and 12,240 ± 160 BP (LU-149) for the second.

Figure 14a. View of the excavation of the Berelekh site.

Figure 14b. View of the excavation of the Berelekh site.

In 1970, Vereshchagin, having substantial experience working at Paleolithic sites, proposed that the "mammoth graveyard" could have attracted early hunters who possibly made their temporary camps here. Vereshchagin's purposeful search for traces of the existence of people brilliantly corroborated his proposition. On the slope of the terrace, 8 m above the Berelekh River, were found four items worked by humans, which in spring 1971 were shown to the author of the present work in Leningrad. In a preliminary report about these finds it was supposed that they belonged to the Dyuktai Paleolithic culture (Vereshchagin and Mochanov 1972).

Considering the importance of Vereshchagin's discovery, in August 1971 the PAE proceeded toward systematic investigations of the "Berelekh mammoth graveyard." At this time Vereshchagin found several more flint flakes and a spear point (?) of mammoth tusk on the terrace slope.

During the PAE investigations a cultural layer was clearly noted, which contained definite human artifacts. The new finds supported the possibility of a Paleolithic site at Berelekh (Fig. 14).

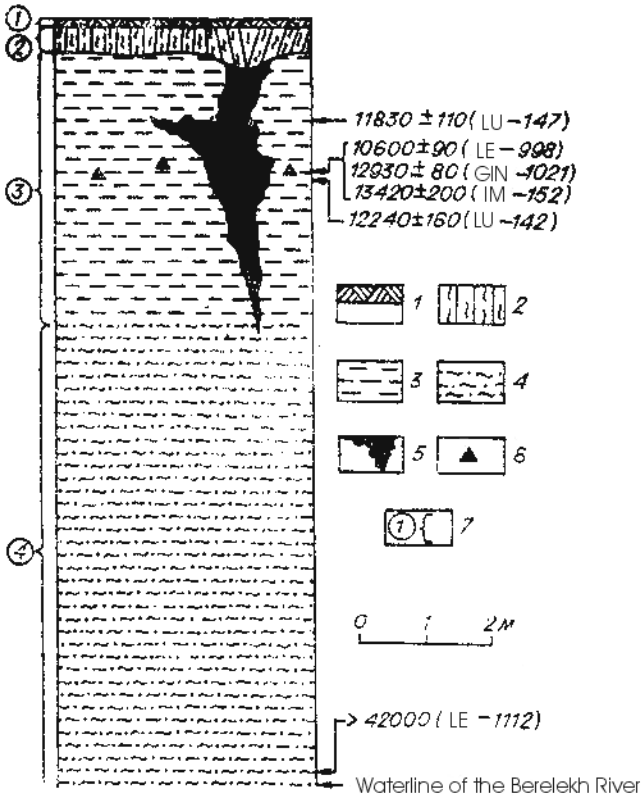

Figure 15. Stratigraphic profile of the Berelekh site. 1) sod; 2) cloddy sandy loam; 3) horizontally laminated sandy loam; 4) horizontally laminated sands and sandy loam; 5) ice vein; 6) upper Pleistocene Paleolithic artifacts; 7) number and boundary of the geological layer.

The excavations revealed the following stratigraphy of the site (Fig. 15):

1. Sod 3 to 5 cm thick (Layer 1 in Figure 15).
2. Yellowish-brown lumpy ice-covered sandy loam with a vertically wavy fill of bluish-gray sandy loam (Layer 2 in Figure 15). The thickness of the parcel is 45 to 50 cm. From the bottom of this sandy loam downward, to a depth of at least 5 m from the present ground surface, run thick ice veins (Fig. 16). This sandy loam is evidently the top of the lower-lying deposits reworked by soil and permafrost processes.
3. A horizontally-laminated parcel consisting of interlayers of grayish-brownish sandy loam 0.1 to 2.0 cm thick and inequigranular gray sand 0.1 to 0.5 cm thick (Layer 3 in Figure 15). The thickness of the parcel is 4.0 to 4.5 m. Judging by the composition and character of the lamination, this parcel is represented not by a mantling loess (as was thought based on work in 1970), but by a floodplain facies of alluvium. Almost all the interlayers contain plant remains—detritus, grass stems, and isolated willow twigs. Interlayers of this kind are usually periodically deposited on the surface of an inundated floodplain. In one such interlayer, containing the most willow twigs and small pieces of thin stems of larch, were found split and partially worked bones of mammoth and other animals, as well as a variety of stone artifacts. This interlayer lay

at a depth of 250 cm from the present ground surface.[5] Several worked stone items and bones also were recorded in the lower-lying interlayer of sandy loam, at a depth of 252–253 cm. These interlayers are joined in several areas; therefore, the finds from them are preliminarily assigned to one cultural layer. Based on a sample of wood taken from the interlayer, which contained the primary finds, a radiocarbon date of 10,600 ± 90 BP (LE-998) was initially obtained. Later it was found to be clearly too young. Based on samples of wood newly obtained from the cultural layer two radiocarbon dates were obtained: 12,930 ± 80 BP (GIN-1021) and 13,420 ± 200 BP (IM-152). These dates correspond well to the ages of samples LU-147 and LU-149.

4. A horizontally-laminated parcel, consisting of interlayers of grayish-brownish sandy loam 1 to 3 cm thick and yellowish inequigranular sands 0.5 to 5.0 cm thick (Layer 4 in Figure 15). The apparent thickness of the parcel is 7.0 to 7.5 m. Some interlayers of sandy loam are supplemented with plant detritus. Based on a specimen of detritus taken 20 cm above the Berelekh River level, a radiocarbon date of 42,000 years was obtained (LE-1112). This date and geological and morphological observations suggest that this parcel represents eroded deposits of floodplain facies of alluvium of the 20-meter terrace (Terrace III or IV?), in which the 12-meter terrace (Terrace II?) is enclosed.

During the process of opening up the cultural layer at the Berelekh site, 127 worked stone objects, 49 worked bone objects, and 1,003 animal bones (probably cooking remains) were discovered. The last, based on Vereshchagin's identification, include the bones of mammoth (78 specimens), bison or horse (3 specimens), reindeer (1 specimen), snowshoe hare (827 specimens), willow ptarmigan (92 specimens), and fish (2 specimens).

In addition, 178 burned or split bones of mammoth were collected on the slope of the terrace, as well as 60 worked stone items: 34 flakes and 20 flakelets of flint and hornfels, 1 flint core, two fragments of bifacially-worked flint points of spears or darts (?), 1 fragment of a bifacially-worked knife (?), 1 chisel-like flint tool, and 1 stone pendant. The stone items from the surface are no different in the technical-typological characteristics from the finds in the cultural layer and, therefore, were combined with them in one complex.

The stone items from the cultural layer are represented by flakes (64 specimens), flakelets (44 specimens), blades (4 specimens), a core (1 specimen), tools (10 specimens), and pendants (4 specimens).

Flint, hornfels, and in some cases siliceous limestone and siliceous slate served as material for making all the stone items, except ornaments.

Among the flakes found in the cultural layer, six specimens have medium dimensions; the remaining are small. Three of the medium flakes are partially worked by edge retouch (Pl. 24:11, 23, 25).

The blades are all fragmentary. One blade has a width of 0.7 cm (Pl. 24:2), the width of the remaining blades range from 1.0 to 1.2 cm (Pl. 24:4, 5).

[5] In the note by Vereshchagin and Mochanov (1972:336), a depth of 150 cm was indicated for this interlayer. This error was corrected in Mochanov's note (1972a:251), where a depth of 250 cm is mentioned.

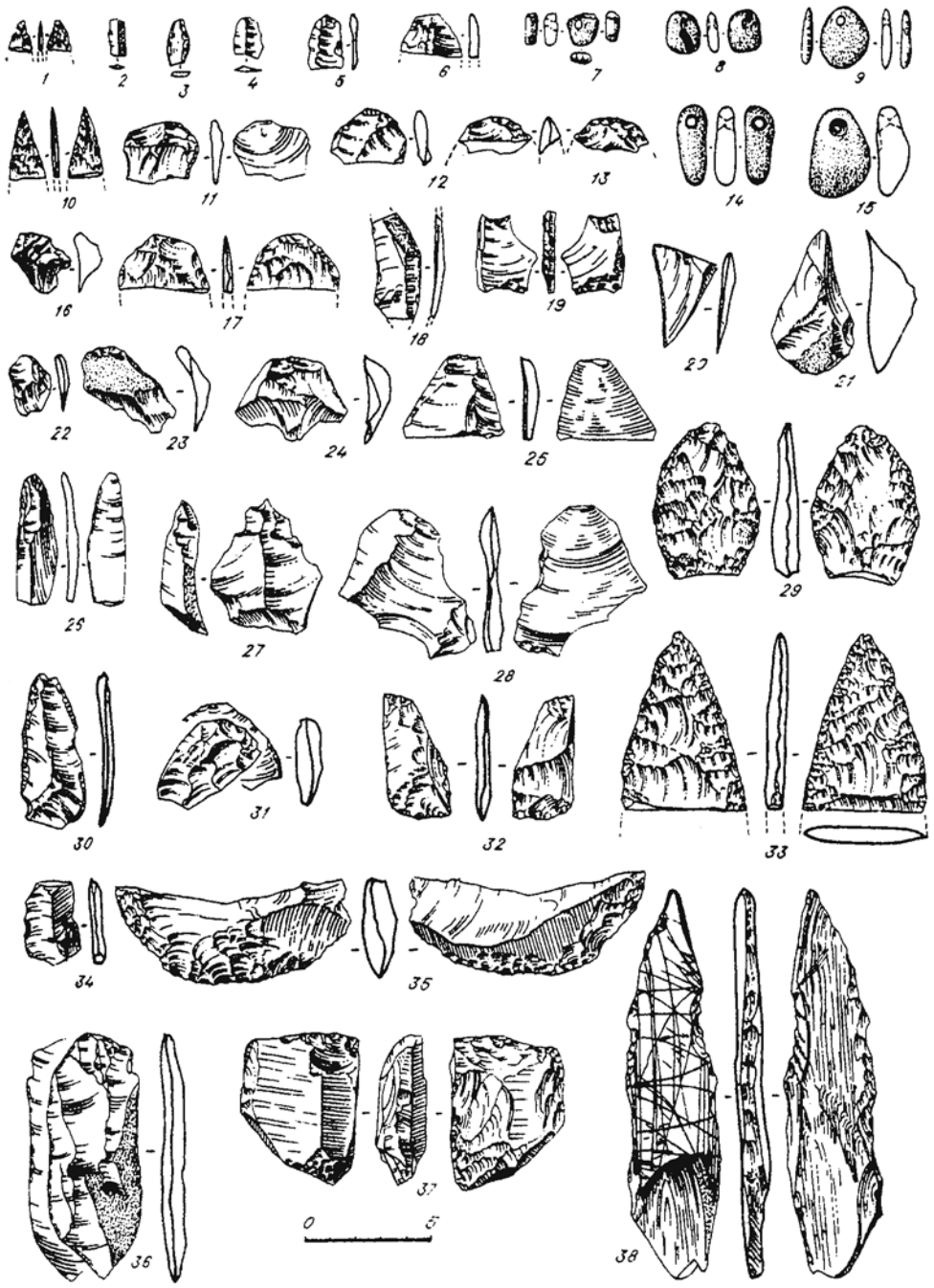

Plate 24. Berelekh site. Stone and bone assemblage.

The cultural layer contained a wedge-shaped core made from a flake, both broad surfaces of which were unworked by retouch. The lateral edges of the core were sharp owing to the sharp edge of the flake. Its base was sharpened with the aid of bifacial edge retouch. The miniature pressure platform is triangular and beveled at an acute angle to the end, from which thin blades had been removed. The surface of the platform was worked by small flat retouch. The length of the core is 2.4 cm, the height of the working part 3.1 cm, and the dimensions of the platform 0.3 x 0.7 cm (Pl. 24:19). Judging by the dimensions and the character of the work, the core could have been used as a multifaceted angle burin.

One core, found on the denuded terrace, was a single-platform unifacial flat core of black flint. Its pressure platform was beveled at an angle of 60º to the plane of removal of blades. The upper edge of the platform was worked by small pressure retouch. The base was sharpened, and the lateral edges flattened. The broad side of the core, opposite the side from which blades were removed, was almost completely worked by flat retouch. The length of the core is 4.5 cm, the height 6.08 cm, the dimensions of the platform 0.9 x 4.2 cm (Pl. 24:37).

The flint tools were represented by knives (7 specimens), points of spears or darts (2 specimens), and a chisel (1 specimen). The artifact descriptions include the finds from the cultural layer as well as the surface finds.

Blades (2 specimens) and lamellar flakes (5 specimens) served as material for making the knives. The knives on blades are represented only by pieces. One of them is a midsection of a tool. A curved blade was used for making this knife. Its working edge is located on a convexly arced edge of the blade. It was worked by the finest edge retouch directed from ventral to dorsal. Partial edge retouch also can be seen on the opposite edge of the tool. The length of the preserved part of the knife is 3.9 cm, the width 1.7 cm (Pl. 24:18). The base of the other artifact is broken. Its working edge also is located on the convexly arced side of the blade and was worked by the finest edge retouch directed from dorsal to ventral. The upper edge of the tool, opposite the working edge, is partially covered with retouch directed from ventral to dorsal. The retouch also extends onto the broad facet of the blade. The length of the preserved part of the knife is 5.05 cm, the width 2.0 cm (Pl. 24:26).

The three knives on blades are fragmentary (Pl. 24:17, 20, 34). The two whole tools were made on flat lamellar flakes. One of them has a form approaching oval (Pl. 24:30), the second, approaching leaf-shaped (Pl. 24:36). The working edges are located on both longitudinal edges of the tools. They were worked by small pressure retouch directed from ventral to dorsal. Partial edge retouch directed from dorsal to ventral also can be seen. The length of the tools is 6.1 and 9.5 cm, the width 3.0 and 4.3 cm.

In the 1970 collections from the surface of the terrace, Vereshchagin found a piece of a bifacially-worked oval knife made of black flint (Pl. 24:35), with a length of 9.2 cm and a width of 3.2 cm. The working edge of the knife, which is semilunar in form, was worked along the edge by the removal of small spalls through pressure retouch. This specimen is almost a copy of a biface fragment from the Ezhantsy site (Pl. 15:21), evidently a piece of a bifacially-worked oval knife of the same type as an artifact from Dyuktai Cave (Pl. 3:2).

In addition, four fragments of bifacially-worked flint points of spears or darts were found at the site: two specimens from the cultural layer and two from the surface collections. The base of one of them was broken (Pl. 24:33), but the upper half of the tool was preserved. Both broad surfaces of the artifact were worked by flat pressure retouch and the edges trimmed by secondary bifacial retouch. The cross section is almond-shaped. The length of the preserved part is 6.9 cm, the width 4.7 cm. Only part of the base of the second point from the cultural layer was broken (Pl. 24:29). The tool has a laurel-leaf form and an almond-shaped cross section. Both broad surfaces were worked by flat pressure retouch; some areas of the edge were trimmed by secondary retouch. The length of the preserved part is 5.8 cm, the width of the middle part 4.0 cm, the width of the base 2.7 cm, the thickness 0.7 cm. The two points from the surface collection are represented by small pieces of a pointed tool (Pl. 24:1, 10).

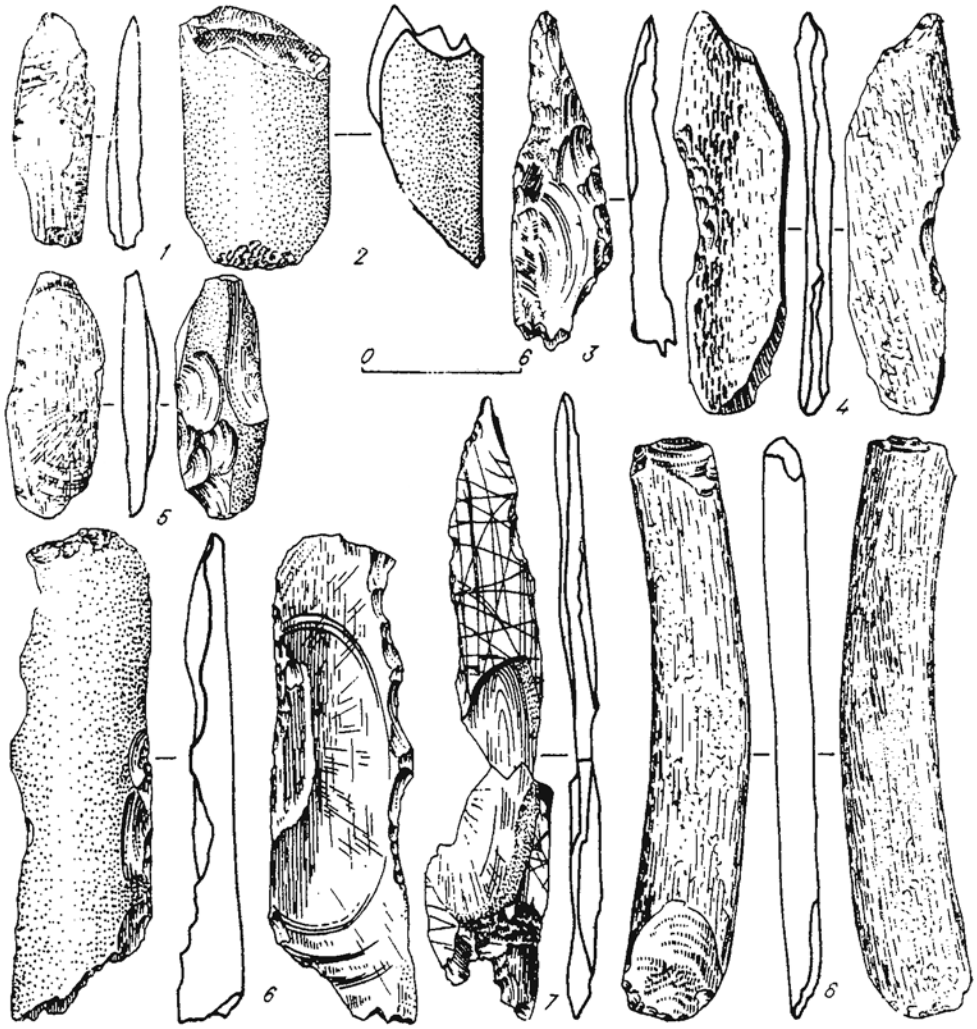

Plate 25. Berelekh site. Bone assemblage.

The chisel-shaped tools, made on flint flakes, were found in the cultural layer (1 specimen) and the surface collection (1 specimen). A flat lamellar flake was used to make the first. Its lower end was transformed into a short straight working edge through edge retouch directed from ventral to dorsal. The edge of the working edge was strongly polished from use. The length of the chisel is 5.7 cm, the width in the middle part 2.2 cm, the width at the working edge 0.3 cm. The chisel found in the surface collection has two working edges. The working edges are located on the upper and lower ends of the tool. The form of the working edges is straight. Both working edges were made by small bifacial pressure retouch that also partially extends onto the broad surfaces of the flake. The length of the tool is 5.2 cm, the width of one working edge 2.4 cm, of the other 1.2 cm (Pl. 24:32).

Five stone ornaments (pendants) were found at the site, four of which were in the cultural layer and one on the surface. The pendants are oval or rounded pebbles of pyrophyllite (1 specimen), gray aleurite with veins of white quartzite (2 specimens), white calcite (1 specimen), and bright-green

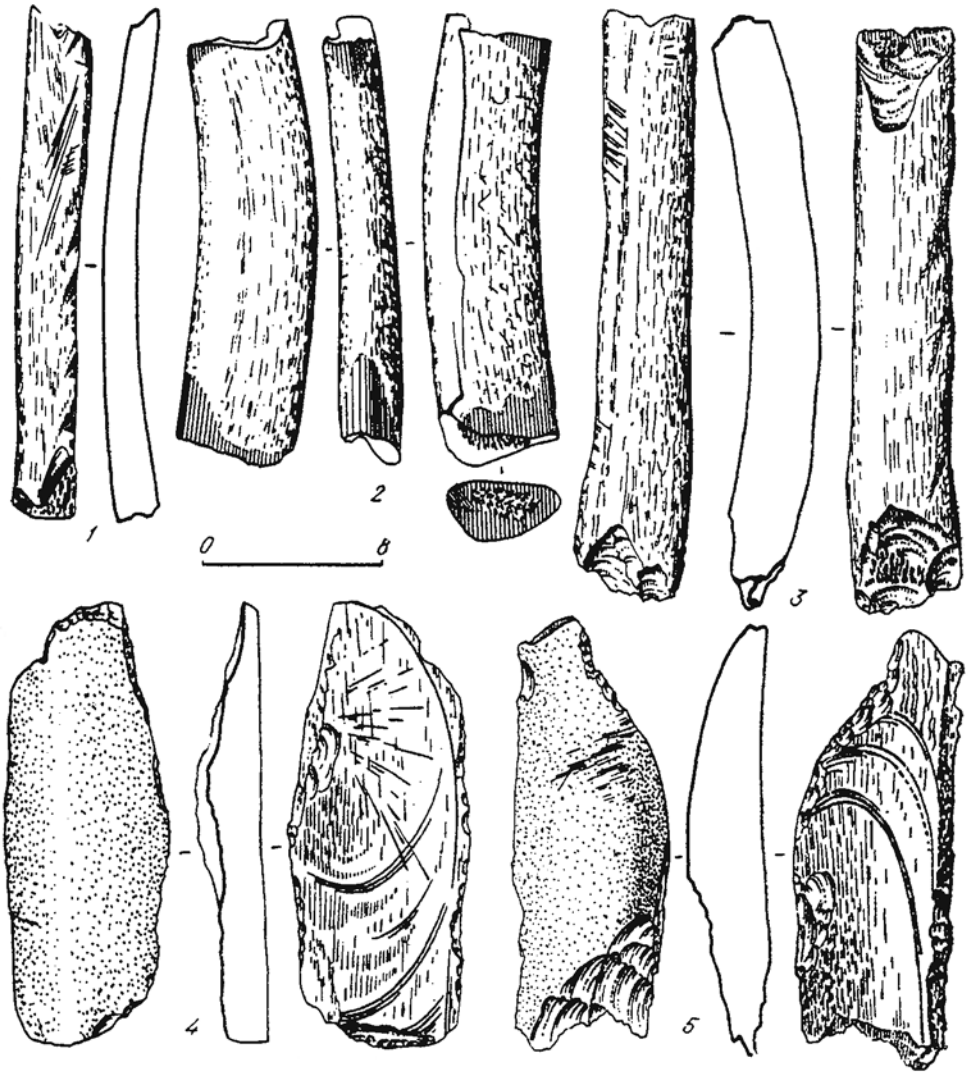

Plate 26. Berelekh site. Bone assemblage.

jadeite (?) (1 specimen). Biconical holes 0.3 to 0.6 cm in diameter were drilled in the upper parts of the pendants (Pl. 24:14). Oblong oval depressions 0.5 to 0.6 cm long and 0.28 cm wide can be seen on both sides of one pendant (Pl. 24:8). These depressions represent the initial stage of drilling the oval biconical hole. Nineteen short parallel notches were applied along the periphery of the white calcite pendant (Pl. 24:9), and five hatches on the pendant of pyrophyllite (Pl. 24:7). The length of the pendants fluctuates between 1.2 and 3.5 cm, the width 1.2 to 2.5 cm, the thickness 0.4 to 0.5 cm. The pendant of jadeite has a thickness of 1.2 cm (Pl. 24:15).

As already noted, in addition to the stone tools in the site there were tools of pieces of mammoth tusk and bone. The most significant of them are knives of oval (Pl. 25:5), subtriangular (Pl. 25:3), and semilunar (Pls. 25:4; 26:5) forms; a leaf-shaped spear point (Pl. 24:38); and skreblos (Pls. 25:6; 26:4). The tools of tusk and bone were worked like the flint ones, with edge pressure retouch.

Traces of polish are found on some pieces of mammoth rib, which attest to their use as polishers (Pls. 25:8; 26:2).

In the denuded area of the terrace Vereshchagin discovered an arc-shaped spear point of mammoth tusk. One end of the tool was broken. The part that was preserved has a length of 94 cm with a diameter in the middle part of 2.5 cm. The cross section of the point is rounded, but the base is markedly flattened. The surface of the tool was planed with a stone knife (Vereshchagin and Mochanov 1972:Fig. 4).

Artistic hatching was noted on some bone tools (Pls. 25:1; 26:3, 5), as well as an engraved design of intersecting lines (Pls. 24:38; 25:7).

The unique image of a mammoth, published by V. E. Flint (1972) and O. N. Bader (1972), is very significant for illuminating the spiritual life of the inhabitants of the Berelekh site (Pl. 27).

According to Flint's report, he obtained the piece of mammoth tusk with an image of a mammoth engraved on it in 1965 from local residents at Berelekh village. They had found it in one of the denuded areas by the Berelekh River, approximately 50 km above the village. "This piece," Flint (1972:94) writes:

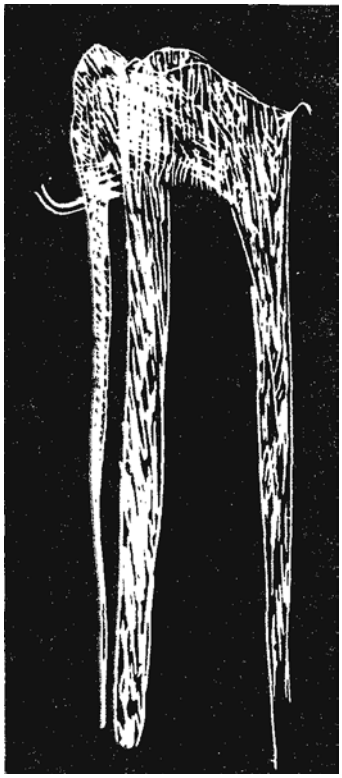

Plate 27. Berelekh site. Image of a mammoth on a tusk.

> This piece is the end of the right tusk of a young mammoth; the length of the piece is 56.5 cm, it is 20.2 cm in girth at the edge of the break. Its enamel layer is excellently preserved and is decorated by ferruginous compounds in a brownish-yellow amber color, changing in places to dark brown. The surface is smooth and shiny. The excellently executed, distinct image of a mammoth standing on long legs that was applied by firm deep strokes is quite notable. The height of the figure of the mammoth at the withers amounts to 18.7 cm, the distance from the forehead to the base of the tail is 5.7 cm. It is sketched transverse to the longitudinal axis of the tusk.

Flint (1972:94) further notes:

> One of the most striking details of the image of the mammoth is the tail raised high and bent. At first impression such a position of the tail is not natural, but, visiting in Africa, I observed hundreds of elephants in natural circumstance and was convinced that they, especially when excited, raise the tail almost the same as illustrated on the piece of mammoth tusk. This detail of elephant behavior could not have been known to people who had not seen a living elephant in natural circumstances. I believe that the configuration of the mammoth's tail in the illustration is one of the most substantial proofs favoring the hypothesis that before us is an illustration by a person contemporary with the mammoth.

Bader (1972:95) gives the most detailed description of the illustration:

> On the piece of tusk we see the figure of a mammoth in profile, the head facing left, with two deeply incised, curved tusks and a short tail raised high. On the

> side can be seen only the two left legs, the right ones hidden by them. Under the belly long hanging fur is represented. The figure of the mammoth occupies almost a third of the circumference of the tusk, therefore it can be examined in detail only by slightly rotating the tusk or in the flat illustration executed for us by K. N. Nikakhristo. Concerning the figure of the animal: the legs are disproportionately thick, which was probably elicited by their great length. The silhouette of the figure in the limits of the contours is thickly cross-hatched by a stone tool. . . . Careful examination of the engraving gives the impression that here not one but two figures of mammoths were illustrated. This is evident in the thickly cross-hatched part of the illustration. The back part of the figure belongs to one animal. Its front part shows two profiles of the bent back and head of mammoths, one shorter and lower, the other larger. It is difficult to understand the reason that forced the author of the engraving to illustrate on the mammoth a trunk and legs so large and disproportionately long. This case is unique in the art of the Paleolithic. It can be supposed that an animal endowed with mythological features is represented here. A. Leroi-Gourhan, the well-known French specialist on Paleolithic art, being guided by several features, corroborates the existence of mythology during the period of Paleolithic cave art.

Bader (1972:95) also describes in sufficient detail the technique of applying the illustration.

> Based on A. G. Chernyakhovskii's conclusion, the overwhelming majority of the lines have a width of 0.1 to 0.2 mm. Their depth is almost always less than the thickness of the etched layer of the enamel, that is, less than 0.1 to 0.15 mm, and only in rare cases is it somewhat deeper. Lines of different profile can be seen when examining the hatching within the contour of the illustration and outside it. Sometimes these are narrow V-shaped, with asymmetric angles of slope of the walls in the strokes. In other cases, the strokes are short broad trough-shaped cuts. Often two or several parallel lines are encountered, clearly scratched through by a serrated instrument. Of course, strokes of the same profile are arranged in series of five to eight cuts. In addition, there are cuts of another profile. Such a picture fully agrees with the idea that the cutting instrument was of stone. A flint burin or the corner of a knifelike blade (or flake) quickly became crushed and was replaced many times by another. Subsequent carved lines were covered by thin fine hydroxides of iron.

Having examined the stylistic features of the image of the mammoth and the technique of its application, Bader (1972:96) concluded that "the illustration, without doubt, was made by man, who saw living mammoths many times." In opposition to this assertion, V. I. Gromov (1972:126) expressed the opinion that

> the artist sketched not from life, but from a dead mammoth, which he saw in the frozen state in permafrost soil in a bank precipice after a landslide. Only part of the mammoth was uncovered. It possibly resulted so that the legs and trunk were covered by the soil so the artist did not see them, therefore he represented them so schematically. It is possible, moreover, that the artist wanted to show the

> mammoth "coming out" of the sticky clay soil. . . . Concerning the reliability of the authors (that is, V. E. Flint and O. N. Bader—*Yu. M.*), regarding the fact that a man saw a living mammoth, seems to me to require additional facts, but an Upper Paleolithic age for the find is quite probable.

Favoring Gromov's assumption are Vereshchagin's first observations about the character of the Berelekh accumulation of mammoth bones (Vereshchagin 1971; Vereshchagin and Mochanov 1972). Vereshchagin (1971:93) notes that

> the solution to the reasons for the dying of the mammoth herd lies in creating more precise ideas about the restructuring of the landscape of the great North-Siberian plains at the end of the Pleistocene. Herds of animals were probably caught unaware by spring-summer floods in the low small isolated rises in the river valleys and perished there from hunger, crowding, and illness, collapsing under the ice, in the fast cold channels. The bodies were pulled down by spring freshets and settled at the mouths of gorges and old river beds; the old river bed in the naturally-bounded area of Ugamyt (the Berelekh locality—*Yu. M.*) being especially "catching." Later, the accumulation of Yakutian loesses covered the mammoth graveyard here.

In another note Vereshchagin (Vereshchagin and Mochanov 1972:333) views the Berelekh cluster of bones as a "mammoth graveyard." He writes that "the bodies of these animals were borne by spring freshets annually to certain old river beds that 'caught' them, where they decayed and were permanently locked in the silty deposits. Later, the macerated skeletons were disarticulated by the water channels, and some bones and tusks were broken up by permafrost and landsliding effects."

In Vereshchagin's (Vereshchagin and Mochanov 1972:336) opinion, the Berelekh site "was evidently situated on the bank of an old stream channel with a mammoth cemetery."

Investigations by the PAE, from our point of view, provided new facts corroborating the fact that the inhabitants of the Berelekh site were contemporary with mammoths—the primary object of their hunt—and that the image of the mammoth described by Flint and Bader belonged to the cultural complex of the site.

Favoring the idea that the Berelekh people were contemporary with the Berelekh mammoths are two radiocarbon dates obtained on specimens of wood from the cultural layer: 12,930 ± 80 BP (GIN-1021) and 13,420 ± 200 BP (IM-152). At three standard deviations their age falls within the range of 12,690 to 14,020 BP. The age of the mammoth tusk, based on radiocarbon analysis, is 12,240 ± 160 BP (LU-149). Most probably the age of all three specimens falls within the interval of 13,000 to 12,500 BP. Based on the results of work in 1970, Vereshchagin thought that the primary bone-bearing horizon lay at a depth of 3.5 to 4.0 m, but in 1971 he specified that this layer, with sample LU-149, belongs to a depth of 2.55 m—that is, the same as the cultural layer.

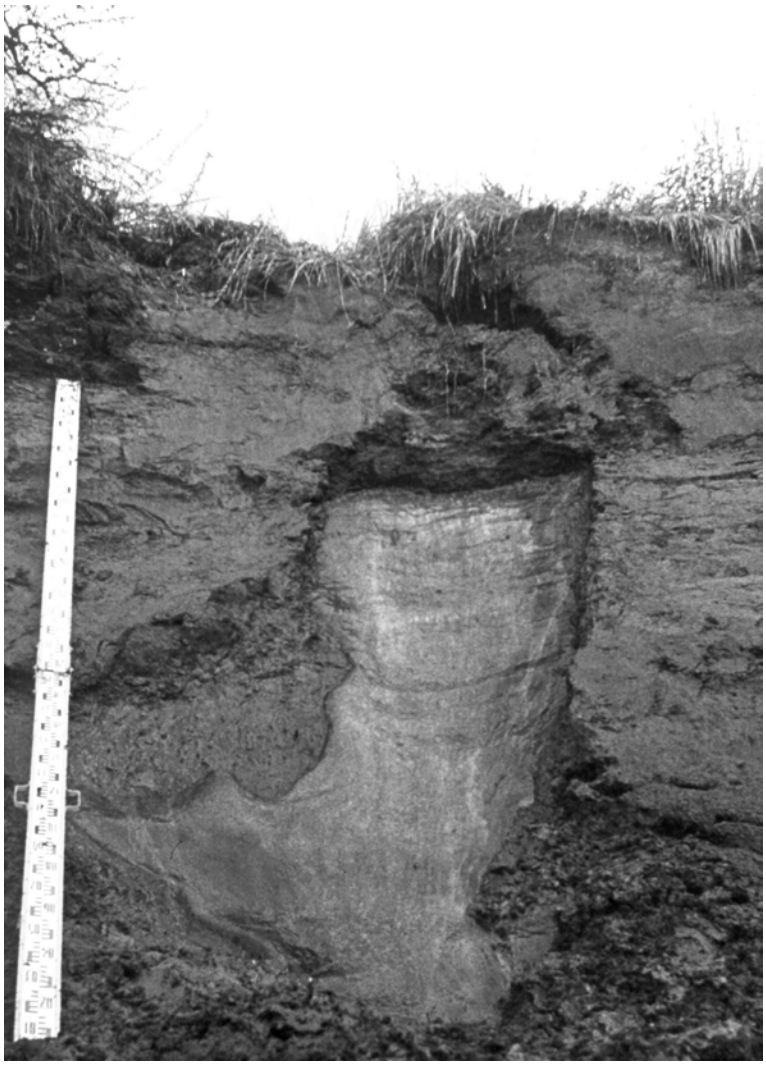

Figure 16. Ice vein in Berelekh site.

The simultaneous existence of humans and mammoths, of course, does not completely confirm that all the mammoths, whose bones were found at Berelekh, were killed by Paleolithic hunters. The reason for the formation of such a gigantic cluster of bones of the animals ultimately is not clear. However, not taking the anthropogenic factor into account seems premature. Not by chance, in his last article Vereshchagin (1975) views the bones of the animals of the Berelekh site as "the remains of the procurement of hunters of the early Stone Age in northern Yakutia (12,000 years ago)." Vereshchagin's position meanwhile does not substantiate his change of view concerning the formation of the Berelekh accumulation of bones. This question requires further study. Preliminarily, we suppose that the bones of the mammoths at the Berelekh site are not a chance accumulation, but rather the remains of early human dwellings destroyed by ice veins and solifluction processes. In this case, the presence of such a large number of bones in a comparatively limited area (approximately 130 m along the river bank) would not be so astonishing. Vereshchagin (1971) notes that the bones collected in 1970 belonged to no fewer than 120 mammoths and supposes that a total of "several hundred animals perished in the area." I. G. Pidoplichko (1969) cites very close figures for the Paleolithic Mezhirich site in the Ukraine. Based on his calculations, the bones of 95 mammoths were used for construction of only one dwelling there. Perhaps part of the dwelling was washed away in 1970 by the hydropump during the work of Rusanov's geological expedition. A fragment of this area is illustrated in a photograph in Vereshchagin's (1971:Fig. 4) article. Vereshchagin (1971:90), describing "the layer of long-bones and flat-bones and tusks lying and *standing vertically and inclined* (emphasis mine—*Yu. M.*)," notes that "the play of the early stream currents and slides—solifluction—created *the impression of the activity of human hands* (emphasis mine—*Yu. M.*)."

Unfortunately, the excavations at the Berelekh site, in which the thick ice veins almost reach the present ground surface, are very difficult (Fig. 16). Only the thawed upper shelf of the terrace can be usefully taken apart. But here, just at the ice vein, the layer begins to seriously thaw and to crumble or to spread along the frozen slope in a thick mass. Excavating this mass is almost impossible, since in it sticks the shovel. Therefore, only very thin parts of the layer can be removed. This is very different field archaeology than in Southern Siberia or in Europe. The frequent sliding of this layer does not permit estab-

lishing the early appearance of the Berelekh site as clearly as was done, for example, at Mezhirich, Kostenki, or Mal'ta and Buret'. And this site's early appearance is more evident since we are convinced that in the permafrost earth of Northeast Asia no fewer outstanding Paleolithic finds are preserved than in, for example, Europe. This is attested by the Berelekh image of a mammoth.

No doubt exists that the image belonged to the Paleolithic inhabitants of the Berelekh site. After a thorough inquiry of the residents of Berelekh village we established that they procured the mammoth tusks exactly where the Paleolithic site is located. This inquiry definitely specifies the geographic coordinates of the location of the image. Its stratigraphic tie to the cultural layer is corroborated by the fact that in the layer two pieces of tusk (one of them transformed into a spear [?] point) were found with linear design executed technically the same as the mammoth image. In addition, the carved lines on the pieces of tusk from the cultural layer and the tusk with the illustration of the mammoth are also practically identical.

Analysis of the archaeological materials collected at the Berelekh site suggests that the northernmost traces of the late stage of the Dyuktai culture, with an age of 13,000 to 12,500 BP, were recorded at it. These are also the northernmost traces of Upper Paleolithic culture in the world. However, it will not be surprising if traces of Paleolithic people are found now below 75º north latitude. An abundance of animals of the late Pleistocene on the vast frozen plain, which included the Novosibirskie Islands, enabled people to settle all the way to the coast of the Arctic Ocean at that time, which lay several hundred kilometers farther north than now.

The Kukhtui III Site

The Kukhtui III site was discovered in 1970 during work of the PAE on the left bank of the Kukhtui River, approximately 1.5 km from the Okhotsk Sea coast. The site was confined to a 25-meter bedrock terrace (Fig. 17). Excavations revealed the following stratigraphy in the site:

1. Sod 3 to 7 cm thick.
2. Reddish-brownish, slightly humic mantle of sandy loam 30 to 35 cm thick. In the upper part of the sandy loam, directly under the sod, were some remains of the early Iron Age (?). Farther throughout the thickness of the sandy-loam stratum are Neolithic remains.
3. A horizontally-laminated parcel consisting of interlayers of yellowish-brownish sandy loam 0.5 to 3.0 cm thick and interlayers of inequigranular yellowish-brownish sand 0.3 to 1.0 cm thick. The total thickness of the parcel fluctuates in various parts from 65 to 110 cm. The whole parcel has been subjected to permafrost disturbance in the form of folded soil veins. In the upper part of the parcel are isolated Neolithic artifacts going to a depth of no more than 7 to 10 cm from the top of the layer. Based on charcoal collected with these artifacts, a radiocarbon date of 4,700 ± 100 BP (LE-995) was obtained. This date requires checking, since the charcoal collected for analysis and the Neolithic artifacts could have been introduced into this layer by permafrost cracks from above-lying deposits. At the base of the parcel—at the very bottom and 5 to 10 cm above it—lie a variety of stone artifacts, which based on technical-typological features are closest to Dyuktai Paleolithic finds. The genesis of this parcel is not entirely clear. Judging by the character of the lamination, it may have an alluvial origin. However, subsequent work will be necessary to clarify whether we have here a case of rhythmic colluvium coming from the slopes of the Lanzhensk Mountains.
4. Pebbles and gravels cemented by grayish-yellowish large-grained sand, 6 to 7 m thick. It remains unclear whether this parcel has a riverine or marine origin.
5. Granite bedrock. The apparent thickness is 17 to 18 m.

Figure 17. View of the Kukhtui III site.

In the horizon containing the Dyuktai (?) materials were flakes of black flint (5 specimens), flakes of black hornfels (12 specimens), flakes of grayish siliceous limestone (2 specimens), a core (1 specimen), and tools and tool blanks (10 specimens). Judging by the character of the work, two more stone artifacts found on the slope of the terrace should be added to this complex.

The discoid core was made from a cobble of gray banded flint (Pl. 28:6). The longitudinal and transverse sections of the artifact are segmentlike. One surface was completely worked by the radial removal of spalls. The cobble cortex was preserved on a large part of the second surface, and only from one edge were a few spalls removed. Work on the striking platform was probably begun in this place. The diameter of the core is 4.6 cm, the thickness in the middle part 1.9 cm.

The stone tools are represented by a scraper (1 specimen), knives on flakes (2 specimens), broken points of spears (?) on large blades (found on the terrace slope) (2 specimens), bifacially-worked oval knives (2 specimens), a piece of a bifacially-worked knife or spear point (?) (1 specimen), a blank of a bifacially-worked knife (?) (1 specimen), a bifacially-worked dart point (?) (1 specimen), and a chisel-like tool (1 specimen).

The skreblo was made from a large flake of gray hornfels (Pl. 28:7). The ovally convex working edge of the tool was worked by steep retouch directed from dorsal to ventral. The surface of the back, with the exception of the part adjoining the striking platform, is covered with cobble cortex. The surface

of the ventral side, except the edge of the working edge, was not subjected to special working. The length of the skreblo is 7.1 cm, the width 5.1 cm.

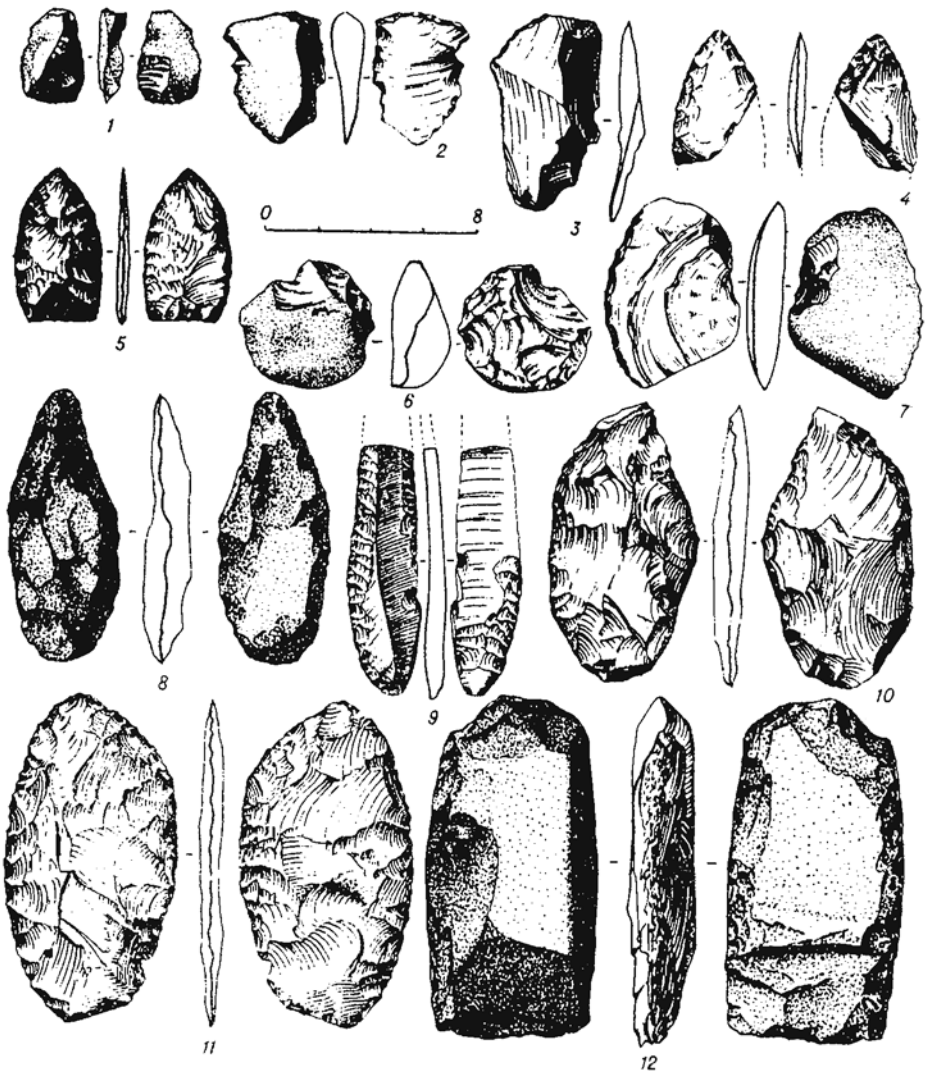

Plate 28. Kukhtui III site. Stone assemblage.

The two knives were made on flakes of gray (Pl. 28:2) and black (Pl. 28:3) flint. The working edges of the first knife were worked by edge retouch directed from dorsal to ventral, and on the second knife, from ventral to dorsal. The length of the first knife is 4.9 cm, of the second, 7.0 cm.

The two spear points (?) found on the terrace slope were made from large blades of black flint and black hornfels. The first point (Pl. 28:9) was made from a large three-faceted blade. Its point, which is located on the lower part of the blade, is broken. The length of the preserved part of the point is 9.2 cm. Both of its lateral edges were worked by pressure retouch from ventral to dorsal. The projecting part of the ventral side in the vicinity of the bulb of percussion was flattened by pressure retouch (evidently for convenience of fastening in a shaft). The second point (?) is represented only by a small fragment of the base. The length of its preserved part is 3.8 cm. It was worked just like the first. Such points do not yet have complete analogies in any of the archaeological sites in Northeast Asia. However, judging by the

dimensions of the blades and the trim on the bulbs of percussion, these points can be tentatively assigned to the earliest Kukhtui complex.

The oval knives were made from black hornfels (Pl. 28:10, 11). Both broad surfaces of the tools were worked by flat retouch. The edge was additionally trimmed by smaller retouch. The longitudinal and transverse sections of the knives are flattened-almond-shaped. The length of the knives is 10.4 and 12.3 cm, the width 5.7 and 6.5 cm.

It is possible that the blank of a such knife is a tumbled flat slab of gray hornfels (Pl. 28:12). It was in the initial stage of working. The facets left by the large spalls were located basically along the edges of the broad surfaces. The length of the blank is 12.8 cm, the width 6.6 cm.

The dart point (?) was made of black flint (Pl. 28:5). The tool is subtriangular with a straight base and slightly convex lateral sides. The point was worked on all sides by the removal of small flat spalls. The base was additionally sharpened on two sides for more convenient seating by small retouch. The length of the point is 5.7 cm, the width in the middle part 3.4 cm, the width of the base 2.6 cm. It looks very much like a point of the same form represented by a piece of the upper part of an artifact of gray hornfels (Pl. 28:4). It differs only by its more massiveness and less careful working. The length of its preserved part is 5.2 cm.

The laurel-leaf knife or spear point (?) is represented by a blank of greenish-grayish hornfels (Pl. 28:8). It was worked almost completely on all sides by the removal of large spalls. The cobble cortex was partially preserved only in the middle part of the broad surfaces. The length of the blank is 10.2 cm, the width in the middle part 4.2 cm.

The chisel-like tool was made from a flake of orangish chalcedony (Pl. 28:1). Only the ovally convex working edge of the tool was worked, by bifacial edge retouch. The length of the artifact is 3.7 cm, the width of the working edge 2.0 cm.

Based on the technical-typological features, the assemblage from the lower layer of the Kukhtui III site can now be compared with the Dyuktai artifacts found on the Aldan River. Especially indicative in this regard are bifacially-worked oval knives. The very substantial difference of this site from the Dyuktai complexes of Northeast Asia is the absence of wedge-shaped cores. If further excavations confirm that, in fact, there are none of these artifacts at Kukhtui III, then it would be necessary to acknowledge that the Dyuktai bifacial tradition was represented by two subtraditions: with wedge-shaped cores, and without wedge-shaped cores. However, no wedge-shaped cores have been found in any Holocene site. Since the age of the Kukhtui III site still remains unclear, we are presently unable to eliminate the possibility that the lower complex of this site represents that stage of development of the Dyuktai tradition when wedge-shaped cores had already vanished. The precise establishment of the chronological position of the lower complex of the Kukhtui III site is one of the most important tasks for archaeology in Northeast Asia. The Kukhtui complex may play a very important role not only for resolving the problem of initial settlement of Priokhot'ye, but also for refining the route and time of penetration by people into North America. Relying on the stratigraphy of the site and the typology of the stone tools, we are inclined to tentatively date the lower Kukhtui complex to the end of the Pleistocene. Only subsequent work can help to determine the absolute age of the site.

The Maiorych Site and Some Other Presumably Paleolithic Sites of the Kolyma and Chukotka

The Maiorych site. In July 1970 the site was discovered by the PAE on the left bank of the Kolyma River at approximately 63º north latitude, somewhat north of the place where the Kolyma River cuts through the Cherskii Range. The site is confined to a point on the left bank at the mouth of Maiorych Creek, a left-bank tributary of the Kolyma. The 14-meter bedrock terrace above the floodplain of the Kolyma River can easily be distinguished in the relief in this area. At the mouth of Maiorych Creek a segmentlike floodplain 5 m high is articulated with it. The 5-meter floodplain is composed of small-grained dark-gray sands that are interbedded with grayish-brownish silts containing plant remains.

The site is located on the 14-meter terrace. Profiling its outer point revealed the following stratigraphy:

1. Sod 3 to 7 cm thick.
2. Beigish-brown mantling sandy loam 25 to 40 cm thick.
3. Pebbles cemented by large-grained gray sand. The parcel represents a fluvial facies of alluvium 7.5 to 8.5 m thick.
4. The bedrock terrace, composed of tufogenic silt, apparently 6.0 to 6.5 m thick.

In several places along the outer point of the terrace, facing the Kolyma, the sod and sandy loam are deflated and the gravels appear directly on the surface. In one such part of the area, about 12 m square, were found three flint flakes, one core, and two flint tools (Pl. 29).

The upper part of two flakes was broken. The length of one of them is 2.5 cm, the greatest width 2.2 cm. The dimensions of the second are 1.5 x 1.7 cm. The third flake has an elongated subtriangular form. Its length is 4.7 cm, the greatest width 2.7 cm.

The core was made from a grayish-yellowish flint slab (Pl. 29:3). Based on the form and technique of working, it was assigned to the category of flattened wedge-shaped cores. Its length is 5.3 cm, the height of the end from which microblades were to be removed 4.8 cm. The longitudinal and transverse sections of the core have a subtriangular (wedge-shaped) form. Both broad lateral sides were carefully worked by flat pressure retouch. One of them partially retained a yellowish cobble nodule cortex. The lateral sides come together smoothly in the lower, rear, and (in part) upper areas of the core, forming an ovally curved rib, which was additionally worked by the removal of small spalls. The pressure platform was arranged diagonally, at an angle of 70º, to the plane of the working end. It was formed by the removal of one longitudinal spall. Its maximum width is 1.0 cm. The core was not at all exhausted. Only one small spall had been removed from its working part.

One of the flint tools was made from a large three-faceted light-gray blade, the upper part of which was broken (Pl. 29:2). The length of the blade is 8.8 cm, the width of the upper part (at the break) 2.1 cm, of the lower part 0.9 cm. The artifact is a combination tool. An ovally convex working edge of an end scraper was formed at the base of the blade by steep edge retouch, applied from ventral to dorsal. The working edge of a knife is located on the left. The knife is the longitudinal edge of the blade worked by pressure retouch that removed flat spalls, which run partially onto the adjoining dorsal surface.

The second tool was made from a subtriangular grayish-yellowish siliceous flake (Pl. 29:1). The length of the flake is 5.5 cm, its width 3.7 cm. The flake was worked along the edges by small pressure retouch applied from ventral to dorsal. The striking platform and bulb of the flake were trimmed by the removal of flat spalls. Four of the spall scars are on the dorsal side, one on the ventral side. The removal of these spalls formed a grooved working edge 0.7 cm wide. The tool was used as a knife and as a chisel.

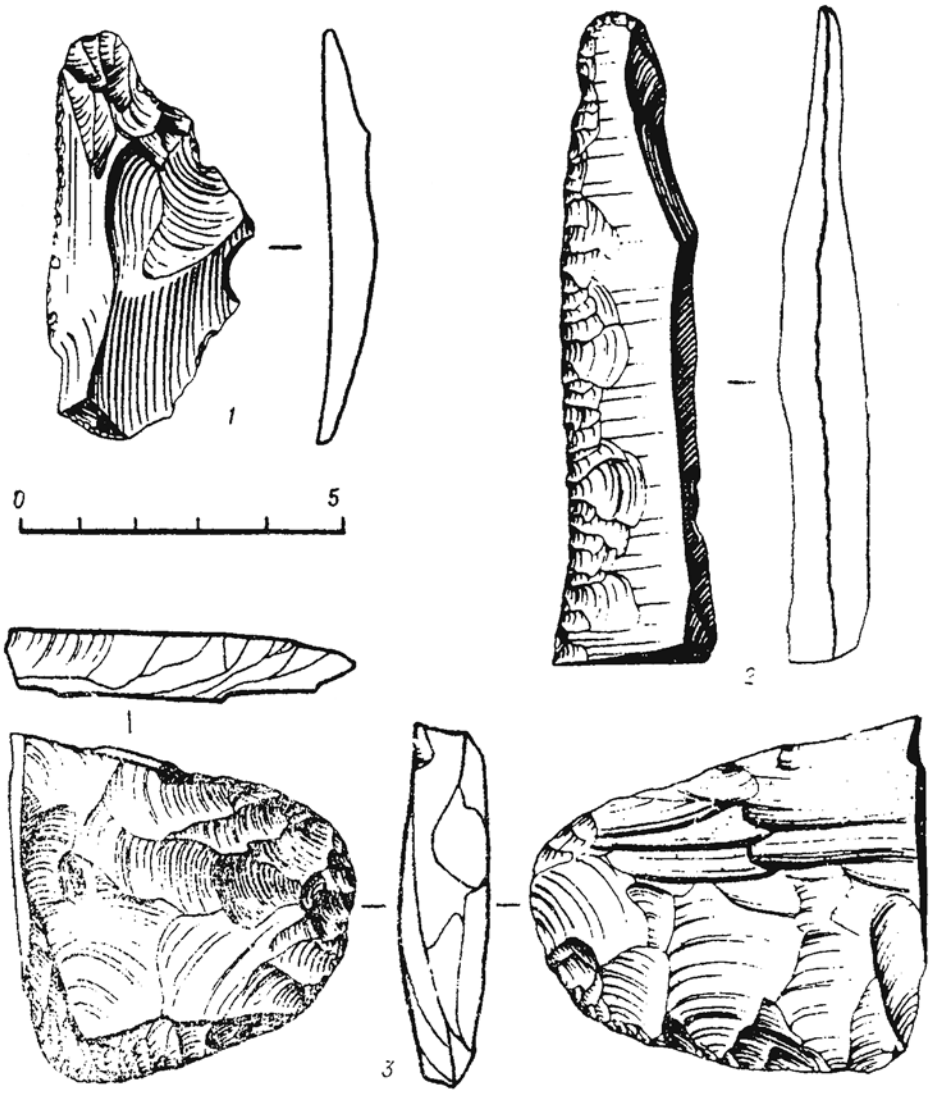

Plate 29. Maiorych site. Stone assemblage.

Even in the absence of clear stratigraphy, absolute dates, and faunal remains, the artifacts examined permit tentatively determining the age and cultural affiliation of the Maiorych site.

Recent investigations have established that east of the Yenisei basin flattened wedge-shaped cores, close in form and technique of preparation to the specimen found at the Maiorych site, are generally confined to sites with clear stratigraphy of late Pleistocene deposits and accompanied by mammoth fauna. The chronological position of flattened wedge-shaped cores has been most precisely determined for the Paleolithic sites of the Aldan valley.

The earliest wedge-shaped cores with retouched lateral surfaces have presently been found in Layer II of the Ikhine I site, the approximate age of which is 30,000 to 25,000 BP. Judging by the materials from the Verkhne Troitskaya site, such cores had a rather wide distribution even at the beginning of Sartan times, about 23,000 or 22,000 to 18,000 BP. In this regard, it is very indicative that the knife-scraper recorded at the Maiorych site has its closest analogy among materials from Verkhne Troitskaya.

The "youngest" wedge-shaped cores similar to the specimen found at the Maiorych site have presently been found in the deposits at Dyuktai Cave, dating to 13,000 to 12,000 BP.

Given the dates of wedge-shaped cores enumerated above, and considering that the drying up of the surface of the fluvial alluvium of the 14-meter terrace of the Kolyma could hardly have occurred earlier than the beginning of Sartan times, we can tentatively supposed that the age of the Maiorych site falls within the interval 23,000 or 22,000 to 12,000 BP. A more detailed date can be obtained only through further research of the Paleolithic on the Kolyma.

For clarification of the cultural association of the Maiorych site, the most important feature is the presence of flattened wedge-shaped cores with two retouched lateral surfaces—a characteristic element of the Dyuktai cultural complex. This observation, as already noted (Mochanov 1972b), tentatively permits assigning the Maiorych site to the Dyuktai culture.

The Susuman site. In 1945, according to A. P. Vas'kovskii, geologist A. I. Zubov found in interglacial deposits of the 110-meter terrace of Susuman Creek (upper Kolyma basin) pieces of poplar, worked (according to A. P. Okladnikov) "by the hand of man" with a bone, antler, or stone tool (Vas'kovskii and Okladnikov 1948).

A detailed study of the remains of a beaver dam discovered in 1963 by B. S. Rusanov in Sartan deposits of Mamontova Mountain on the Aldan indicated that a multitude of pieces of wood worked in precisely the same way as the Susuman "wooden stake" were contained there. As evidence, one need only compare Figure 3 in the article by Vas'kovskii and Okladnikov (1948) with Figure 55 in the monograph by Rusanov (1968). The latter clearly shows that the so-called "hewings" on the wood are traces of the gnawings of beavers. There is no basis for doubt that the "hewings" on the Susuman pieces of wood are those of beavers.

Significantly, Okladnikov (1953), analyzing the "worked" pieces of wood found in quaternary deposits on Malyi Patom Creek and published by N. M. Koz'min (1898), concluded that the traces on the wood were left not by Paleolithic people, but by beavers.

In connection with the problem of the initial stages of settlement of the Kolyma and the regions of Chukotka lying to the east, we must dwell on several more supposed Paleolithic finds.

The Bochanut site. The most interesting finds, from our point of view, were made by the Moscow geologist A. P. Muzis in 1972 on Lake Bochanut, located on the left bank of the Kolyma River 80 km northeast of the city of Srednekolymsk (approximately 68º north latitude). Here numerous bones were found in six places in a steep denuded bank 10 to 15 m high. Based on identification by A. V. Sher, they belonged to mammoth, woolly rhinoceros, bison, horse, muskox, reindeer, and moose.

Traces of wear in the form of hammering and polishing can be easily seen on the bones of bison (8 specimens), horse (2 specimens), rhinoceros (1 specimen), and muskox (1 specimen). Based on S. A. Semenov's determination, these traces were left on the bones through human use. But no clearly formed types of tools can be distinguished among these bones. And since no special archaeological investigations have been conducted at Lake Bochanut, we cannot reliably confirm that we are definitely dealing with a human Pleistocene site here. Up to now it has not been finally clarified which of the animal bones (killed or scavenged) were used by humans. In this regard, the Bochanut cluster of bones of Pleistocene animals is very similar to the Old Crow site in northern Canada (67º 6' north latitude), among which were also found bone artifacts. Relying on radiocarbon dates obtained on bone artifacts from the Old Crow site, the researchers (Irving and Harington 1973) believe that people lived in the American Arctic approximately 25,000 to 30,000 years ago. However, some archaeologists note that people could have used bone that

was not contemporary with them for making tools (Haynes 1971), but of extinct animals from any time. Unfortunately, no stone artifacts have been found at the sites of Old Crow and Bochanut and the precise stratigraphic position of the bone remains has not been established. Nevertheless, further study of these sites and comparative analysis of the materials found at them may provide great prospects for solving the problem of settlement of Northeast Asia and America.

The Shilo site. In 1970, V. I. Gerasimchuk discovered in a saddle between hills on the right side of the source of Shilo Creek (upper Kolyma basin) an end scraper made on a large lamellar flake 7.5 cm long and 3.4 cm wide. No cultural layer or any other finds were recorded in this area. N. N. Dikov and Gerasimchuk (1971) proposed that "this single find is related to a temporary site of Upper Paleolithic hunters." Later, Dikov (1974b) concluded that this scraper belonged to "the very end of the glacial period" and has an age of "approximately 10,000 years." Dikov, not citing any typological analysis, believes that the scraper from Shilo Creek probably belongs to a Paleolithic culture, traces of which were found at the Ushki site (Layers V and VI) and at Dyuktai Cave. However, though Dikov also writes that this scraper is "typical for the late Paleolithic of Northeastern Siberia" (Dikov and Gerasimchuk 1971), we believe that such "axiomatic" assertion has to be seriously questioned. End scrapers similar to that described by Dikov do not have clear stratigraphic ties at present. Of course, they could belong to the Paleolithic, but it is just as probable that they were also used in the early Iron Age. The "intense patina" that Dikov refers to is not in itself evidence of substantial antiquity since very many stone tools encountered among surface materials from the Neolithic and Iron and Bronze Ages are much more patinized than Paleolithic artifacts. The intensity of patinization rather often depends not on the duration of the stone objects on the surface, but on the microconditions of their deposition. For this reason stone tools are often found, the different sides of which are patinized with different degrees of intensity.

Considering the fact that the scraper being examined does not possess clear diagnostic traits, it is presently premature to view it as evidence of the presence on Shilo Creek of a Paleolithic site. If one were to rely on such criteria as Dikov uses, any patinized "archaic" stone flake or blade, not having clear stratigraphic ties, could be assigned to the Paleolithic.

The Ryveemskoe site. In 1973, Dikov published a report that "*in 1959 in a damaged, probably Paleolithic cultural layer* (here and further emphasis mine—*Yu. M.*) on the high left bank of the Ryveem River (on Aion Island, above the Arctic Circle) *at a depth of more than 6 m* the author found *a flint knifelike microblade*, and below, in the talus of this same 25-meter terrace—the skull and several long-bones of a shortish mammoth" (Dikov 1973:5–6). Later, the author quotes his reports, which provide an understanding of the time and culture to which, in his opinion, the Ryveemskoe microblade belonged. He writes:

> At the very end of the glacial period, approximately 10,000 years ago, in Chukotka a very different Paleolithic culture was probably widespread (before this time, according to Dikov, there "very probably" existed a culture in Chukotka for which stemmed stone dart and arrow points were characteristic, analogous to artifacts from the seventh layer of the Ushki site—*Yu. M.*). Traces of it were found in the fifth and sixth layers of the Ushki sites in Kamchatka, in Dyuktai Cave on the Aldan, and evidently in the upper Kolyma basin at Shilo Creek. The creators of this culture had very characteristic methods of working stone; they exclusively widely used *small cores of distinctive wedge-shaped form, from which it was possible to flake the thinnest knifelike blades. We found a piece of precisely such blade at the above-mentioned Ryveemskoe site on Aion Island.* (Dikov 1973:6–7)

Data on the "Ryveemskoe blade" had already been used by Dikov (1974b) as evidence for the existence of the Paleolithic in Chukotka in the summary work, "Notes on the History of Chukotka from Earliest Times to the Present," and became a contribution to a wide circle of specialists and those interested in the earliest past of Northeast Asia. Accordingly, we consider it necessary to examine in detail the "history of the discovery" of the named "Paleolithic" find. For the historiographic value of the "Ryveemskoe Paleolithic blade" we must clarify the following questions: (1) What kind of blade was found on Ryveem River in 1959; (2) Under what stratigraphic conditions were the blade and mammoth bones deposited; (3) To what time was the blade dated; and (4) What, finally, is the reason to redate the blade.

(1) The first reports about work on Lake Aion (Dikov 1960:98; 1961:40) pointed out that in 1959 a "*small piece* of a heavily patinized knifelike blade of gray flint" was found on the Ryveem River. As already noted, in his recent works Dikov believes without doubt that the Ryveemskoe microblade was taken from a wedge-shaped core. However, analysis of thousands of microblades convincingly attests that based on one microblade, additionally represented as a "small piece," it is completely impossible to determine whether it was taken from a wedge-shaped core or a prismatic microcore. Microblades sometimes turn out to be nothing more than unsuitable spalls from large prismatic cores. Prismatic cores, including those from which exceptionally fine microblades were removed, had a broad temporal range in Northeast Asia—from the Paleolithic to the early Bronze Age. Consequently, the "small piece" of the knifelike blade cannot serve as even indirect evidence of the existence of a Paleolithic site on Ryveem River.

(2) Concerning the stratigraphic position of the Ryveem finds, Dikov (1960:98; 1961:40) noted:

> In the depth of the island (Aion Island—*Yu. M.*), 8 m from the sea, *on a high (about 25 m) sandy cliff of the left bank of the river (*the Ryveem River—*Yu. M.), 6–8 m from its upper edge, a dark peaty sandy-loam layer 60–70 cm thick can be clearly seen*, a brownish color in places. Opposite the steep bend of the river, *there is a place where laminated sands above this dark layer were weathered, having denuded a large area of it. Here in the very upper part, at the edge of the cliff*, we succeeded in finding a fully identified *trace of human occupation*—the small piece of heavily patinized knifelike blade of gray flint. *Six meters below on the slope of the cliff, in its talus, showed white the broken long-bones of a small mammoth*, still lower—its ribs and lower jaw, and at the very bottom of the cliff—the skull. *Meanwhile there is not sufficient reason to doubt that the bones of the mammoth belong to the cultural horizon with the knifelike blade.* (Dikov 1961:40)

Dikov notes in other works (Dikov 1960:99; 1969b:155): "The bones of the mammoth *do not, of course, belong* to the cultural horizon with the knifelike blade." From the description cited, clearly the piece of knifelike blade lay "*not at a depth of more than 6 m*" (as Dikov [1973:5] now writes), but directly on the surface of the "*sod-covered layer*" at the edge of the cliff. When the piece of blade arrived on the surface of the "*sod-covered*" layer remains unclear. No answers are given to the questions: When was the "*sod-covered*" layer formed and what is its genesis; when was it covered by the laminated sands 6 to 8 m thick, and what was the genesis of these sands; when and why were the sands "*weathered*," and so on. In order to prove that the piece of blade was found "*at a depth of more than 6 m*," Dikov must find some kind of cultural remains *in situ* in the "*sod-covered*" layer under the "*laminated sands*" 6 to 8 m thick. However, after 1959 Dikov did not conduct any work on the Ryveem River nor cite any new data permitting reexamination of the stratigraphic position of the blade. Therefore, as before, the "Ryveemskoe Paleolithic blade" can be viewed only as a surface find that does not have any definite geological age.

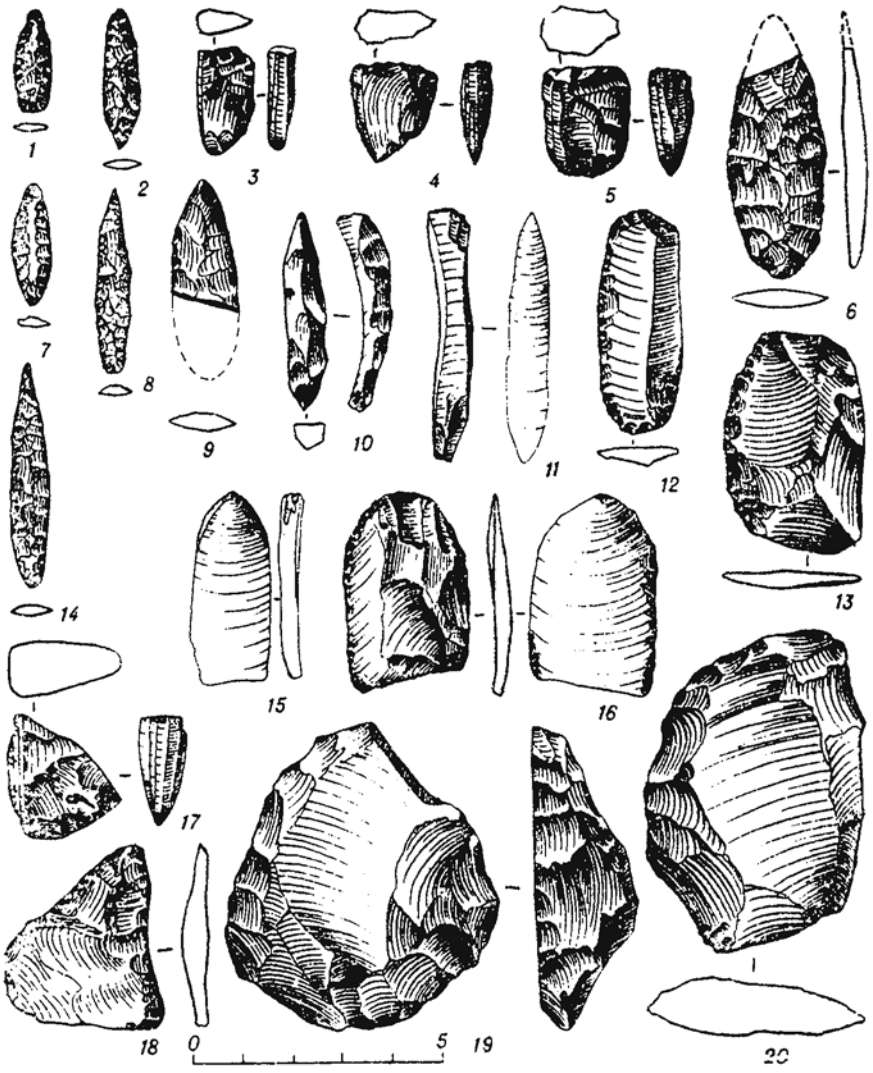

Plate 30. Ushki site. Dyuktai Paleolithic complex (based on materials of N. N. Dikov).

(3) Having found the piece of knifelike blade in 1959, Dikov (1961:40) noted that it "*belongs to the same time as the sites that were discovered by A. A. Kalinin and V. D. Lebedev*, known now on Aion Island." Having compared the Aion finds with archaeological materials from Yakutia, Dikov (1961:41) concluded that "these comparisons are fully sufficient to *date the time of existence in the Aion sites to Late Neolithic and early Bronze Age by the scales of northern Yakutia, that is, the second and beginning of the first millennia B.C.*"

(4) What was the reason that impelled Dikov to assert in recent years that the piece of the blade belongs not to the Late Neolithic or early Bronze Age, but to the Paleolithic? Dikov (1973:6) writes that he "*abstains* from a Paleolithic interpretation of these finds," because he did not yet have available "*data on the Paleolithic of Kamchatka*." However, a study of Dikov's works shows that his assertion does not correspond to reality. Dikov (1967:17) noted that in 1964 a "*very clearly expressed Upper Paleolithic*" was discovered in Kamchatka (Pl. 30). Why does he not assign the "Ryveemskoe finds" at this time to the Paleolithic? Perhaps he simply had not succeeded in adequately interpreting the Paleolithic of Kamchatka. However, the names of Dikov's work (*The Discovery of Paleolithic in Kamchatka and the*

Problem of the Initial Settlement of America—1967; *The Upper Paleolithic of Kamchatka*—1969a) show that for a long time he was already acquainted with the Paleolithic of Kamchatka. But indeed, in his summary work, *The Early Hearths of Kamchatka and Chukotka: Fifteen Thousand Years of History*, Dikov (1969b:155) writes that the *Ryveemskoe blade belongs to the Late Neolithic or early Bronze Age*. Interestingly, in the catalog of archaeological sites of the Magadan Region (Dikov 1974:13) the "Ryveemskoe blade" belongs to the Neolithic.

Not until 1971 did Dikov mentioned that "the first features of the Paleolithic in Chukotka were noted by V. K. Arsen'ev, and were also discovered by the author on Aion Island" (Dikov 1971a:14). Before writing this work Dikov was acquainted with the archaeological finds of N. K. Vereshchagin from the "Berelekh mammoth graveyard" (71° north latitude). It was these finds, showing for the first time that mammoth hunters lived in Asia on the coast of the Arctic Ocean by at least the end of the Pleistocene, and not "data on the Paleolithic of Kamchatka," that prompted his assertion that he had discovered the Paleolithic in the Arctic by 1959.

* *

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Finishing the brief review of the various sites of the Kolyma and Chukotka, we can conclude that in this territory only the Maiorych site can presently be assigned to the Paleolithic. But the question still requires further study. Very important materials can also be obtained from Bochanut site. The close similarity of archaeological sites on the Aldan and Berelekh (assigned to Pleistocene deposits) to the earliest sites of Alaska attest that on the Kolyma and in Chukotka, sites will be found characteristic of the Paleolithic. The Alaskan sites were settled by people from Asia through Chukotka and the now-flooded Bering Strait.

Chapter II

ARCHAEOLOGICAL TYPE SITES OF THE EARLY HOLOCENE OF NORTHEAST ASIA (10,500 to 6,000 BP)

Only ten years ago not one archaeological site was known in Northeast Asia which would have preceded Neolithic sites and indisputably belonged to the early Holocene. Not by chance, one of the pioneers of archaeological study in Northeast Asia, A. P. Okladnikov, wrote in the first summary of the earliest history of Northeast Asia:

> Archaeologists have not yet found in the territory of Yakutia traces of the gradual transition from the Paleolithic to the Developed Neolithic. Very few such finds are known even in better studied Pribaikal'e. Consequently, we must immediately arrive from the Paleolithic past of Yakutia to the Neolithic stage of its history, represented by rich and distinct sites, including not just settlements, but also burials and specimens of art. (Okladnikov 1955:74)

Considering such a position, the PAE turned its steadfast attention to the search for traces of human occupation in the early Holocene. The search for these traces found success in 1965 when in the Aldan valley at the Sumnagin I site, under Early Neolithic layers in Holocene deposits of the high floodplain, the first remains of a culture were noted that was characterized by the lack of ground stone tools and clay vessels. This culture was given the name "Sumnagin" (Mochanov 1966a).

At present, sites of the Sumnagin culture have been recorded on the Aldan, Amga, Mai, Vitim, Olekma, Lena, Vilyui, Pyasina, Kheta, Indigirka, Kolyma, and Ulya Rivers (Fig. 18). The best studied of them are the multicomponent Bel'kachi I (Layers 8 to 20) and Ust' Timpton sites (Layers 4a to 5a). A wealth of material was obtained from them, permitting characterization of the appearance of the Sumnagin culture, which existed in Northeast Asia 10,500 to 6,000 years ago. Therefore, various researchers have turned to these sites in order to interpret early Holocene archaeological sites found in such distant regions (from the Aldan region) as, for example, the Upper Vilyui (Fedoseeva 1972), the Taimyr (Khlobystin 1973a), or Chukotka and Kamchatka (Dikov 1971b).

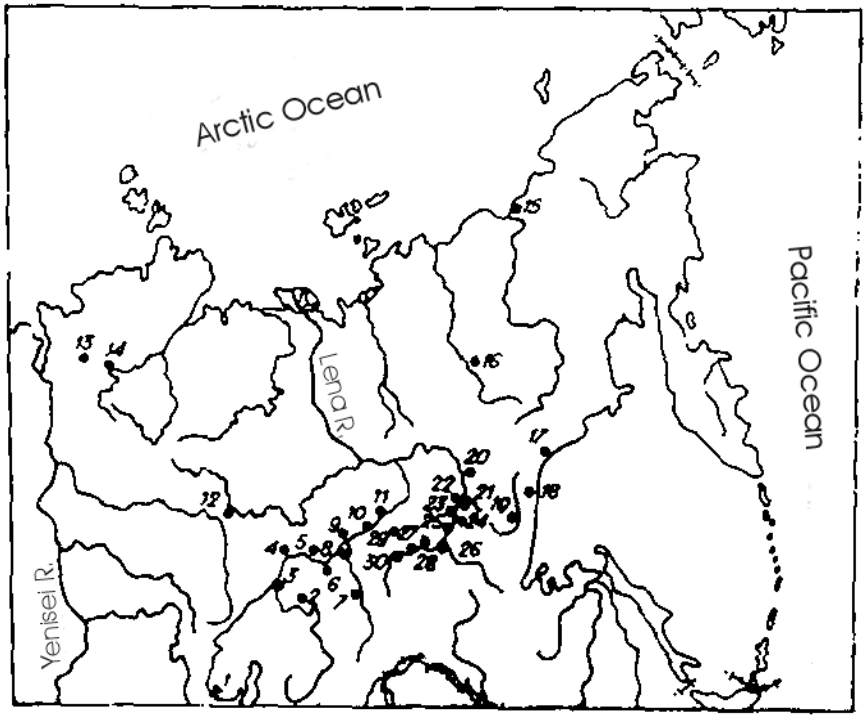


Figure 18. Map of the distribution of early Holocene archaeological sites of Northeast Asia. 1) Shishkino; 2) Bol'shaya Severnaya; 3) Ust' Vitim; 4) Solyanka; 5) Nyuya; 6) Tochil'naya; 7) Leten Novyi; 8) Teryut I; 9) At Daban; 10) Markhachan; 11) Kullaty; 12) Ust' Chirkuo; 13) Pyasina I, III, IV; 14) Tagenar VI; 15) Panteleikha I–VIII; 16) Yubileinaya; 17) Kukhtui II; 18) Amka; 19) Yakimdzha II; 20) El'dikan; 21) Verkhne Troitskaya; 22) Ust' Mil' I, II; 23) Bilir; 24) Dyuktai Cave; 25) Bel'kachi I; 26) Alysardakh; 27) Tumulur; 28) Sumnagin I, II; 29) Buyaga; 30) Ust' Timpton.

The Multicomponent Bel'kachi I Site

The multicomponent Bel'kachi I site was discovered in July 1974 during work of the Aldan Expedition (from the Institute of Language, Literature, and History) on the left bank of the Aldan 1,075 km from its mouth (Fig. 19).

A geological-geomorphological study of the Bel'kachi I site carried out from 1964 to 1968 indicated that its cultural layers were confined to deposits of floodplain facies of alluvium in a channel bank of a high floodplain. The crest of the bank extends along the left bank of the Aldan from southwest to northeast toward the mouth of Ulakhan El'ga Creek. The width of the bank fluctuates from 25 to 50 m and extends 1.3 km in length. The southwest extremity of the bank where the excavation was located (Fig. 20) has an elevation of 14.5 m above the Aldan River level. Toward the northeast its elevation gradually drops to 11 to 12 m.

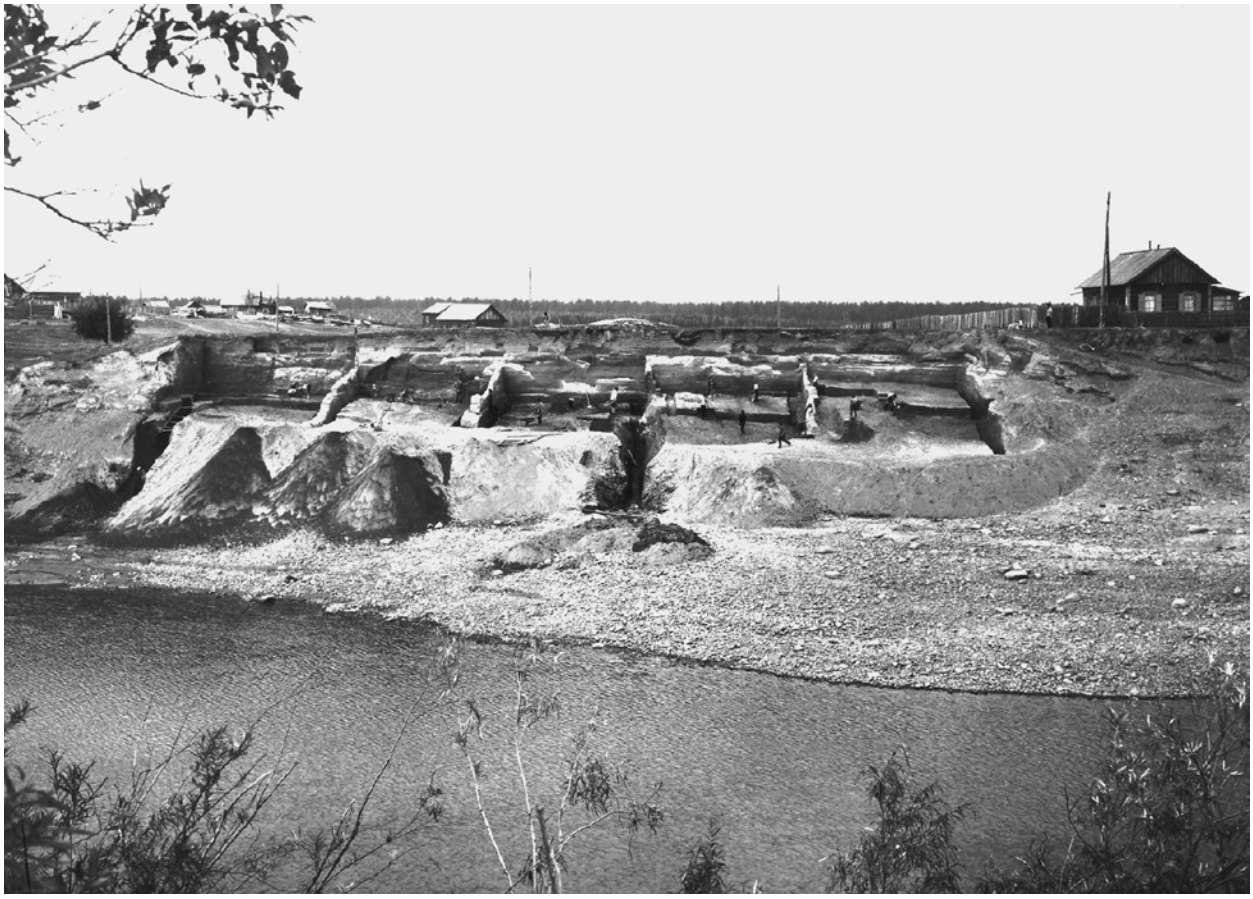


Figure 19. View to the excavation of the Bel'kachi I site.

The bank is articulated on all sides by channel deposits of floodplain facies of alluvium, as if they wrapped it, which together with deposits of the channel bank compose the high floodplain. The high datum marks at the top of the fluvial facies of the high floodplain alluvium reach 6.5 to 7.0 m above the Aldan River level at the longitudinal axis of the bank, while at the bottom of the channels the marks are only 2 to 3 m.

At present we hold that the southwestern part of the bank was higher in relation to the surrounding areas of the floodplain when, during brief periods of its drying up the primary accumulation of the floodplain facies of alluvium began to occur, creating the modern high floodplain. This circumstance also clarifies why the earliest residents of the multicomponent Bel'kachi I site set up their houses for the first time right here.

At that time this area (during the period of drying) was comparatively small. In front of it stretched a low swampy floodplain that remained for a long time. Even now during the highest flood the southwestern extremity of the bank remains the only part of Bel'kachi village located on the high floodplain that is not subjected to flooding.

Figure 20a. The Bel’kachi I site during excavation.

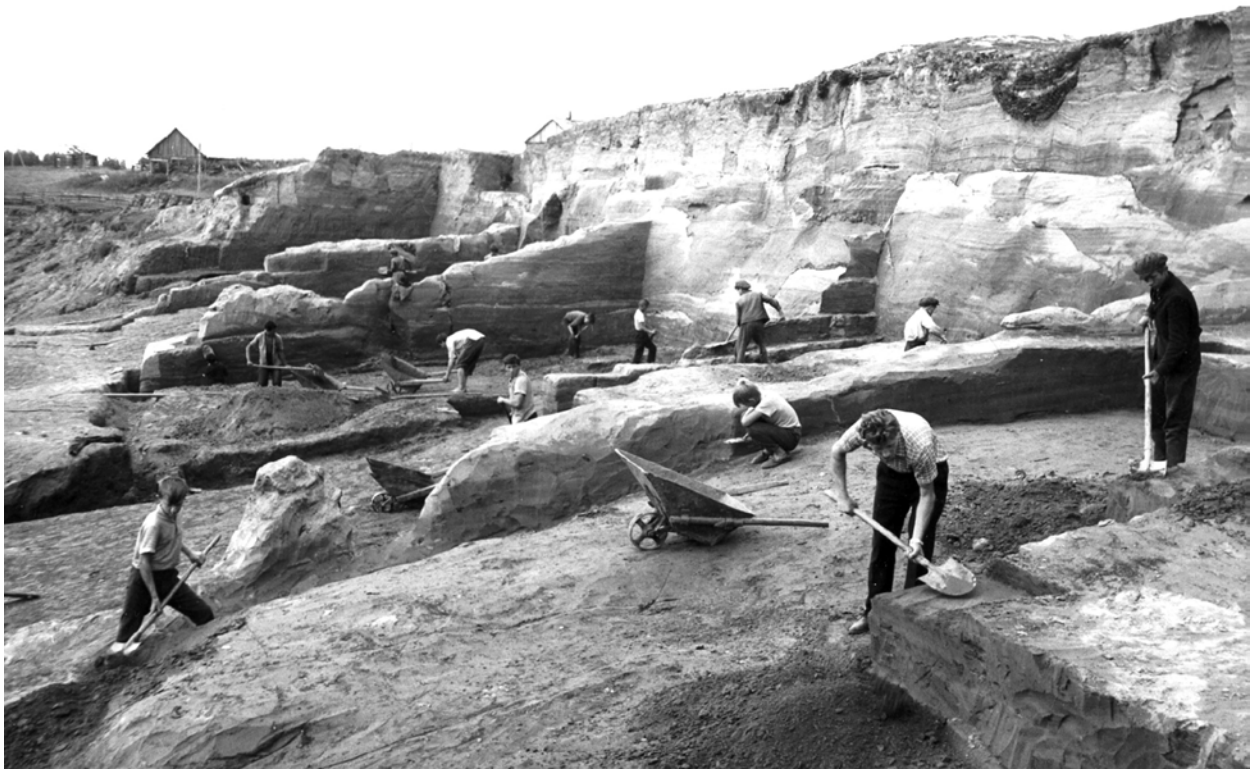


Figure 20b. The Bel'kachi I site during excavation.

The cultural layers of the Bel'kachi I site, lying in the floodplain deposits of the channel bank, become pinched out in the channel floodplain deposits in the direction of the Aldan. This situation is especially characteristic for the lower cultural layers, which have not been subjected to modern damage. Evidently the upper cultural layers were earlier composed by the same method. But the intensity of destruction of the bank projection of the high floodplain led to destruction of the upper parcel of the channel deposits with the cultural layers that wedged into them. As a consequence, the upper cultural layers, approximately to Layer XV, came out directly to the denuded point on the bank.

Control trenches placed in the high floodplain in 1965 to determine the "sterile soil" opened primarily those areas away from the banks where, under the fluvial alluvium lay the channel floodplain deposits. Following the distribution of these deposits through the depths of the river to the channel bank turned out to be impossible because of permafrost. In 1965 we supposed that the grayish-green sandy-loam stratum, which does not contain clear humic or detrital interlayers or the cultural remains confined to them, belonged not to the channel floodplain deposits, but to the upper part of the fluvial alluvium and underlies its cultural layers, that is, is culturally sterile subsoil.

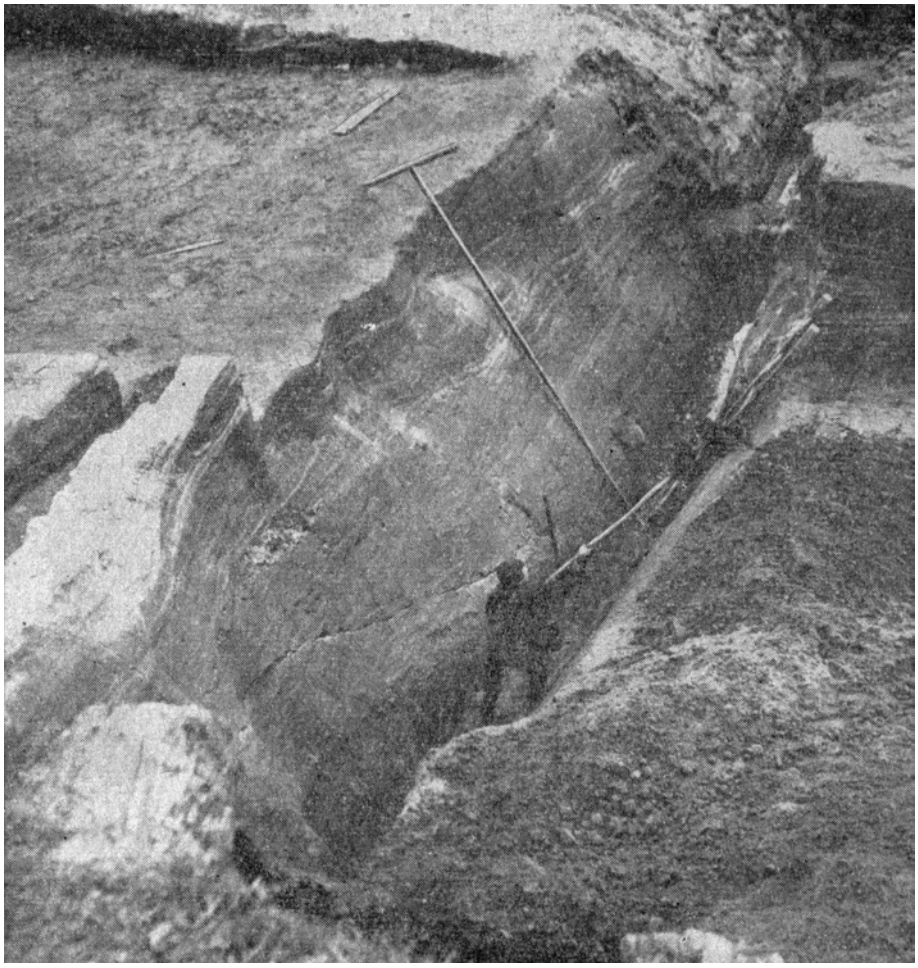


Figure 21. Bel'kachi I site. Stratigraphic trench along Line A-21–T-21.

The possibility of running the control trenches along Lines 1, 21–22, and 50 to the walls of the excavation, which passed along Line A, occurred for the first time in 1966 (Fig. 21). After taking out cultural Layers XII to XX, the deposits underlying them, which were until then in a permafrost state, began to thaw quickly (15–20 cm a day), which allowed going deeply to the fluvial alluvium.

In the process of studying the cultural layers and the deposits underlying them, the following stratigraphy of the multicomponent Bel'kachi I site was revealed from bottom to top from the level of the Aldan (Figs. 22, 23):

1. At the base of the high floodplain is a parcel of fluvial alluvium (Fig. 22). Its thickness above the Aldan River level fluctuates from 2 m in areas that correspond to the channel depressions to 7 m in the highest parts corresponding to the channel wall.

   The fluvial alluvium is represented by a parcel of interbedded yellowish-gray lightly silted inequigranular sands and greenish-gray hard loams. In the sandy interlayers pebbles and cobbles are often found, which in some cases compose rather thick lenses. The pebbles and cobbles are rounded Jurassic sandstone, which in this place serves at the bedrock of the 18- to 40-meter Aldan terrace.

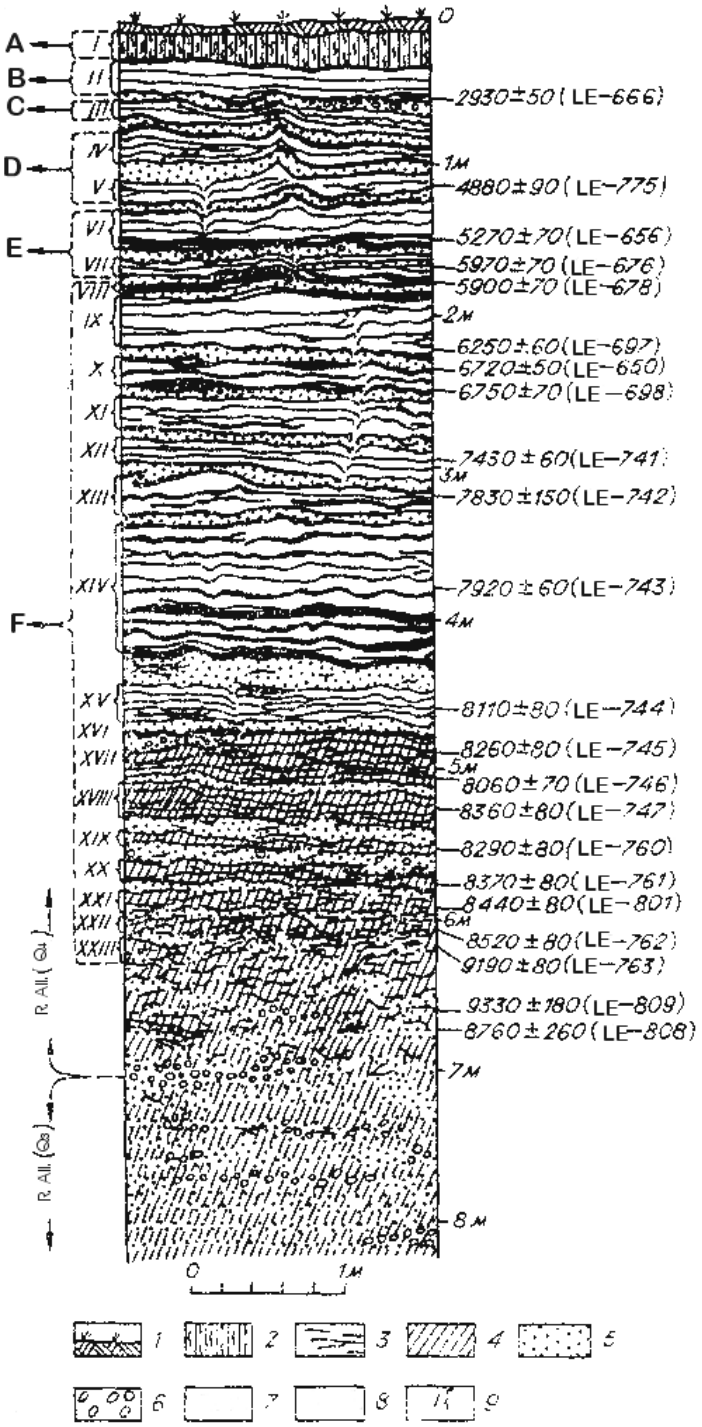


Figure 22. Stratigraphic profile of deposits at the multicomponent Bel'kachi I site. 1) sod; 2) ploughed layer; 3) silts with humus and woody material; 4) loam; 5) sand; 6) pebbles and gravels; 7) floodplain alluvium; 8) fluvial alluvium; 9) number and boundary of cultural layer. A) cultural complexes of the early Iron Age; B) Ust' Mil' culture (Bronze Age); C) Ymyyakhtakh culture (Late Neolithic); D) Bel'kachi culture (Neolithic); E) Syalakh culture (Neolithic); F) Sumnagin culture (final stage of the Upper Paleolithic).

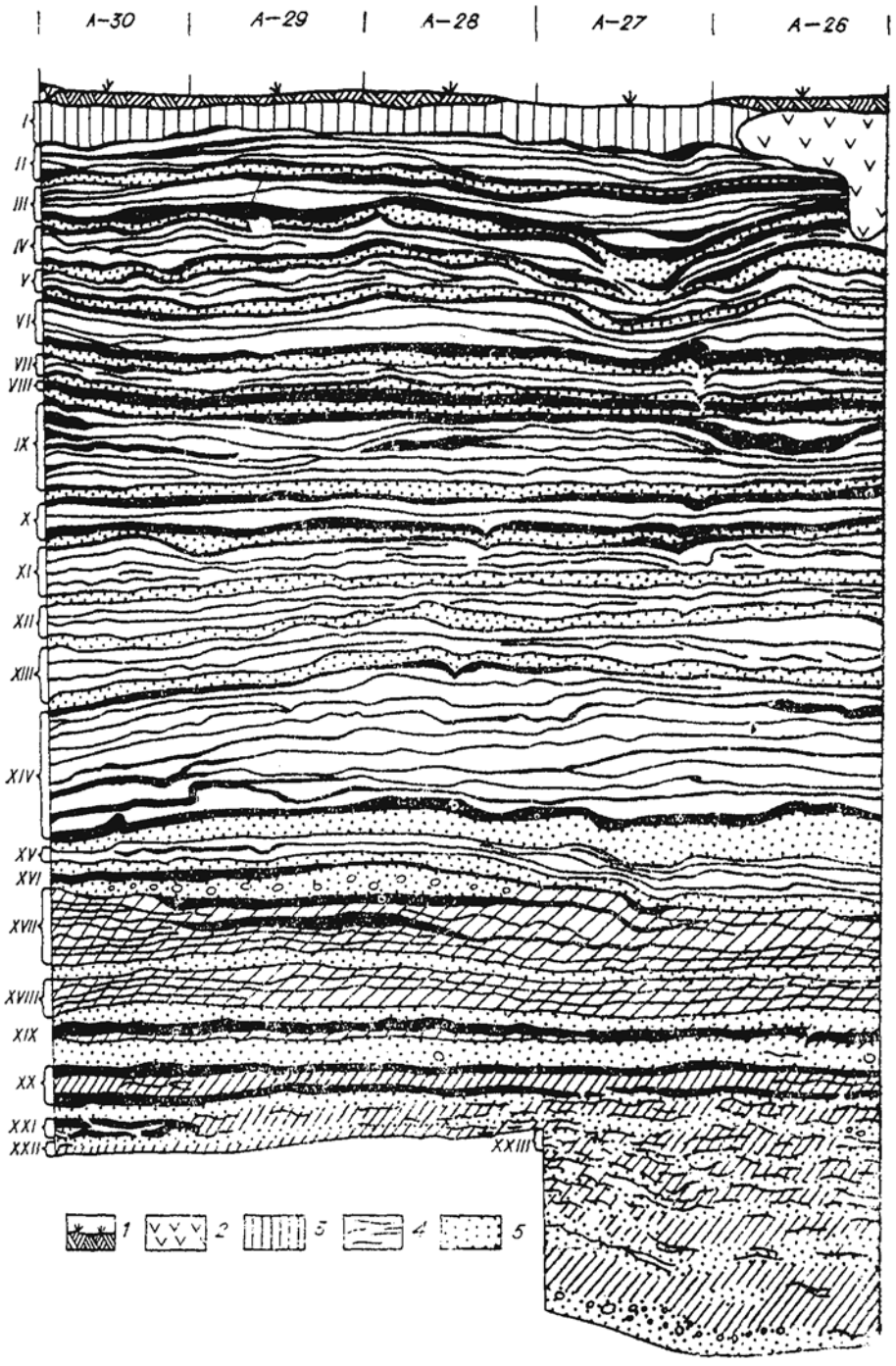
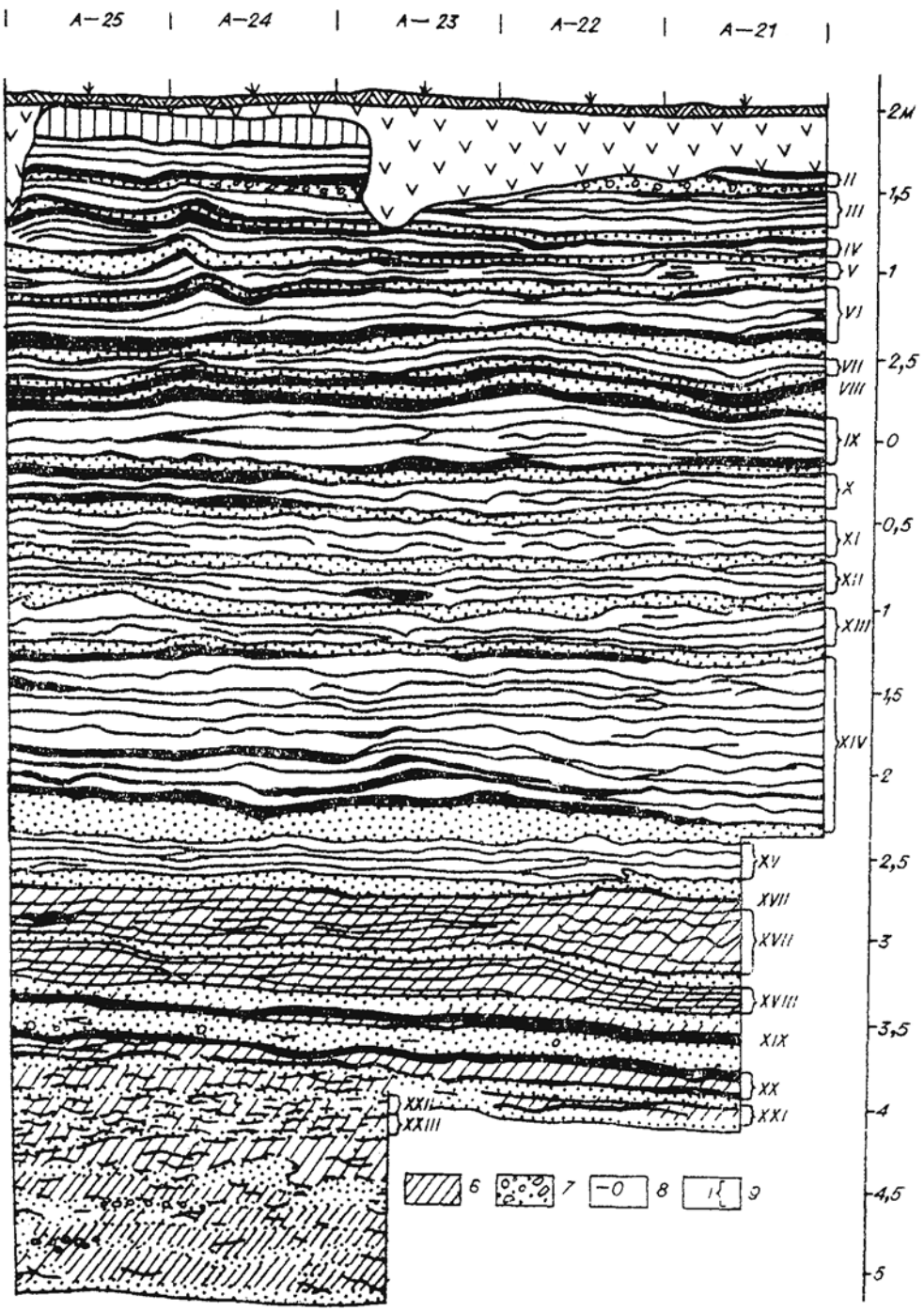


Figure 23. Schematic profile of the long wall of the excavation at the Bel'kachi I site along Line A-21–A-30. 1) sod; 2) modern pits; 3) ploughed sandy loam; 4) interlayers of silts, saturated with plant remains; 5) inequigranular sands; 6) loam; 7) pebbles and gravels; 8) neutral line; 9) boundary and number of cultural layer.


А–25
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Characteristic for the fluvial alluvium is a horizontally wavy or more rarely sloping lamination. The thickness of the individual sand interlayers, as a rule, is from 0.5 to 10 cm, and the loam interlayers, from 1 to 6 cm. Here and there the loams consist of the smallest oval or rounded grains with dimensions of 0.5 to 5.0 mm. On the whole, a parallel-layered cryogenic texture for the loams is characteristic, formed by thin (up to 1 mm) ice interlayers thawing in them. Each individual interlayer of loam has the appearance of a layered cake. No plant remains were found in the sands or in the loams of the fluvial alluvium. Also, no frost displacement of the layers is observed here.

2. Above the fluvial alluvium in the primary part of the excavation (from Line A to approximately Line I–K) lie deposits of floodplain alluvium of the channel bank facies (Fig. 24), and closer to the bank projection, the floodplain alluvium of the ravine facies.

   Radiocarbon dates confirm that the cut of the Aldan and the beginning of alluviation of the floodplain alluvium took place approximately 10,500 ± 100 years ago, that is, on the boundary of the Pleistocene and Holocene.

   The thickness of the floodplain deposits of the channel wall is 6 to 8 m. These deposits, differing substantially in homogeneous character, are subdivided into two strata: the lower—more loamy, and the upper—more sandy (Figs. 22, 23). The thickness of the lower parcel is 1.5 to 2.5 m, of the upper, 3.5 to 5.5 m.

   The floodplain alluvium of the channel bank facies is composed equally of alternating yellow and light-gray silt and yellowish-gray inequigranular sands, between which are dark-gray argillaceous (in the lower stratum) and sandy (in the upper stratum) humic silt.

   The humic nature of the individual silt interlayers is due chiefly to the presence of pieces of wood, plant detritus, decayed threadlike rootlets, and small pieces of charcoal. The humic interlayers confirm that during the accumulation of the floodplain facies of alluvium there were brief periods of drying, at which time vestigial soils were formed.

   The thickness of the individual humic interlayers is 0.5 to 5.0 cm, in rare cases increasing to 7 to 15 cm. The thickness of the separating dark humic interlayers of light silts and sands fluctuates from 1 to 10 cm. In some cases these deposits comprise lenses up to 50 cm thick. Frequently in the sands, and sometimes pebbles and cobbles are also encountered in the light silts, which here and there form very pronounced lenses.

   Due to alternating dark and light interlayers, the floodplain alluvium has a horizontally-wavy lamination. Directed along the channel bank, both dark and light interlayers lie more or less horizontally, parallel to each other (Fig. 23).

   Transverse to the channel bank (approximately from Line A–D to the point of the bank) individual interlayers often lie sloping toward the Aldan at an angle of 10 to 20º. This sloping is most characteristic for the lower horizons of the loam stratum of the floodplain alluvium, which accumulated during the earliest period of brief drying in the location of the future Bel'kachi I site. These deposits, in distinction from the ones above, are characterized by less clear lamination. Only rarely are small isolated inclusions of wood encountered in the loams here and almost no charcoal. In the sandy interlayers lenses of pebbles and gravels are often observed. The thickness of these deposits is on average 0.8 to 1.0 m.

The deposits lying above, represented by the whole sandy stratum and the top of the loam stratum, become articulated in 23 separate layers through distinct horizontally-wavy lamination and well pronounced sandy interlayers. Their thickness fluctuates from 5 to 50 cm. In rare cases it increases to 100 to 130 cm.

All the layers, with the exception of the uppermost and Layers VIII and XVI from the top, consist of several (3 to 15) dark interlayers of argillaceous (in 16 to 23 layers) and sandy (in 2 to 15 layers) humic silt and light interlayers of arenaceous silt. The latter often become wedged out after several meters, and as a result two to three humic interlayers merge into one.

The upper layer, under the influence of the process soil formation and modern tilling, lost its initial structure and was changed into a humic lumpy sandy loam of brownish-gray color. Layers VIII and XVI are represented only by one thin humic layer of silt.

Each of the layers, as a rule, is separated from the other by light-yellow or light-gray arenaceous silt or inequigranular sand. These light layers, in distinction from the light layers within one stratum, extend horizontally for several tens of meters, tapering almost but not quite out, and are reliable marking horizons.

Toward the Aldan, ravine floodplain deposits are attached to the floodplain deposits of the channel bank. The boundary between them is unclear; the deposits often taper into one another.

Absolute dates obtained for the deposits of both facies (8370 ± 80, LE-761 for Layer 20 and 8500 ± 160, LE-740 for the ravine deposits attached to this layer) confirm that their accumulation occurred simultaneously. Only some deposits were separated in the upper parts and others in the lower parts during different levels of flooding.

Figure 24. Deposits of the Bel'kachi I site. With the knife is shown the upper (VIII) layer of the Sumnagin culture. The ladder stands at Layer XXIII.

The ravine deposits are represented by a stratum of greenish-gray silty loams that are interstratified with fine-grained silty sands of light-gray color. The latter, as a rule, are made up of separate lenses, stretching to a length of 0.5 to 5.0 m and not forming clear layers. Their thickness fluctuates from 0.2 to 10.0 cm. In the sand lenses are found isolated pebbles and gravels. In the loams scattered pieces of twigs and stems of equisetum are often encountered, lying flat. They do not form clear dark interlayers, but make up isolated impregnations or small seams. In distinction from the floodplain deposits of the channel bank, there are substantially fewer vertically-running filamentary rootlets found in the ravines, and frequently they are entirely absent. This attests to the fact that the ravine areas emerged much more rarely from the influence of flood waters than areas of the channel bank.

The thickness of the ravine deposits in the area of excavation is approximately 2.5 to 3.0 m. In some cases it increases to 4.0 to 4.5 m. On the basis of study of the ravine deposits in the vicinity of the Bel'kachi I site, we can suppose that more recently they were somewhat thicker. In the area opened by the excavation they could have reached approximately 6 to 7 m. Here the ravine deposits are not as thick

because, forming the outer point on the high floodplain, they are most heavily damaged by ice movement and flood waters.

The whole thickness of the deposits of the high floodplain, beginning at a depth of 1.1 to 1.2 m from the present ground surface and back 0.5 to 1.0 m from the bank edge, is in a permafrost state.

The parcel of fluvial alluvium is characterized by horizontally laminated cryogenic textures. Most characteristic for the floodplain alluvium are frost cracks filled with ice, frost wedges, and bent soil veins that consist of unequal downward bending layers containing rock (Fig. 22). Frost cracks, veins of folding, and wedges were noted at various levels beginning at 70 to 80 cm below the present ground surface. Sometimes they go to a depth of 3 to 4 m from their upper horizon. The width of the cracks is usually small—1 to 3 cm.

The formation of the frost cracks, veins of folding, and wedges, judging by their locations in the different levels, was produced by a seasonally thawed layer syngenetically based on accumulations of moisture. Syngenetic frost formations show that the deposits of the floodplain facies of alluvium of the high floodplain were accumulated in the presence of, and at a shallow depth from, a multiyear frost substrate.

The process of excavating the Bel'kachi I site established that its cultural layers were confined to the upper 20 geological layers, to which are attached deposits of the floodplain alluvium. In Layer 21 only a few pieces of wood charcoal were noted, and in Layer 22, wood charcoal and eight small split bones of moose and reindeer. In Layer 23 there was one flint knifelike blade. However, as will be shown below, a special cultural layer cannot be distinguished on the basis of it.

The study of the archaeological materials confirms that cultural Layer I contains remains of the early Iron Age (Fedoseeva 1970b); Layer II, the Ust' Mil' culture of the Bronze Age (Fedoseeva 1970c); Layer III, the Neolithic Ymyyakhtakh culture; Layers IV and V, the Neolithic Bel'kachi culture; Layers VI and VII, the Neolithic Syalakh culture (Mochannov 1969a); Layers VIII to XX, the Sumnagin culture of the final stage of the Upper Paleolithic.

In 1964–1965, only Layer VIII and part of Layers IX to XI (Mochanov 1969a) were fully opened (within the limits of the excavation). In 1966 to 1968, Layers IX to XI were finished and Layers XII to XX were opened. Data from them are published here for the first time. At the same time, in order not to violate the integrity of the Sumnagin complex of the Bel'kachi I site, the characteristics of the materials are considered together with the finds of 1964–1965 from Layers VIII to XI as well.

Cultural Layer VIII

Layer VIII was opened over an area of 222 m^2. It was 4 to 8 cm thick. In the layer were 33 animal bones (Table 1),[6] 2 small pieces of graphite, and 14 stone items. The last are represented by flint flakelets (3 specimens), a diabase flakelet (1 specimen), flint knifelike blades (6 specimens), a scraper (1 specimen), and inset blades (3 specimens).

[6] Identification of the fauna from all layers of the Bel'kachi I site was made by senior research associate of the Institute of Biology, Yakutsk Branch, SO AN SSSR, Doctor of Biological Sciences O. V. Egorov.

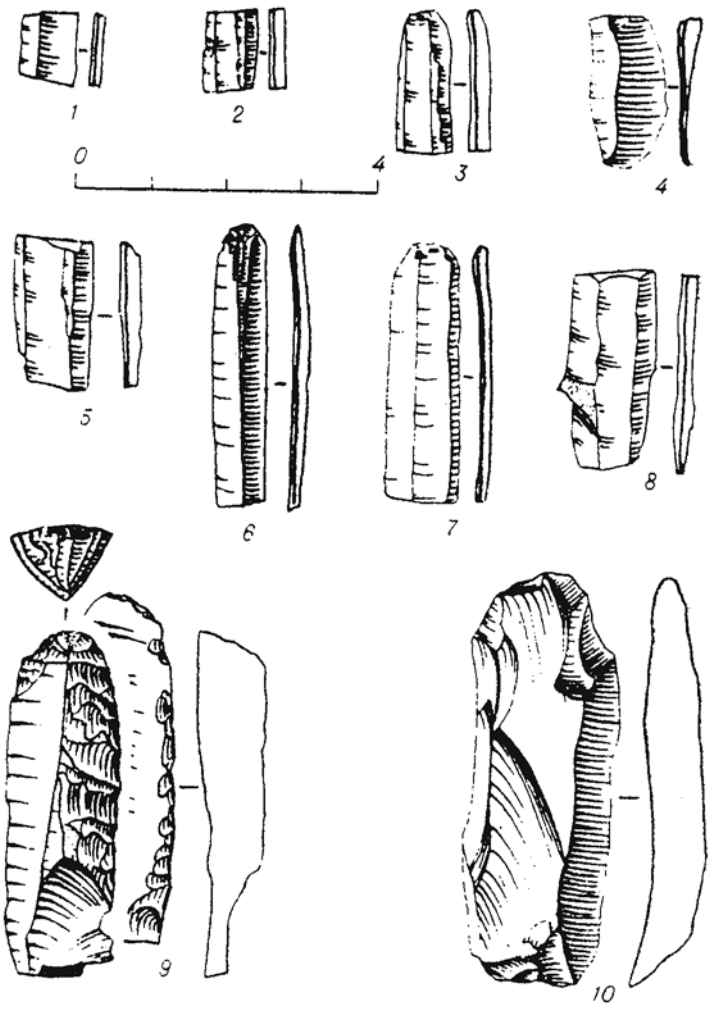


Plate 31. Bel'kachi I site. Stone assemblage from Layer VIII.

The scraper was made on the end of a large three-faceted blade of red flint. It is characterized by a high steep back and oval-convex working edge. The working edge and lateral edges were worked on the ventral side by planing retouch with narrow long facets, over which small secondary edge retouch was applied. The left lateral side was worked by opposite lateral retouch, directed from the dorsal side. Judging by the wear on the lateral edges, the tool simultaneously served as a double-bladed knife. The length of the tool is 4.9 cm, the width of the working edge of the scraper 1.1 cm (Pl. 31:9).

The inset blades are the midsections of knifelike blades. Their working edges do not have additional modification by retouch, but preserve traces of use in the form of small notches (Pl. 31:1, 2, 5).

Layer VIII, like all the lower ones, did not contain ceramics or ground stone tools. Based on wood charcoal collected in Quadrant D_6, a radiocarbon date of 5900 ± 70 BP (LE-678) was obtained, which agrees well with the date for Layer VII (Early Neolithic) of the Bel'kachi I site of 5970 ± 70 BP (LE-676). The small discrepancy in the index of the absolute age observed here does not exceed the limits of the two standard deviations.

Table 1. Distribution of bone remains of animals from the Belkachi I site by layer.

Species of animal	9190 ± 80 Sumnagin Culture								
	XXIII	XX	XIX	XVIII	XVII	XVI	XV	XIV	XIII
Moose	1/1	–	2/1	19/3	24/7	5/1	5/2	65/9	39/5
Reindeer	–	–	–	–	–	–	–	–	–
Siberian stag	–	–	–	–	–	–	–	7/1	–
Roe deer	1/1	5/1	5/2	1/1	–	–	1/1	3/1	–
Brown bear	–	–	–	–	–	–	–	–	–
Wolf or dog	–	–	–	–	–	–	–	–	–
Hare	–	–	8/1	–	–	–	–	–	–
Vole	–	23/3	22/1	–	7/1	–	–	–	–
Ptarmigan	–	–	–	–	–	–	–	–	–
Duck	–	1/1	–	–	–	–	–	–	–
Other birds	–	–	–	–	–	–	–	–	–
Fish	–	9/2	–	–	1/1	–	–	–	–
Total: Identified bones / Individuals	2/2	38/7	37/5	20/4	32/9	5/1	6/3	75/11	39/5
Small fragments of ungulate bones (?)	–	35	38	70	171	5	72	130	5
Total bones	2	73	75	90	203	10	78	205	44

Note: The numerator indicates the total number of bones; the denominator – the number of individuals.

5900 ± 70												
XII	**XI**	**X**	**IX**	**VIII**	**Total**	**VII**	**VI**	**V**	**IV**	**III**	**II**	**Total**
75 8	320 19	57 7	116 13	–	728 76	94 28	318 76	83 13	47 4	7 4	18 3	1295 204
1 1	7 1	1 1	1 1	–	10 4	16 3	23 4	–	–	–	–	49 11
1 1	–	–	–	–	8 2	–	–	–	–	–	–	8 2
1 1	18 2	–	14 5	14 2	63 17	9 2	5 1	–	–	–	4 1	81 21
–	2 1	–	–	–	2 1	14 2	17 3	9 1	–	–	9 1	51 8
–	–	–	–	17 1	17 1	–	–	–	–	–	–	17 1
–	–	–	–	–	8 1	–	–	–	–	–	–	8 1
–	–	19 1	–	–	71 6	–	–	–	–	–	–	71 6
–	–	2 1	–	–	2 1	–	2 2	–	–	–	–	4 3
1 1	14 3	1 1	7 2	–	24 8	2 1	26 11	3 1	–	–	3 1	58 22
2 1	6 2	3 2	–	–	11 5	3 1	7 3	–	–	–	–	21 9
–	3 2	1 1	–	–	14 6	1 1	11 4	–	–	–	–	26 11
81 13	370 30	84 14	138 21	31 3	958 128	139 38	409 104	95 15	47 4	7 4	34 6	1689 299
121	382	348	342	2	1721	234	208	103	64	–	87	2417
202	752	432	480	33	2679	373	617	198	111	7	121	4106

Cultural Layer IX

Layer IX was excavated over an area of 342 m^2. Its thickness in various places ranged from 37 to 62 cm. In the layer were found 480 specimens of animal bone (Table 1) and 636 stone objects. The latter are represented by cores and their blanks (10 specimens), flint flakes (87 specimens), diabase flakes (73 specimens), flint flakelets (153 specimens), diabase flakelets (26 specimens), flint knifelike blades (135 specimens), microblades (21 specimens),[7] and a variety of tools (131 specimens).

The flint cores are represented by four blanks and six complete artifacts. Among the latter are four whole and two broken ones. They are all prismatic cores. The blanks have the appearance of four-sided rods with a rectangular upper platform and a base shaped in the form of a rib. The prepared cores can be divided into two-platform prismatic, single-platform prismatic, conical with the removal of blades around the whole perimeter, and a unifacial conical one (Pl. 32:16, 20, 25, 28). The length of the cores is 3.2 to 4.3 cm, the diameter of the pressure platforms 2.3 to 3.1 cm.

Among the flakes, both flint and diabase, small and medium ones predominate and do not exceed 5 cm in length. The only diabase flakes, removed as a rule at the first working of the cobble, reached a length of 10 cm or more.

Most of the knifelike blades and microblades were made from flint, while 14 were of chalcedony. There are 10 whole flakes, and the rest are broken. Basically the blades have a width of 0.5 to 0.8 cm (Pl. 33:14, 20), though 21 blades are 1 cm wide, and only 7 are more than 1 cm wide (Pl. 33:21).

The stone tools of Layer IX include 78 inset blades, 1 knife on a blade, 11 burins, 3 gravers, 2 blades with beveled edge, 22 scrapers, 3 skreblos, 1 punch, 1 chisel-like tool, 1 axe, 6 whetstones, and 2 pressure flakers.

The inset blades were made on flint knifelike blades and are subdivided into two groups: retouched and unretouched. Six inset blades were worked by retouch, four of them having microdimensions. Two inset blades are distinguished by the method of work; both the working edges were trimmed by fine edge retouch directed from dorsal to ventral (Pls. 32:24; 33:11); three inset blades were worked along one working edge by retouch directed from dorsal to ventral (Pl. 33:8, 13); and one fragment of an inset blade has the working edge trimmed by edge retouch directed from ventral to dorsal (Pl. 33:16). Most of the inset blades (72 specimens) were made on midsections of knifelike blades, and were not subjected to additional work. However, included in the group are tools that are analogous to known compound tools of animal bones, with pointed cutting edges equipped with flint working edges composed of midsections of inset blades compactly set one against the other. Due to wear of the long sharp edges of blade sections, these tools have small dents and notches.

The knife was made from a crude broad blade, and does not have a strictly worked form. Only the edge of the working edge of the tool was worked, by retouch directed from dorsal to ventral. Its length is 3.4 cm, its width 1.5 cm (Pl. 33:22).

[7] Knifelike blades with a width of less than 0.4 cm are considered microblades in this work.

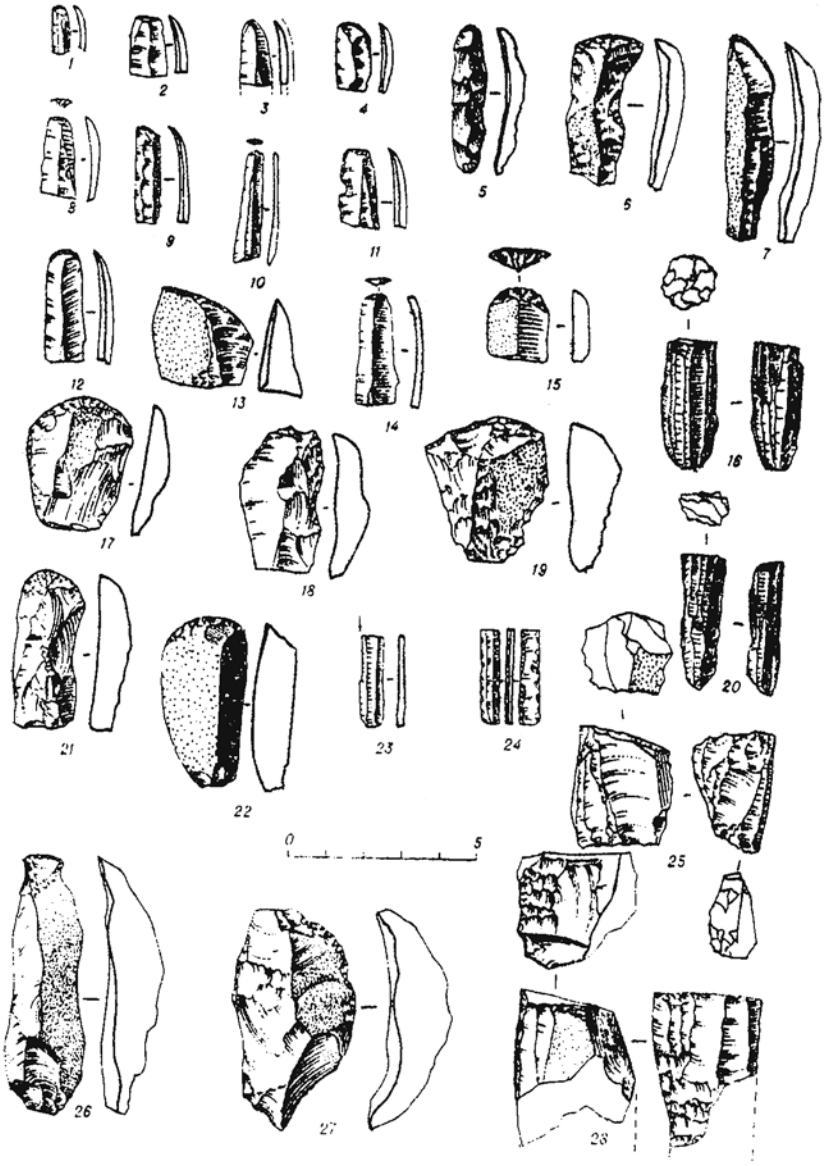


Plate 32. Bel'kachi I site. Stone assemblage from Layer IX.

Of the burins, ten were made on blades, one on a flint flake. All the burins on blades are angle burins. Their working edges were formed at an angle to the beveled or straight edge of the break of the blade by the removal of longitudinal burin spalls (Pls. 32:23; 33:2–6, 17–19). As a rule, the tools were not subjected to additional working by retouch. The exception are two burins (Pl. 33:17, 19) on which the longitudinal edge, opposite the working edge, was trimmed by edge retouch directed from ventral to dorsal. These tools could have been used not only as burins but also as knives. Interestingly, both of these tools were made on broad blades. The length of the burins is 1.5 to 3.4 cm, the width 0.7 to 1.2 cm, the length of the burin spalls 0.2 to 2.8 cm, the width of the burin spalls 0.1 to 0.2 cm. One burin has microdimensions: length 0.6 cm, width 0.4 cm.

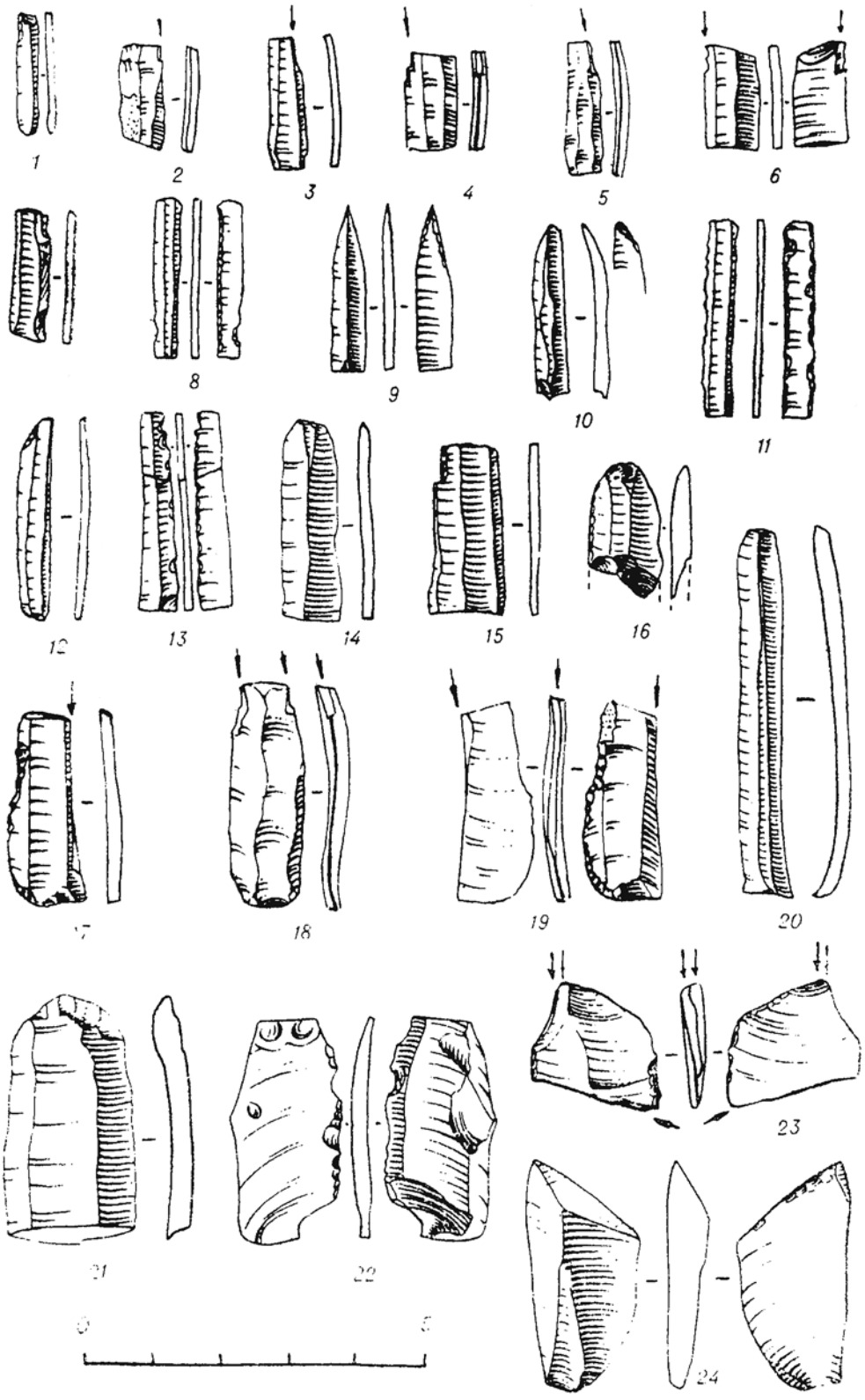


Plate 33. Bel’kachi I site. Stone assemblage from Layer IX.

The burin on a flake is a combination tool in which a lateral and a dihedral burin are combined. The length of the burin is 2.2 cm, the width 1.5 cm, the length of the burin spalls 0.5 to 1.0 cm, the width of the burin spalls 0.2 to 0.3 cm (Pl. 33:23).

The gravers were made on regular knifelike blades that were retouched only on the working edge. The working edge was formed by the smallest steep pressure retouch disposed along the lateral edge of the blade and transverse break. The working edge of the gravers is reminiscent of angle burins. The difference between them is that the groove was made not by the removal of a burin spall, but by retouch. One of the gravers was made on a microblade 1.8 cm long and 0.3 cm wide, the remaining on blades 2.0 to 2.5 cm long and 0.6 to 1.0 cm wide (Pl. 33:1, 7, 15).

The working edges of the blades with a beveled edge are situated on the lower, slightly bent ends of the tools and were formed by the smallest steep retouch directed, in one case, from dorsal to ventral, and in the other, from ventral to dorsal (Pl. 33:10, 12). The length of the blades is 2.5 and 3.1 cm, the width 0.5 cm.

The scrapers were made both on knifelike blades (19 specimens) and on lamellar flint flakes (3 specimens).

The scrapers on blades are subdivided by disposition of the working edge into 16 end scrapers (Pl. 32:2, 4–12, 14, 15, 22, 26) and 3 grooved side scrapers. One end scraper (Pl. 32:1) and two grooved side scrapers were made on microblades. The scrapers on blades have a high back. Their working edges, as a rule, are oval-convex and more rarely beveled. Primarily only the working edges of the tools were formed by steep pressure retouch directed from ventral to dorsal. The length of the scrapers is 1.6 to 6.8 cm, the width of the working edges 0.7 to 2.1 cm. The length of the microscrapers is 0.8 to 1.1 cm, the width of the working edges 0.3 cm.

The scrapers on lamellar flakes follow the form of the flake. The oval-convex working edges of these scrapers were subjected to work by retouch. The retouch could also partially reach to one of the lateral sides of the tools. Along the edges of the working edges small projecting “ears” were produced with the aid of retouch. The length of the scrapers is 2.4 to 4.2 cm, the width of the working edges 2.0 to 3.2 cm (Pl. 32:17, 19, 21).

In Layer IX were three skreblos: one on a primary flint flake (Pl. 32:27), one on a primary diabase flake (Pl. 34:4), and one on a split quartzite cobble (Pl. 34:6).

The punch was made on a regular knifelike blade. The point of the tool was worked by small steep retouch directed from dorsal to ventral. The length of the tool is 2.5 cm, the width of the base 0.5 cm (Pl. 33:9).

The chisel-shaped tool was made on a crude blade. Its working edge was formed by small steep retouch placed on the transverse edge of the tool (Pl. 32:18).

The axe was made from a large diabase cobble. It has the form of an irregular oval and is stretched along the longitudinal axis. Its base is straight, the working edge oval-convex. The transverse section of the butt in the middle part of the artifact is rectangular and of the working edge, almond-shaped. The axe is crudely worked on both sides by stepped retouch and flat pressure retouch. The length of the tool is 10.2 cm, the width of the working edge 5.2 cm, the width of the butt 3.7 cm (Pl. 34:5).

The whetstones discovered in the layer were made of subrectangular slabs of fine-grained sandstone (Pl. 34:1–3). The pressure flakers are elongated-oval quartzite cobbles 12.8 to 15.0 cm long and 5.4 to 6.0 cm wide. They have dotted impact points on the ends that appeared during their use (Pl. 34:7, 8).

For the lower interlayer of cultural Layer IX a radiocarbon date of 6250 ± 60 BP (LE-697) was obtained on wood charcoal from Quadrant E_5.

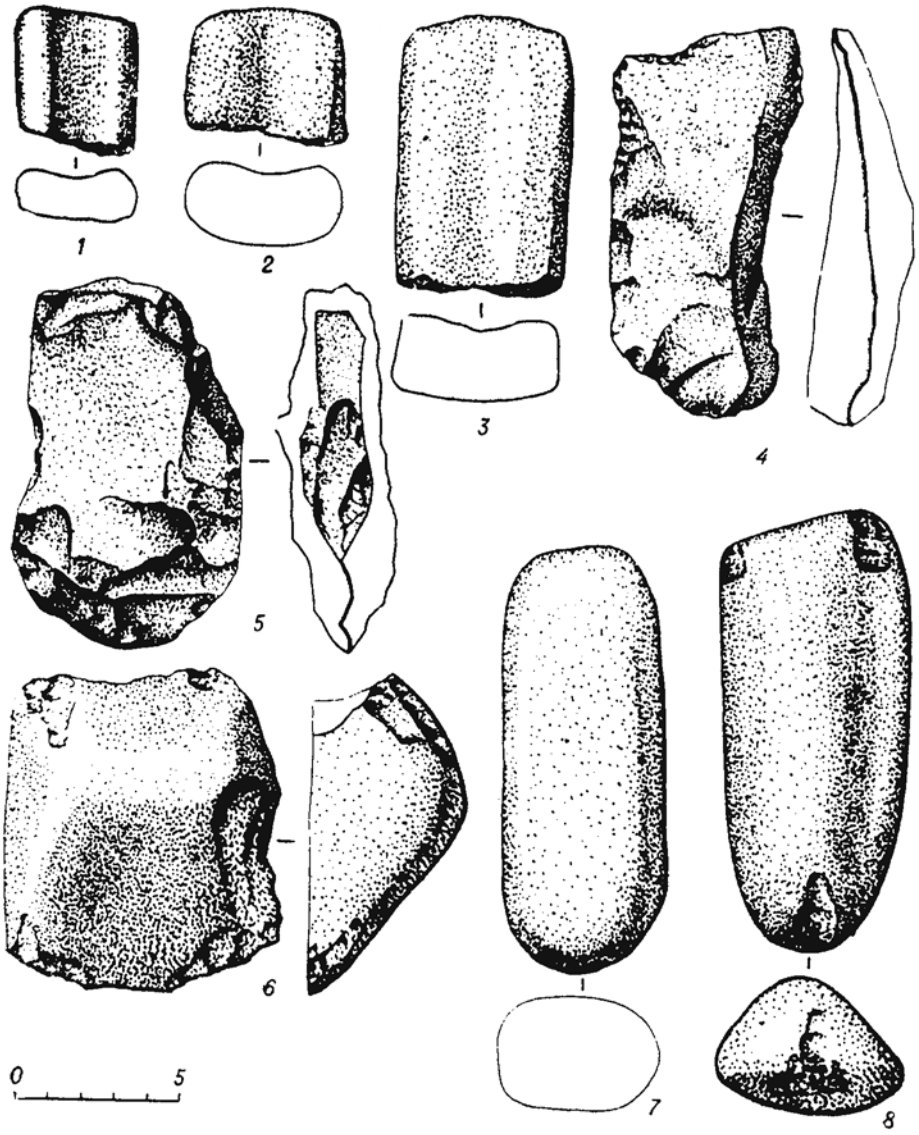


Plate 34. Bel’kachi I site. Stone assemblage from Layer IX.

Cultural Layer X

Layer X was excavated over an area of 477 m^2. Its thickness was 15 to 30 cm. Found in the layer were 432 specimens of animal bones (Table 1) and 7,676 stone objects. The latter are represented by cores (12 specimens), flint flakes (574 specimens) and diabase flakes (437 specimens), flint flakelets (515 specimens) and diabase flakelets (5,513 specimens), knifelike blades (277 specimens), microblades (121 specimens), tools on flint flakes (5 specimens) and on diabase flakes (1 specimen), tools on blades (135 specimens) and microblades (82 specimens), cobble tools (2 specimens), and pressure flakes (2 specimens).

The cores belong to the prismatic type with the removal of blades around the whole periphery. They are subdivided into two varieties: single-platform (5 specimens) and double-platform (7 specimens). The single-platform, or pencil-shaped, cores have a regular conical form, oval or rounded pressure platforms located almost perpendicular to the long axis of the tools, and pointed bases (Pl. 35:17, 23, 24, 33). The length of the cores is 2.8 to 3.6 cm, the length of the platforms 0.6 to 1.4 cm, the width of the platforms 0.4 to 2.0 cm. The double-platform cores have a cylindrical form. Their oval or rounded platforms are located on the upper and lower ends of the artifact and are almost parallel to each other. The form of the pressure platform is either oval or rounded. Thin knifelike blades with regular edges were removed from both platforms (Pl. 35:10, 18–21, 29, 31). The length of the cores is 3.0 to 3.5 cm, the length of the platforms 0.4 to 1.1 cm, the width of the platforms 0.3 to 0.7 cm.

The flint flakes, as a rule, are small. Only 52 flakes have a length of 3 to 5 cm, and 9 flakes more than 5 cm. The flakes were not trimmed even by partial retouch, and they show no traces of wear.

The diabase flakes and flakelets form a large group in the stone assemblage of the site, though comparatively fewer tools of diabase were found than of flint, apparently due to the fact that diabase artifacts in most cases are represented by large chopping tools and massive skreblos made both of whole cobbles and parts of them. With the manufacture of such tools a large amount of debitage in the form of flakes and flakelets is usually created. Large diabase flakes were used as the base material for making skreblos, scrapers, and knives. The layer contained 33 large diabase flakes, their backs covered with cobble cortex. There are 183 medium flakes, the rest being small.

Knifelike blades were made of flint and similar stone. The overwhelming majority of flakes were broken. A total of 30 specimens of whole flakes was preserved. Microblades made up about a third of the blades (Pl. 36:5). The vast majority of blades have a width of 0.5 to 0.8 cm (Pls. 35:27; 36:39, 44). Six blades have a width of 0.9 to 1.0 cm (Pl. 35:6), and only three have a width greater than 1 cm (Pls. 35:22, 34; 36:43). Traces of wear and partial retouch can be observed on some blades, attesting to their use as tools.

The stone tools are represented by inset blades (161 specimens), a knife (1 specimen), burins (23 specimens), gravers (2 specimens), blades with a beveled edge (10 specimens), scrapers (18 specimens), blades with a groove (3 specimens), a punch (1 specimen), a pointed tool (1 specimen), chisels (2 specimens), a skreblo on a diabase flake (1 specimen), a skreblo on a cobble (1 specimen), a chopping tool on a cobble (1 specimen), and batons (2 specimens).

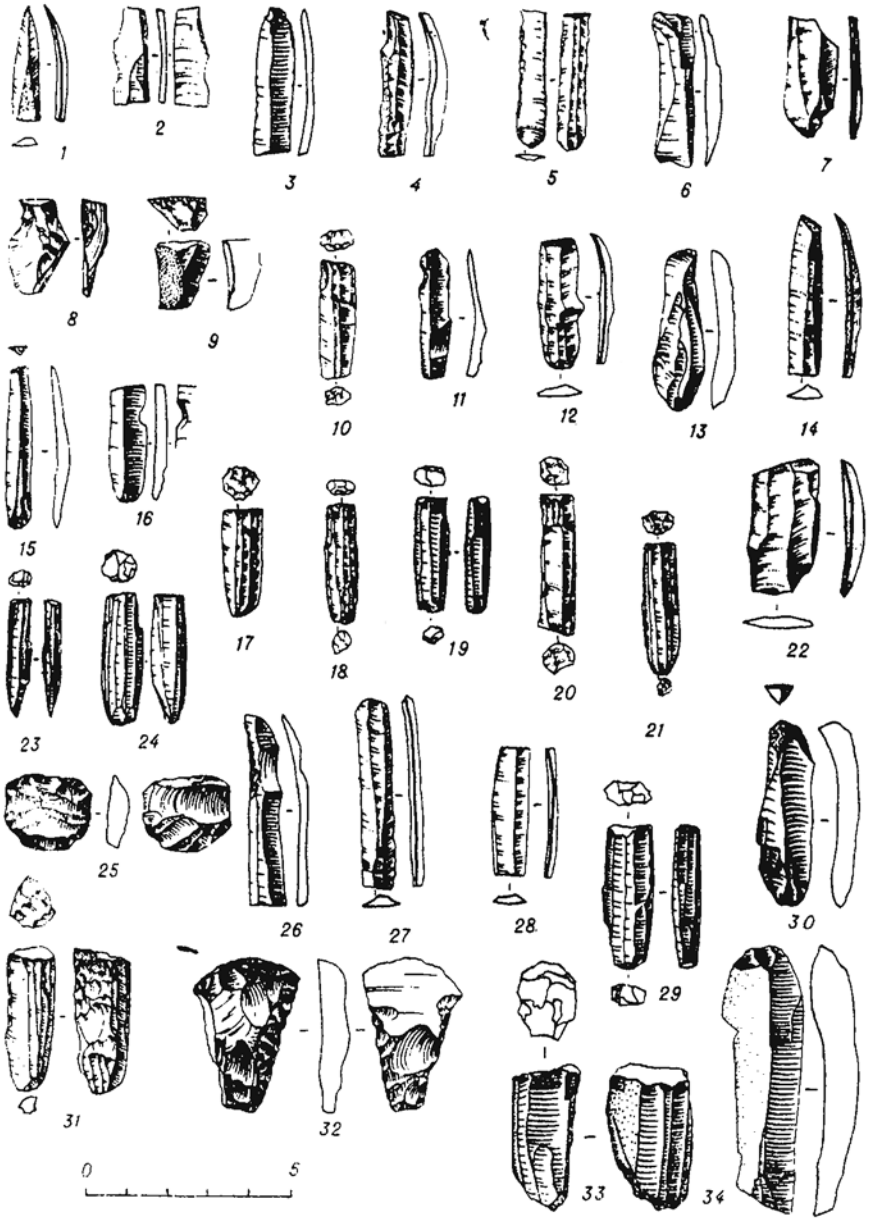


Plate 35. Bel'kachi I site. Stone assemblage from Layer X.

All of the inset blades were made on knifelike blades, including 66 specimens on microblades. The working edges of 30 inset blades were worked by the finest edge retouch. Unifacial retouch directed from dorsal to ventral was applied on 22 specimens of the tools (Pl. 36:1, 27). Six inset blades were worked by unifacial retouch directed from ventral to dorsal. One tool has the retouch applied from ventral to dorsal along both working edges (Pl. 36:22). Both working edges of one of the inset blades were worked by retouch directed from ventral to dorsal along the right edge, and along the left edge, from dorsal to ventral. The length of the retouched inset blades varies from 0.7 to 2.1 cm, the width from 0.3 to 0.8 cm. Inset blades without retouch comprise a large group of tools (131 specimens). As a rule, they are midsections of blades (81 specimens) and microblades (50 specimens). Traces of wear can be observed on many sections.

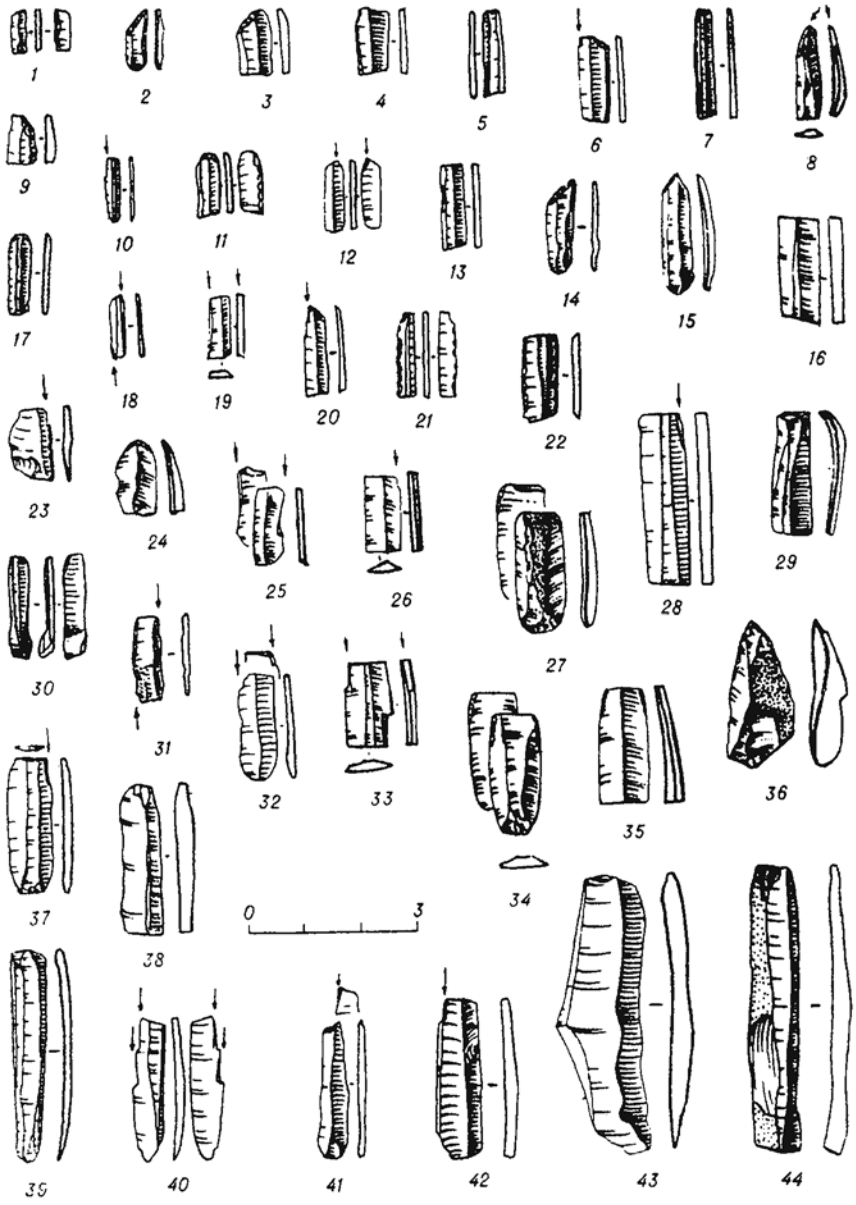


Plate 36. Bel'kachi I site. Stone assemblage from Layer X.

The knife was made on a large blade 1 cm wide. Its working edge was located on the curved longitudinal edge of the blade. It was worked by large edge retouch directed from ventral to dorsal (Pl. 35:26). The length of the tool is 4.8 cm.

The burins of Layer X were made on blades. Among them, 19 are angle burins and 4 lateral burins, and 6 tools have microdimensions (4 angle and 2 lateral). The working edges of the lateral burins were formed by the removal of burin spalls at a right angle or acute angle to the plane of the break of the blade (Pl. 36:8, 10, 12, 19, 25, 26, 28, 32, 37). Three tools are double angle burins, made on midsections of knifelike blades. The burin working edges are situated in the lower right and upper left corners of the tools (Pl. 36:18, 31, 33). Two burins preserved traces of rejuvenation of the working edges (Pl. 36:40). One of the burins was made on the corner of a broken blade with a beveled edge (Pl. 36:6).

Only one angle burin had the longitudinal edge of the blade worked near the burin spall by the finest edge retouch directed from ventral to dorsal (Pl. 36:23). The length of the burins is 1.2 to 3.0 cm, the width 0.3 to 0.8 cm, the length of the burin spalls 0.2 to 2.3 cm, the width of the burin spalls 0.02 to 0.06 cm.

The lateral burins differ from the angle burins only by the fact that the transverse plane of the break of the flake, toward which the burin spalls were directed, was worked by the finest steep retouch directed from ventral to dorsal (Pl. 36:20, 41). These burins apparently were made on blades with a beveled edge. The length of the burins is 1.6 to 2.5 cm, the width 0.3 to 0.6 cm.

The gravers are represented by two specimens, one with micro-dimensions. They were made on blades. The working edge of the large graver was formed by the edge of the blade, which was worked by the finest retouch directed from dorsal to ventral, and by the plane of the blade section (Pl. 35:2). On the microtool the retouch forming the working edge was directed from ventral to dorsal. The length of the tools is 1.6 and 2.6 cm, the width 0.3 and 0.9 cm, the length of the working edges 0.5 and 1.3 cm.

Of the ten blades with beveled edges, two tools have microdimensions. The beveled edges are located at the lower, slightly curved end. Nine tools have the working edge worked by the finest steep retouch directed from ventral to dorsal (Pl. 36:2, 3, 9, 14, 15). The retouch of one microtool, forming the working edge, is directed from dorsal to ventral (Pl. 36:30). The length of the tool is 0.9 to 2.2 cm, the width 0.4 to 0.5 cm.

The scrapers are represented by 14 specimens on blades and 4 on flakes. Among those made on blades, 4 are microscrapers. Based on the arrangement of the working edge, all the scrapers on blades are end scrapers, and of the scrapers on flakes, 3 are end scrapers and 1 a side scraper.

The end scrapers on blades were in large part made on the lower curved ends of blades. The end microscrapers were made on the midsections of microblades. The form of the working edge of the tools is ovally convex, straight, or beveled. The back on all of the scrapers is high. The working edges were formed by steep pressure retouch directed from ventral to dorsal. In some cases, the lateral sides of the tools were also partially worked by edge retouch. The length of the scrapers varies from 1.1 to 4.0 cm, the width of the working edge from 0.3 to 1.4 cm (Pls. 35:4, 5, 12–15; 36:11, 17, 24, 29).

The form of the end scrapers on the flint flakes is oval (1 specimen), bell-shaped (1 specimen), and trapezoidal (1 specimen). Both of the first tools have an elaborated form (Pl. 35:25, 32), while the last follows the form of the flake (Pl. 35:9). The working edges of the scrapers are ovally convex, the backs are high. Sharpened “ears” can be seen along the edges of the working edge of the bell-shaped scraper.

The oval scraper was worked on both sides by complete retouch with parallel facets. The working edge was trimmed by steep secondary retouch directed from ventral to dorsal. The length of the scraper is 1.9 cm, the width of the working edge 2.3 cm, the width of the base 2.0 cm.

The bell-shaped scraper was worked on the side of the back by complete pressure retouch, with the exception of a small area in the center of the tool where cobble cortex was preserved. The edge of the working edge was worked by steep secondary retouch. The base and middle part of the ventral side were covered by retouch. The length of the scraper is 3.9 cm, the width of the working edge 2.6 cm, the width of the base 0.9 cm.

Only the working edge of the trapezoidal scraper was worked, and that by steep pressure retouch directed from ventral to dorsal. Half the surface of its back is covered by cobble cortex. The length of the scraper is 1.6 cm, the width 1.4 cm, the width of the working edge 0.8 cm.

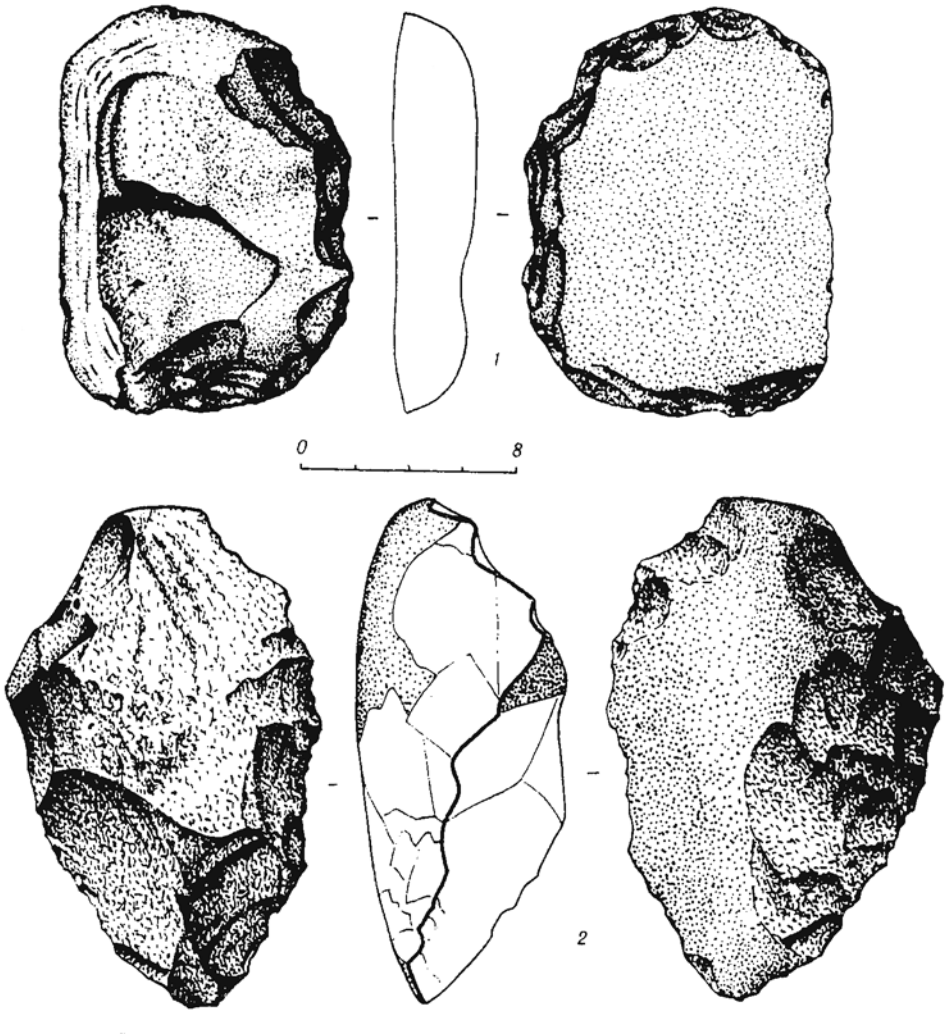


Plate 37. Bel'kachi I site. Stone assemblage from Layer X.

The grooved side scraper follows the form of the flake. Only the working edge was subjected to work by retouch. The retouch covering the working edge is steep and is directed from ventral to dorsal. The length of the scraper is 2.4 cm, the width of the base 1.4 cm, the length of the working edge 1.0 cm, the depth of the groove 0.53 cm (Pl. 35:8).

Two of the blades with a groove were made on large knifelike blades, the third on a microblade. The grooves are located on the long sides of the blades. They were formed by steep pressure retouch directed from ventral to dorsal on two tools (Pls. 35:11; 36:13) and from dorsal to ventral on one (Pl. 35:16). The length of the tools varies from 1.5 to 3.2 cm, the width from 0.4 to 1.0 cm, the length of the grooves 0.36 to 0.6 cm, the depth of the grooves 0.15 to 0.2 cm.

The punch was made on a regular knifelike blade broken on top. The working edge is located on the lower, curved end of the blade. The point was trimmed by the finest pressure retouch directed from ventral to dorsal. The length of the tool is 2.9 cm, the width of the base 0.8 cm (Pl. 35:1).

The pointed tool was made on a primary flint flake and preserves its natural subtriangular form. The pointed, curved end of the flake was worked by small pressure retouch directed from ventral to dorsal. The length of the tool is 2.5 cm, the width 1.1 cm (Pl. 36:36).

The chisel-like tools were made from the midsections of flint microblades. The working edges are situated on the plane of their transverse sections and worked by steep pressure retouch directed from ventral to dorsal. The longitudinal sides of the tool are also partially covered by retouch. The length of the chisel-like tools is 1.3 to 2.0 cm, the width 0.3 to 0.4 cm (Pl. 36:7).

The skreblos were made on a large primary flake of diabase (1 specimen) and on half of a longitudinally split flat quartzite cobble (1 specimen).

The skreblo on the flake has a form approaching triangular. The grooved working edge of the tool was worked by flat pressure retouch directed from ventral to dorsal. The base of the skreblo is broken. Its preserved part is heavily calcified. The length of the tool is 6.8 cm, the width 4.5 cm, the length of the working edge 3.7 cm.

The quartzite skreblo does not have clear stratigraphic context. It was found in the bank slump, the deposits of which are close in color, thickness, and number of layers to the parcel of Layer X. The form of the skreblo is oval; its transverse and longitudinal sections are segmentlike. The tool has a large heel that is covered on the back with cobble cortex and blunted by the removal of small spalls directed from the ventral side. The ovally convex working edge was worked by bifacial stepped retouch, partially covering the broad surface of the back of the tool. The length of the skreblo is 15.1 cm, the width 11.5 cm (Pl. 37:1).

The chopping tool was made from a whole diabase cobble 19.2 cm long and 14.5 cm wide. It is almond-shaped in plan and cross section. A large part of the back and the large heel of the tool retain cobble cortex. The tool is equipped with two working edges running at an acute angle to each other. Both working edges were worked partially by bifacial and partially by unifacial large flat retouch. The heel is displaced to the right of the longitudinal axis of the tool. For convenience of grasping in the hand it was flattened by the removal of several spalls directed from the ventral side. Wear in the form of impact dots and dents appears at the place of the convergent working edges (Pl. 37:2).

The batons are represented by a quartzite and a limestone cobble of oval form. The end part of the tools is strongly worn and has asterisklike impact marks.

Based on a sample of wood charcoal taken from Quadrant E_6, for the upper interlayers of Layer X a date of 6720 ± 50 BP (LE-650) was obtained. Based on a sample of wood charcoal collected from a hearth in Quadrant $A_{19–20}$–$B_{19–20}$, a date of 6750 ± 70 BP (LE-698) was obtained for the lower interlayer of Layer X.

Cultural Layer XI

Layer XI was excavated over an area of 502 m^2 (Fig. 25). Its thickness fluctuated between 20 and 30 cm. In the layer was a total of 752 animal bones (Table 1), 2 bone artifacts, and 1,377 stone objects. The last are represented by cores (6 specimens), flint flakes (177 specimens), flint flakelets (317 specimens), diabase flakes (69 specimens), diabase flakelets (96 specimens), knifelike blades (237 specimens), knifelike microblades (103 specimens), and tools (372 specimens).

The cores are represented by whole finished artifacts (5 specimens) and a piece of an upper part (1 specimen). They are all prismatic with blades removed around the whole circumference. Based on form the cores are subdivided into two varieties: cylindrical double-platform (1 specimen) and conical or pencil-shaped (4 specimens).

The cylindrical double-platform core has an upper rounded platform and a lower oval one, both situated perpendicular to the long axis of the artifact. The upper platform, from which the overwhelming majority of flakes was removed, was worked over the whole surface by flat pressure retouch, while the lower one was insignificantly trimmed and partially preserves the cobble cortex. The length of the core is 2.8 cm, the diameter of the upper platform 1.2 cm, the length of the lower platform 0.9 cm, its width 0.8 cm (Pl. 38:42). The pencil-shaped cores have rounded and oval pressure platforms and pointed bases. Thin knifelike blades with regular edges were removed from them. The platforms were carefully trimmed by the removal of small spalls of flat pressure retouch. The pressure platforms of the cores are situated at a small angle to the long axis. The length of the cores is 2.2 to 3.6 cm, the diameter of the platforms 0.6 to 1.0 cm (Pls. 38:34; 39:1).

Both the flint and diabase flakes are primarily medium and small, and total 18 large flakes. Partial edge retouch can be traced on some specimens.

All the knifelike blades were made from flint and siliceous stone; 14 whole ones were found, and the remainder are broken. One hundred and thirty two blades have microdimensions. Traces of wear in the form of the smallest dents can be seen on many blades, and 17 blades show partial retouch. Blades 0.5 to 0.9 cm wide are the most frequently encountered (Pl. 38:44, 46). Only a few have a width of 0.9 to 1.0 cm (Pl. 38:32, 33). Only two blades are wider than 1.0 cm (Pl. 39:5).

The stone tools are represented by inset blades (231 specimens), burins (71 specimens), gravers (3 specimens), blades with a beveled edge (22 specimens), scrapers on blades (24 specimens), scrapers on flakes (6 specimens), blades with a groove (2 specimens), punches (2 specimens), a chisel-like tool (1 specimen), a knife on a flake (1 specimen), skreblos (3 specimens), and whetstones (6 specimens).

The inset blades form the most numerous group of tools. They can be subdivided into tools without retouch (214 specimens) and tools with retouch (17 specimens). The inset blades without retouch are midsections of blades (133 specimens) and microblades (81 specimens). Among the retouched inset blades are 12 on blades and 5 on microblades. They all were worked by the finest edge retouch. Unifacial retouch on seven is directed from dorsal to ventral (Pl. 38:25), and on six from ventral to dorsal (Pl. 38:15). Two inset blades were encountered; on both, the longitudinal edges were worked by edge retouch directed from ventral to dorsal (Pl. 38:16). On two inset blades the retouch along one working edge is directed from dorsal to ventral, and along the other, from ventral to dorsal (Pl. 38:22). The length of the inset blades varies from 1.6 to 2.0 cm, the width 0.3 to 0.7 cm.

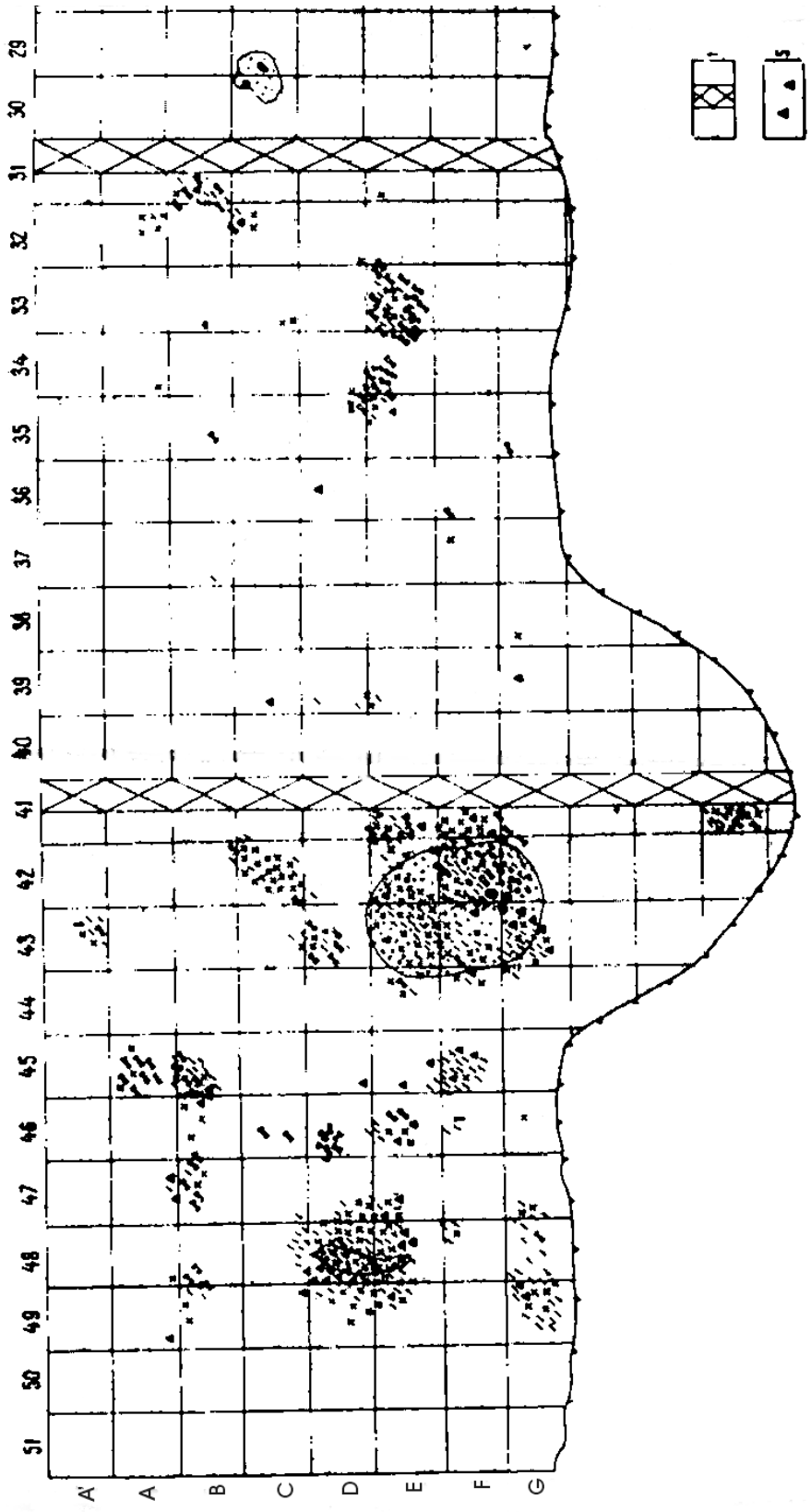
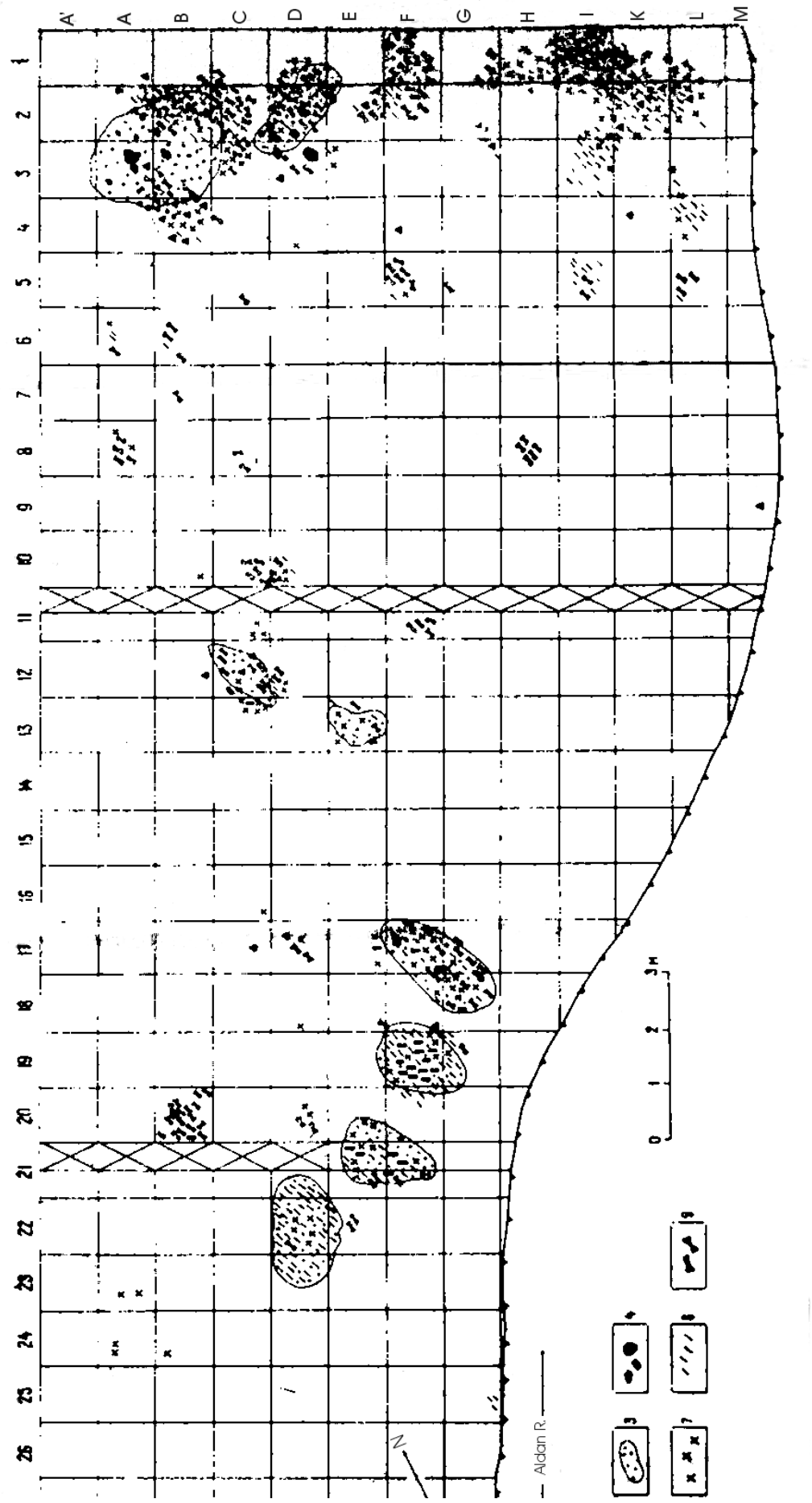


Figure 25. Plan of Cultural Layer XI of the Bel'kachi I site. 1) lip; 2) line of cliff; 3) hearths; 4) hearth stones; 5) cores; 6) tools; 7) blades; 8) flakes; 9) animal bones.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Burins form a large group of tools. They were all made on knifelike blades (59 specimens) and microblades (12 specimens). The working edge of the burins, based on the method of preparation, belong to angle (68 specimens) and lateral (3 specimens). The bulk of angle burins (61 specimens) have one working edge, formed by the plane of the break of the blade or microblade and the removal of a narrow burin spall directed at an acute angle, more rarely at a right angle to it (Pl. 38:1, 11, 26). The long side of the blade near the burin spall is most often not worked, but in some cases is trimmed on the ventral or dorsal side by the finest steep retouch (Pl. 38:6). In isolated cases the side opposite the burin spall scar was worked by edge retouch (Pl. 38:7). Four angle burins were made on blades with a beveled edge, the burin spall being directed toward the plane of the break of the blade, while the beveled edge of the tool, worked by retouch, is located on its opposite end (Pl. 38:2, 18, 30). Four tools are double angle burins, with working edges formed by the plane of the break on the bottom of the blade and burin spalls on the right and left directed toward it (Pl. 38:28, 49).

Three tools have burin working edges located in the upper left and lower left corners of the blade. One of them is a combination angle and lateral burin (Pl. 38:13). The other edge of the blade, opposite the working edge, was worked by the finest edge retouch directed from dorsal to ventral (Pl. 38:5). The burin spall scars of the third burin were joined, while the edge of the blade opposite the working edge was blunted by retouch (Pl. 38:35). The length of the angle burins fluctuates from 0.9 to 3.3 cm, the width 0.3 to 0.7 cm, the length of the burin spalls 0.2 to 2.0 cm, the width of the burin spalls 0.01 to 0.05 cm.

The lateral burins were made on blades with a beveled edge. Their working edges were formed by burin spall scars directed at an acute angle to the flake's beveled edge, which was worked by steep pressure retouch (Pl. 38:19). The length of the burins is 1.3 to 2.0 cm, the width 0.4 to 0.5 cm, the length of the burin spalls 0.5 to 0.7 cm, the width of the burin spalls 0.03 to 0.07 cm.

One of the three gravers is a microtool. The gravers are similar in form and assignment to burins, but the burin spall scars on them are replaced by a groove made by steep retouch directed at a right or acute angle to the plane of the break of the blade (Pl. 38:23). The length of the graver is 0.6 to 1.7 cm, the width 0.4 to 0.8 cm, the length of the retouched groove 0.3 to 0.7 cm.

Among the 22 blades with a beveled edge, 12 are microtools. All the tools of this type were made on pieces of blades or microblades having a straight longitudinal profile. The beveled working edge of the tool, worked by retouch, is located on the transverse plane of the break of the blades. Tools with the working edge worked by steep pressure retouch directed from ventral to dorsal predominate (Pl. 38:3, 8, 21, 41). The working edges of four tools were worked by steep retouch directed from dorsal to ventral (Pl. 38:4). The length of the artifacts is 1.1 to 3.5 cm, the width 0.3 to 1.0 cm.

In the layer were two tools on which two parallel beveled edges were elaborated—on the upper and lower parts of the blade. The beveled edges of the tools were formed by small steep retouch directed from ventral to dorsal. Through careful working the tools have the form of regular parallelograms (Pl. 38:10, 17). In the upper right corner of one of the tools is a lateral burin, formed by the removal of a burin microspall 0.5 cm long and 0.04 cm wide directed toward the retouched edge of the tool (Pl. 38:10). The length of the parallelograms is 1.8 to 2.2 cm, the width 0.6 to 0.7 cm.

There are 30 scrapers on blades and flakes: 24 of them made on blades, 5 on flint flakes, and 1 on a diabase flake.

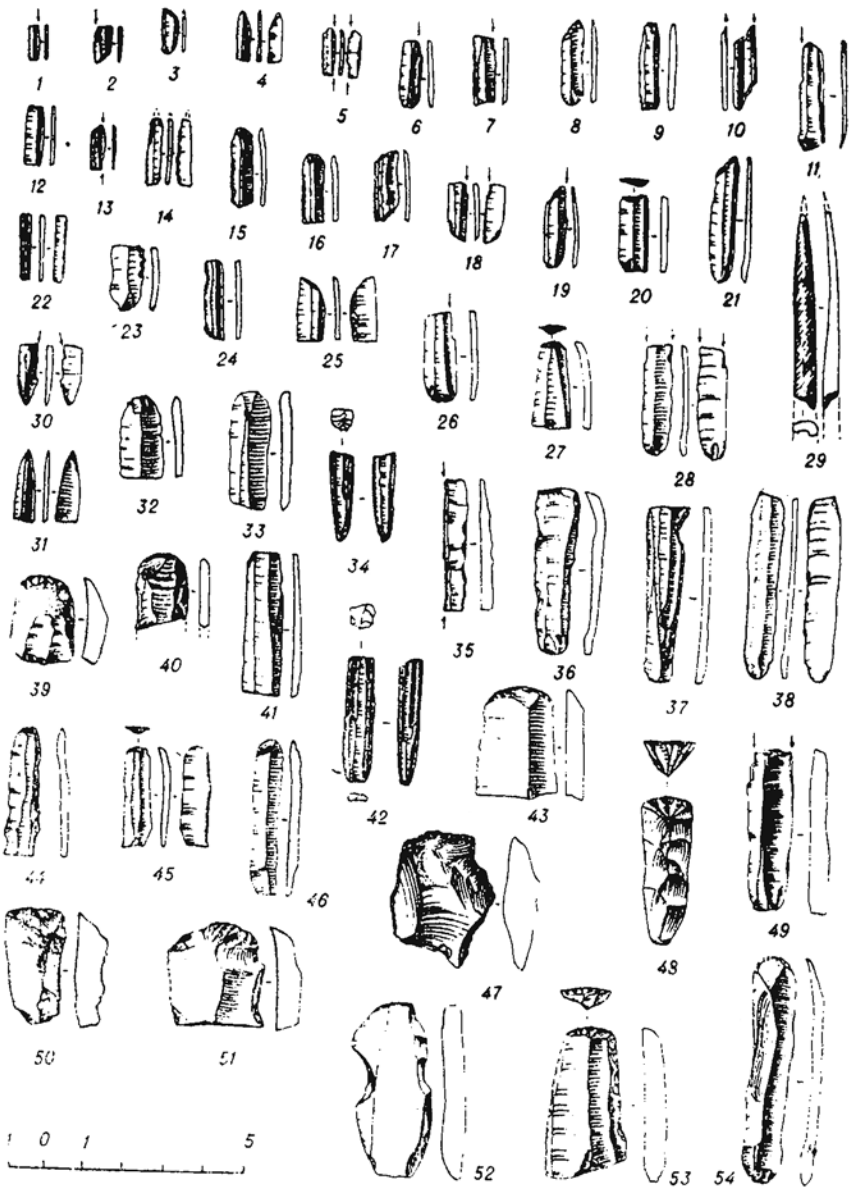


Plate 38. Bel'kachi I site. Stone and bone assemblage from Layer XI.

All those on blades are end scrapers. One of them has microdimensions. Both thin regular blades and crude primary blades were used for making the tools (Pls. 38:45; 39:4). The working edges of the scrapers are ovally convex (22 specimens) and concave (2 specimens). The backs of all are high. As a rule, for the scrapers with ovally convex working edges, the lower curved part of the blades was used. Only 5 scrapers were made on whole blades. Most often only the working edge of the tools was subjected to retouch (Pl. 38:27, 40, 43, 48, 54). The retouch in all cases is steep, small, and directed from ventral to dorsal. Some tools were also worked by partial edge retouch along the long lateral sides (Pl. 38:36, 45, 53). A large scraper, made on a whole primary blade, has elaborated pointed "ears" along the side of the working edge (Pl. 39:3). The length of the scrapers varies from 1.8 to 5.7 cm, the width of the working edges from 0.4 to 2.5 cm.

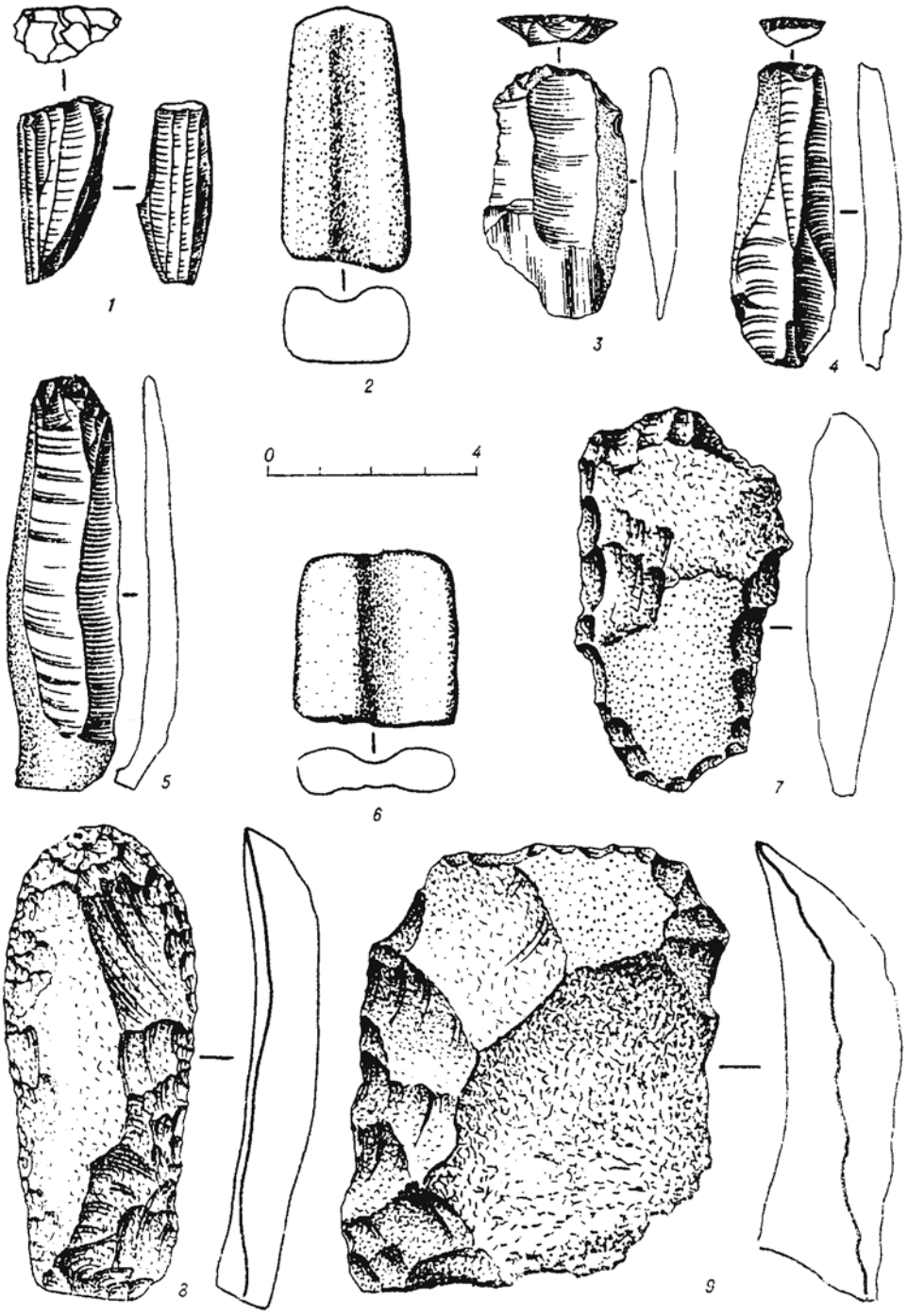


Plate 39. Bel’kachi I site. Stone assemblage from Layer XI.

The scrapers with concave working edges were made on sections of regular knifelike blades. Only the working edges of the tools were worked by retouch. Steep pressure retouch on both tools was directed from ventral to dorsal. The length of the scrapers is 1.9 to 2.5 cm, the width of the working edges 0.6 to 0.7 cm (Pl. 38:20).

The scrapers on flint flakes are represented by four with an end working edge and one with a lateral working edge. All were made on primary lamellar flakes, on which half of the surface of the dorsal side is covered with cobble cortex.

The end scrapers have an ovally convex working edge, worked by pressure retouch with fine parallel facets directed from ventral to dorsal (Pl. 38:39, 47, 50). One of them has small "ears" along the edges of the working edge (Pl. 38:51). The length of the scrapers is 2.2 to 3.3 cm, the width of the working edge 1.5 to 2.3 cm.

The side scraper has an oval outline. Its grooved working edge was worked by steep pressure retouch directed from ventral to dorsal. The opposite edge of the tool was blunted. The length of the scraper is 4.3 cm, the width 1.9 cm, the length of the working edge 1.5 cm, the depth of the groove 0.5 cm (Pl. 38:52).

The end scraper on a diabase flake has a well worked form. A lamellar flake with a curved longitudinal profile was used for its preparation. The form of the working edge of the scraper is ovally convex, the back high. Both the working edge of the tool and its lateral sides were carefully worked by edge pressure retouch directed from ventral to dorsal. The working edge preserved traces of wear in the form of polish of the edge. The length of the scraper is 8.8 cm, the width of the working edge 2.3 cm, the width of the base 2.4 cm (Pl. 39:8).

Blades with a groove were made on regular knifelike blades. The groove was formed by steep pressure retouch directed from ventral to dorsal (Pl. 38:24, 37). The length of the tools is 2.0 to 4.4 cm, the width 0.5 to 1.0 cm, the length of the groove 0.5 to 1.0 cm, the depth of the groove 0.1 to 0.25 cm.

The punches were made on sections of knifelike blades. The points of the tools were formed by small steep retouch, directed from dorsal to ventral, converging at an acute angle (Pl. 38:31). The length of the punches is 1.4 to 1.8 cm, the width of the base 0.5 to 0.6 cm.

The chisel-like tool was made on a section of a knifelike blade, with one of the planes of the break transformed into a slightly grooved working edge with the aid of steep pressure retouch directed from ventral to dorsal (Pl. 38:12). The length of the tool is 1.5 cm, the width 0.5 cm.

The knife was made on a flat primary flake of gray argillaceous-siliceous slate. The tool does not have an elaborated form, but rather follows the subtriangular outline of the flake. The working edge is on the straight side of the flake. The working edge and the areas of the lateral sides of the tool adjacent to it were worked by bifacial edge retouch. Wear in the form of small dents and scratches is well marked on the working edge. The cobble cortex was worn off the back of the knife along the working edge during the process of work. The length of the knife is 6.3 cm, the length of the working edge 4.0 cm, the width of the knife 6.0 cm.

The skreblos were made from large diabase flakes that have the form of an irregular oval (1 specimen), a parallelogram (1 specimen), and amorphous (1 specimen). The working edges of the tools were worked by steep edge retouch directed from ventral to dorsal. The skreblos have both end and side working edges (Pl. 39:7, 9). The length of the tools is 7.2 to 8.3 cm, the width 4.1 to 6.5 cm.

The whetstones are subrectangular slabs of fine-grained sandstone with longitudinal grooves 0.5 to 0.8 cm wide on the broad surfaces. All of the tools were broken (Pl. 39:2, 6).

Along with the stone, bone served as the basic material for making tools. Layer XI contained 26 bones with traces of working. Twenty-four of them are broken and blanks of indeterminate tools. Each of

the bones has traces of working in the form of longitudinal and transverse incisions and partial grinding of the exterior surface.

Longitudinal incisions, as a rule, can be seen on long-bones. They have the form of thin scratches and grooves that stretch along the cut surface of the bone as continuous thin threads.

The transverse incisions in one case outlined the bone by a narrow deep groove; in the remaining cases they were executed in the form of small scratches.

Two bone artifacts that were finished and used in work are awls. They have the form of long and narrow rods, reminiscent of a needle without an eye. One tool was made from a longitudinally split long-bone of a bird; the second, from the long-bone of a mammal. The cross section of the rods in one case is a flattened oval, in the other, subtriangular. The grinding of the tools differs by the amount of care. Especially well worked is the awl of bird bone. The direction of the scratches left by the grinding instrument is diagonal. The length of the tools is 5.5 to 6.0 cm, the width of the bases 0.5 cm (Pl. 38:29).

Cultural Layer XII

Layer XII was excavated over 495 m^2. Its thickness fluctuated between 10 and 35 cm. There was a total of 202 specimens of animal bones (Table 1) and 249 stone artifacts in the layer. The latter are represented by a core (1 specimen), flint flakes (4 specimens) and diabase flakes (5 specimens), flint flakelets (90 specimens), knifelike blades (59 specimens), microblades (26 specimens), and tools (64 specimens).

The core belongs to the prismatic type. Its oval pressure platform was oriented perpendicular to the long axis of the artifact. The base was sharpened. Thin regular knifelike blades were removed around the whole circumference of the core. The length of the core is 4.23 cm, the length of the platform 0.9 cm, the width of the platform 0.7 cm (Pl. 40:20).

The flakes discovered in the layer, both flint and diabase, are small and amorphous. Only one flint flake, of trapezoidal form, was worked by partial edge retouch (Pl. 40:17). It could have been used as an end scraper; however, no traces of wear are noted on it.

Among the knifelike blades, 26 specimens have microdimensions (Pl. 40:7). Two blades are wider than 1 cm (Pl. 40:22); the width of the remainder is 0.5 to 0.9 cm (Pl. 40:13).

The stone tools are represented by 49 inset blades, 4 burins, 3 gravers, 3 end scrapers, 1 blade with a groove, 1 chisel-like tool, 1 knife, 1 axe, and 1 baton.

The inset blades were made on blades and microblades. Some tools are without retouch; some were worked with retouch. The inset blades without retouch number 22 specimens of sections of blades (Pl. 40:11) and 21 specimens of sections of microblades. All of the retouched inset blades (6 specimens) were made on microblades. Based on the character of the work, three inset blades can be distinguished that have unifacial edge retouch directed from ventral to dorsal (Pl. 40:1), and three inset blades worked by unifacial edge retouch directed from dorsal to ventral (Pl. 40:5, 6, 12). The length of the microinset blades is 0.6 to 2.4 cm, the width 0.3 to 0.4 cm.

All the burins are angle burins. They were made on the midsections of knifelike blades (3 specimens) and on a blade with a broken bottom (1 specimen). The burin working edges were formed by the planes of the break of the blades and directed toward it in two cases at a right angle, and in two, at an acute angle by the removal of short burin microspalls. The length of the spalls is 0.22 to 0.32 cm, the width 0.06 to 0.07 cm. The length of the burins is 0.7 to 1.8 cm, the width 0.5 to 0.9 cm (Pl. 40:2, 4, 8, 9).

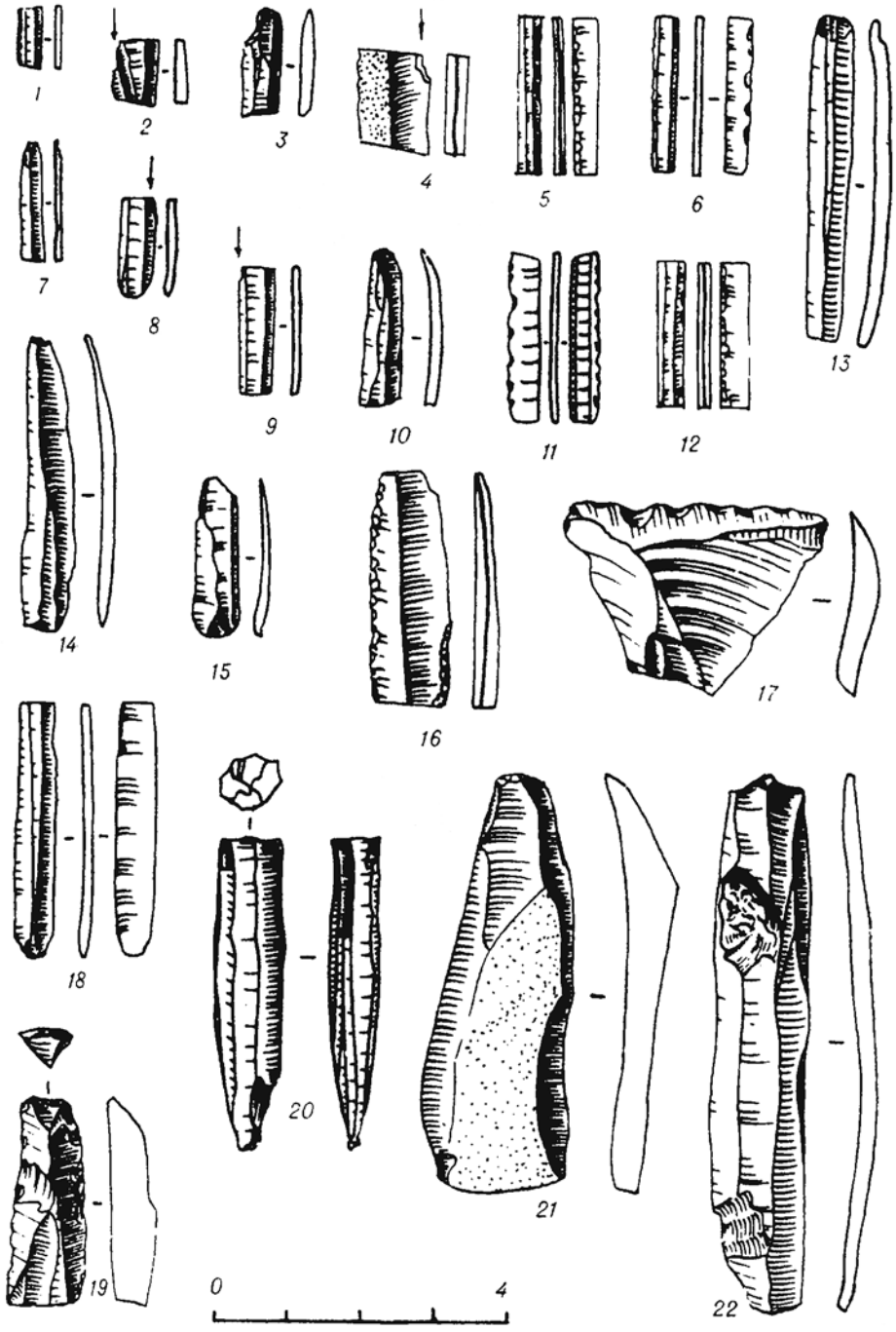


Plate 40. Bel'kachi I site. Stone assemblage from Layer XII.

The gravers were made on knifelike blades 1.5 to 3.5 cm long and 0.5 to 0.6 cm wide. The working edges of the two tools were formed by the plane of the break of the blades and the angular grooves adjoining them, which were executed by small steep retouch directed from ventral to dorsal (Pl. 40:3, 15). On the third graver the retouch forming the groove is directed from dorsal to ventral (Pl. 40:18). The length of the working edges is 0.5 to 0.7 cm.

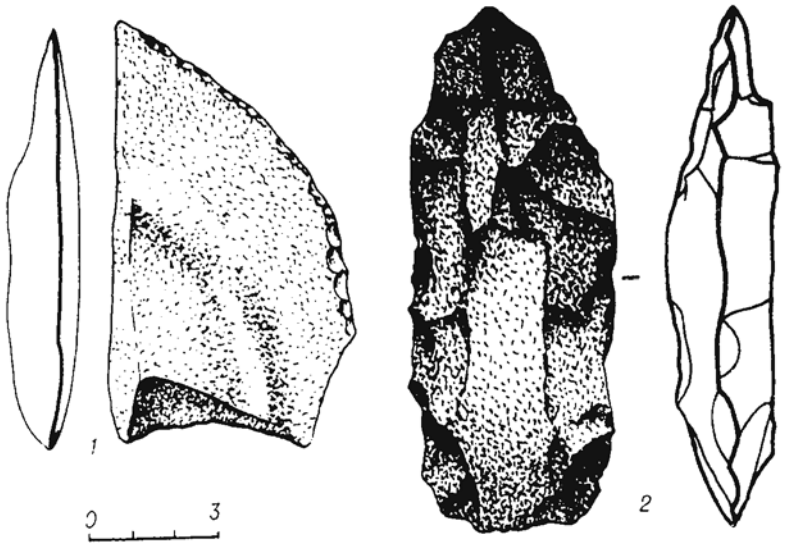


Plate 41. Bel'kachi I site. Stone assemblage from Layer XII.

The scrapers were made on knifelike blades, one of which is a large primary blade. The working edges of the scrapers are located on the lower curved ends of the blades. The form of the working edges is convexly arced. The backs are high. Only the working edges of the tools were worked by steep pressure retouch directed from ventral to dorsal. The length of the scrapers is 2.1 to 5.7 cm, the width of the working edge 0.3 to 0.7 cm (Pl. 40:10, 19, 21).

The blade with a groove was made on the midsection of a knifelike blade 1.5 cm long and 0.5 cm wide. The groove was formed by steep pressure retouch directed from ventral to dorsal. The length of the groove is 0.5 cm, its depth 0.2 cm.

The chisel-like tool is a long knifelike blade on which the plane of the break is transformed into a grooved working edge with the aid of steep retouch directed from ventral to dorsal. The length of the tool is 4.0 cm, the width 0.7 cm, the width of the working edge 0.35 cm (Pl. 40:14).

A knife was made from a primary diabase flake of truncated-semilunar form. Only the working edge of the tool was subjected to work by unifacial edge retouch from the dorsal side. It is located on the convexly arced side of the flake. The working edge, especially its pointed upper end, is worn, which is reflected by light polish of the edge. The length of the knife is 9.8 cm, the width of the base 4.5 cm (Pl. 41:1).

The diabase axe has a subrectangular outline and a pointed butt. The working edge of the axe is straight, the lateral sides sharpened. The transverse and longitudinal sections are almond-shaped. Both surfaces of the tool were worked by bifacial flat retouch. The length of the axe is 11.8 cm, the width of the working edge 4.1 cm, the width of the axe in the middle part 4.9 cm, the width of the butt 0.8 cm. The edge of the working edge has traces of polish from work, the edge of the butt is also slightly polished from use (Pl. 41:2).

Eight fragments of animal bones with traces of grinding and longitudinal sawing were found in the layer. Of special interest are two blanks made from a tibia and a radius of a moose, each cut into halves. The instrument with which they were cut left traces in the form of thin even longitudinal scratches and grooves on the surface 0.5 to 0.6 cm wide the whole length of the bone. After the long-bones were separated into longitudinal halves, smoothing of the surface and flattening of the bones

were produced by means of flaking the projecting parts. Six small fragments found around the blanks had been flaked from them during the process of working. Some fragments fit to each other. Thus, the small flaked fragment from Quadrant E_2 was split from the blank of radial bone from Quadrant C_{13}. The outer surface of the bones preserved traces of grinding. The length of the blanks is 23.5 and 24.7 cm, the width 4.65 and 3.37 cm.

Wood was discovered in Layer XII in Quadrant K_7, from which was obtained a radiocarbon date of 7430 ± 60 BP (LE-741).

Cultural Layer XIII

Layer XIII was excavated over an area of 608 m^2. Its thickness fluctuated between 15 and 40 cm. In the layer was a total of 44 specimens of animal bones (Table 1) and 67 stone objects. The latter is represented by flint (1 specimen) and diabase (2 specimens) flakes, flint flakelets (43 specimens), knifelike blades (10 specimens), a microblade (1 specimen), and tools (10 specimens).

The diabase flakes are large and have cobble cortex on the back. The flint flake is large and partially trimmed by edge retouch.

The knifelike blades are represented by 1 microblade (Pl. 42:2) and 10 blades, the width of which is 0.5 to 0.8 cm (Pl. 42:4–6).

In the group of tools are 3 inset blades, 1 microburin, 1 burin, 2 end scrapers, 1 punch on a microblade, 1 skreblo on a diabase flake, and 1 baton on a diabase cobble.

The inset blades are represented by midsections of blades 0.7 to 1.2 cm long and 0.5 to 0.6 cm wide not worked by retouch.

The microburin was made on a midsection of a knifelike microblade 0.7 cm long and 0.4 cm wide. The working edge of the tool was formed by the removal of a burin spall 0.2 cm long, situated at a right angle to the plane of the break of the microblade.

The graver was made on a blade with a broken bottom. The working edge of the tool was formed by a retouched groove, situated at an acute angle to the transverse plane of the top of the blade. The retouch forming the groove was directed from ventral to dorsal. The length of the burin is 0.9 cm, the width 0.6 cm, the length of the working edge 0.3 cm, the depth of the groove 0.15 cm.

The end scrapers were made on long regular knifelike blades with a curved longitudinal profile. The working edges of the scrapers are situated on the lower transverse planes of the break of the blades. The form of the working edges is convexly arced, the back high. Only the working edges of the tools were worked, by steep pressure retouch directed from ventral to dorsal. The length of the scrapers is 3.3 to 4.3 cm, the width of the working edges 0.5 to 0.7 cm (Pl. 42:3, 7).

The punch was made on the lower longitudinally curved break of a knifelike microblade. Only the end of the tool was worked, by the finest retouch directed from ventral to dorsal. The length of the punch is 1.3 cm, the width of the base 0.3 cm (Pl. 42:1).

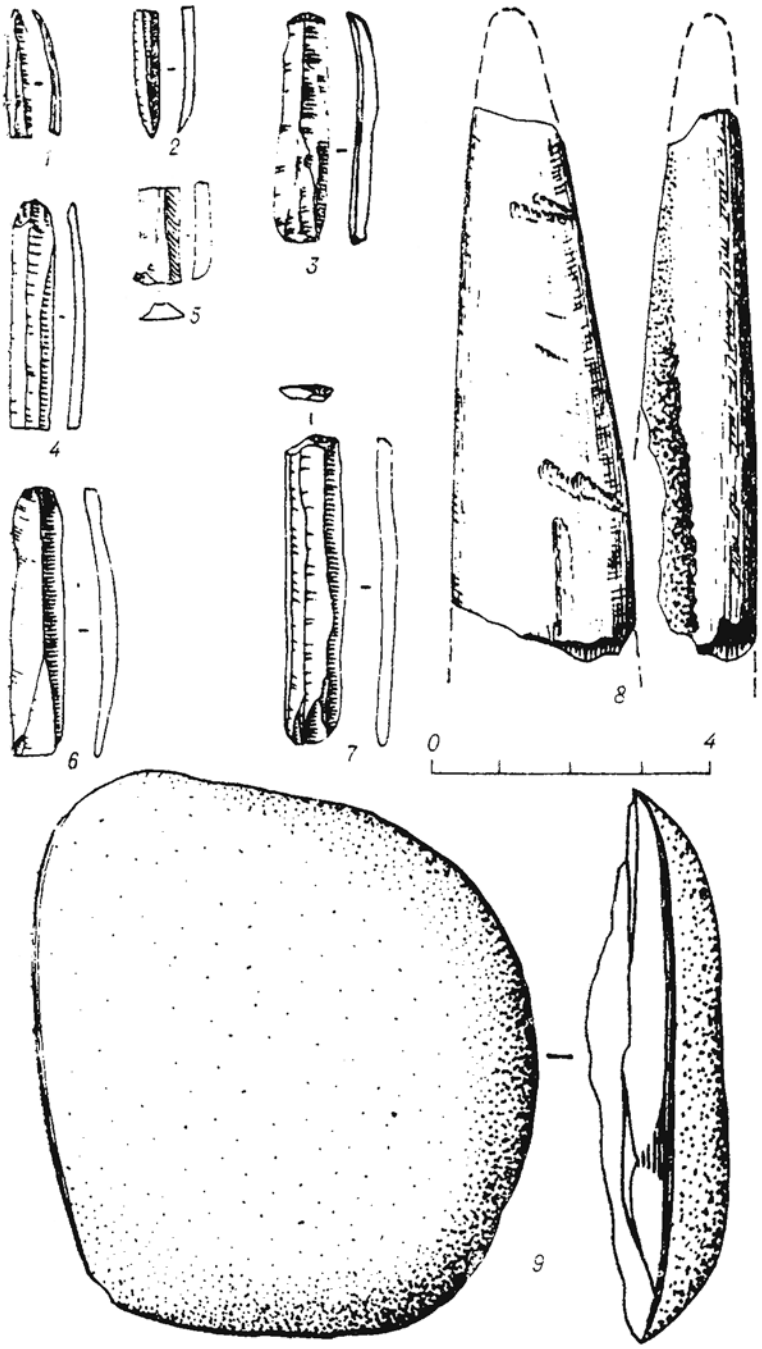


Plate 42. Bel’kachi I site. Stone and bone assemblage from Layer XIII.

Cultural Layer XIV

Layer XIV was excavated over an area of 278 m^2. Its thickness fluctuated from 55 to 95 cm. In the layer was a total of 205 animal bones (Table 1), 1 bone artifact, and 299 stone objects. The last are represented by a core (1 specimen), flint flakes (15 specimens), flint flakelets (23 specimens), knifelike blades (80 specimens), microblades (52 specimens), and tools (128 specimens).

The flint core is represented by an artifact of the prismatic type with the removal of blades along the whole circumference. The pressure platform of the core has a segmentlike form. Its surface was worked by the removal of small spalls of flat retouch. The base of the core was sharpened. The length of the artifact is 3.5 cm, the dimensions of the platform 1.0 x 1.3 cm (Pl. 43:14).

Diabase flakes and flakelets were entirely absent from the layer. The flint flakes are small. Only three flakes have medium dimensions.

There are 52 microblades (Pl. 43:3, 8). The overwhelming majority of knifelike blades have a width of 0.5 to 0.6 cm (Pl. 43:9). There are 14 blades with a width of 0.7 to 0.8 cm (Pl. 43:11). Five blades are whole, their length 1.98 to 5.1 cm, which in some degree attests to the dimensions of the cores that were used here.

The stone tools are represented by inset blades (110 specimens), angle burins (4 specimens), gravers (2 specimens), scrapers (10 specimens), and blades with a beveled edge (2 specimens).

The inset blades are subdivided into retouched (2 specimens) and unretouched (108 specimens). Both retouched inset blades have microdimensions. Their working edges were worked by unifacial edge retouch directed from dorsal to ventral (Pl. 43:2). The unretouched inset blades were made on the midsections of blades (56 specimens) and microblades (52 specimens).

The angle burins are represented by tools on blades (3 specimens) and microblades (1 specimen). Broken blades with a straight longitudinal profile were used for making them (Pl. 43:1). The length of the burins is 0.8 to 1.6 cm, the width 0.4 to 0.6 cm.

The gravers were made on a blade (1 specimen) and a microblade (1 specimen). Their working edges were formed by the plane of the break at the bottom of the blades and the retouched grooves adjoining the working edges. The graver on the blade has the retouch directed from dorsal to ventral (Pl. 43:10), and on the microtool, from ventral to dorsal. The length of the gravers is 1.2 to 3.0 cm, the width 0.4 to 0.8 cm.

The end scrapers were made on blades (8 specimens) and lamellar flint flakes (2 specimens). The scrapers on blades have subrectangular (5 specimens) and oval (2 specimens) forms. All were made on large short blades (Pl. 43:5, 13), five of which are partially covered with cobble cortex (Pl. 43:12, 16, 17, 19). The form of the working edges on all scrapers is ovally convex, the backs high. Only the working edges of the tools were worked by retouch. The length of the scrapers is 2.9 to 4.4 cm, the width of the working edges 1.8 to 2.0 cm. One end scraper was made on a thin knifelike blade 0.5 cm wide (Pl. 43:4). It has a microworking edge 0.3 cm wide.

The scrapers on lamellar flakes are not very different from the tools on large flakes. They have a truncated-oval (1 specimen) and trapezoidal (1 specimen) form. Their working edges are ovally convex, the backs high. Not only the working edges, but the edges of the lateral sides of the tools in part as well, were worked by retouch directed from ventral to dorsal (Pl. 43:6, 15). The length of the scrapers is 3.2 and 3.3 cm, the width of the working edge 1.8 cm.

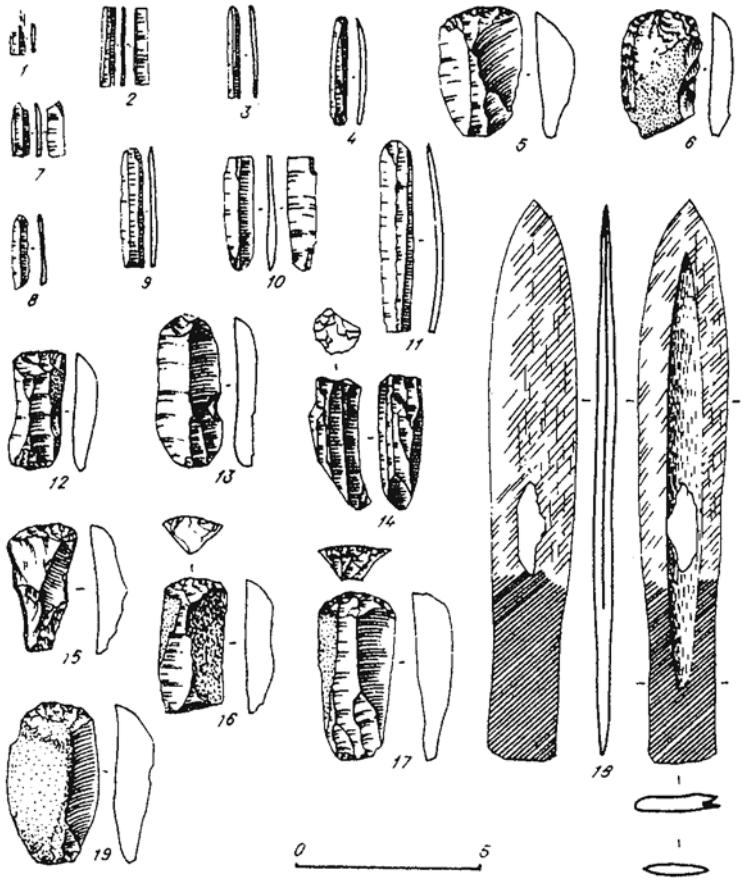


Plate 43. Bel'kachi I site. Stone and bone assemblage from Layer XIV.

The blades with a beveled edge are broken in the working part. Only a small part of the working edge was preserved, which was worked by small pressure retouch directed from dorsal to ventral on one tool, and from ventral to dorsal on the other (Pl. 43:7). The length of the tools is 1.3 to 1.4 cm, the width 0.5 cm.

Besides artifacts of stone, a piece of graphite was found in the layer, as well as a bone dagger. The dagger has a length of 14.7 cm, a width of 2.2 cm. It narrows to 1.8 cm toward the handle. Along one working edge from tip to handle a narrow slot was made for attaching inset blades. The cross section of the dagger is a flattened oval with a shallow groove in the upper part of the section. The groove was formed as a result of work on the unevenness of the inner part of a moose long-bone, from the longitudinal half of which the tool was made. The cross section of the handle is almond-shaped (Pl. 43:18).

For Layer XIV a radiocarbon date of 7920 ± 60 BP (LE-743) was obtained on wood from Quadrant K_{14}.

Cultural Layer XV

Layer XV was excavated over an area of 326.5 m^2. Its thickness fluctuated from 3 to 30 cm. Here a total of 78 animal bones (Table 1) and 112 stone items was found. The latter were represented by a flint core (1 specimen), flint flakelets (21 specimens), diabase flakelet (1 specimen), knifelike blades (42 specimens), microblades (13 specimens), and flint tools (34 specimens).

In the layer was a longitudinally broken conical core, from which blades had been removed around the whole circumference. The length of the core is 3.6 cm (Pl. 44:10).

There are 13 microblades (Pl. 44:2). Most of the blades have a width of 0.5 to 0.7 cm (Pl. 44:6, 9). One blade has a width of 0.8 cm (Pl. 44:4).

Among the group of tools from Layer XV are 30 inset blades, 3 angle burins, and 1 blade with a beveled edge. Of three retouched inset blades, one has microdimensions. Retouch on all inset blades was applied along one working edge and directed from dorsal to ventral (Pl. 44:3). There are 27 unretouched inset blades. They are sections of blades (17 specimens) and microblades (10 specimens), many of which have traces of wear along one working edge and along both working edges (Pl. 44:7). The length of the inset blades is 0.7 to 1.3 cm, the width 0.3 to 0.7 cm.

The angle burins were made on the midsections of blades (2 specimens) and microblades (1 specimen). The burin working edges of all the tools were formed by the plane of the break of the blades and by burin spall scars directed at a right angle to the working edges (Pl. 44:1, 5). One of the burins was twice rejuvenated. The length of the burins is 0.9 to 1.3 cm, the width 0.3 to 0.7 cm, the length of the burin spalls 0.2 to 0.53 cm, their width 0.05 cm.

The blade with a beveled edge has a length of 2.4 cm, a width of 0.6 cm. The working edge of the tool was formed by steep retouch directed from ventral to dorsal (Pl. 44:8).

For Layer XV a radiocarbon date of 8110 ± 80 BP (LE-744) was obtained on a sample of wood from Quadrant F_{16}.

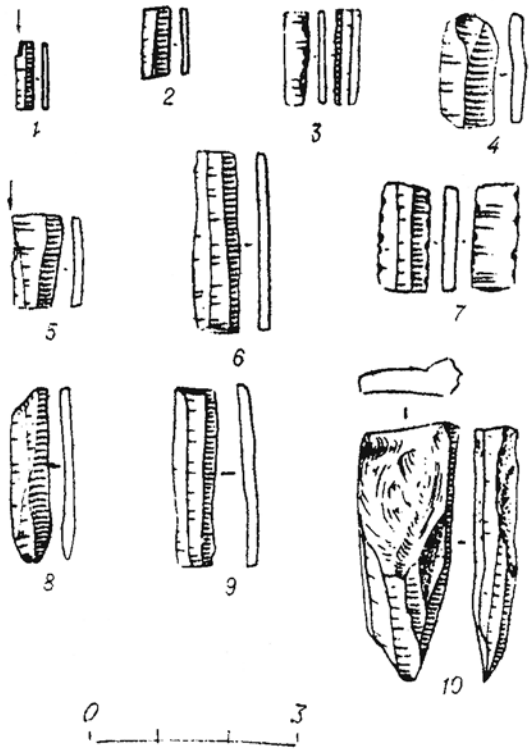


Plate 44. Bel'kachi I site. Stone assemblage from Layer XV.

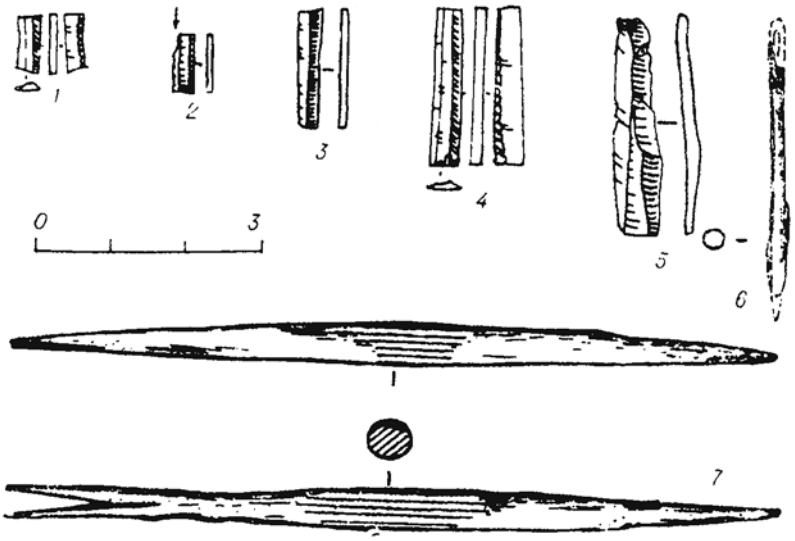


Plate 45. Bel'kachi I site. Stone and bone assemblage from Layer XVI.

Cultural Layer XVI

Layer XVI was excavated over an area of 269 m^2. Its thickness fluctuated between 1 and 10 cm. A total of 10 animal bones (Table 1), 2 fragments of bone tools, and 14 stone items was collected from the layer. The last are represented by a flint flakelet (1 specimen), knifelike blades (2 specimens), a microblade (1 specimen), and tools on microblades (10 specimens).

The knifelike blades have a width of 0.6 to 0.7 cm (Pl. 45:5). Interestingly, all the blades, the microblade, and the tools on microblades were made from black flint, and possibly were all taken from one core.

The tools on microblades are represented by nine inset blades and an angle burin.

Three of the inset blades were worked by retouch, six were not worked. All the retouched inset blades have a single working edge. Their working edges were formed by steep unifacial retouch directed from dorsal to ventral. The length of the tools is 1.3 to 2.5 cm, the width 0.3 to 0.4 cm (Pl. 45:1, 4). The inset blades that were not worked by retouch are the midsections of microblades on which wear of the working edge can be seen (Pl. 45:3).

Near the inset blades lay a bone rod with a split on one end. Both ends of the tool are pointed, and its cross section rounded. The length of the tool is 10.4 cm, the diameter of the midsection is 0.6 cm (Pl. 45:7). This artifact was probably the point of a dart or arrow (?).

The angle burin was made on a section of knifelike microblade. The working edge of the burin was formed by the removal of a burin spall 0.2 cm long and 0.01 cm wide directed at a right angle to the plane of the break of the blade. The length of the burin is 0.9 cm, the width 0.3 cm (Pl. 45:2).

In Quadrant F_{36} was a fragment of a bone needle with the point and the base broken off. The cross section of the needle is rounded. Toward the base it is bifacially flattened. The whole surface of the tool is well ground. The length of the preserved part of the needle is 3.44 cm, the diameter of the section 0.32 cm, the diameter of the base 0.1 cm (Pl. 45:6).

Cultural Layer XVII

Layer XVII was excavated over an area of 284.5 m^2. Its thickness was 35 to 65 cm. A total of 203 animal bones (Table 1) and 98 stone items was found here. The latter are represented by blanks of cores (2 specimens), flint flakes (53 specimens), diabase flakes (4 specimens), flint flakelets (13 specimens), knifelike blades (13 specimens), microblades (4 specimens), and tools on blades (9 specimens).

The blanks of cores were made on flint cobbles. In final form they would be single-platform prismatic cores with a pointed base. One of the blanks was cracked, evidently due to fire, and had been rolled and rounded by water. Its subrectangular pressure platform, from which two primary blades had been removed, was partially worked by flat retouch. The platform was directed perpendicular to the long axis of the artifact. The length of the blank is 3.2 cm, the length of the pressure platform 2.5 cm, the width of the pressure platform 1.5 cm (Pl. 46:8). The other blank also had the subrectangular pressure platform, measuring 3.9 cm long and 1.3 cm wide, worked by retouch. The base is pointed. A large part of the surface of the artifact had been freed of cobble cortex. Two short irregular knifelike blades had been removed from the blank. The length of the artifact is 3.61 cm, the width 3.3 cm (Pl. 46:9).

All the flakes found in the layer are small, with the exception of one specimen of diabase. One of the flint flakes was partially worked by edge retouch.

There were four microblades, nine knifelike blades with a width of 0.5 to 0.6 cm, and four blades with a width of 0.8 cm (Pl. 46:3, 4).

The tools on blades are represented by inset blades (4 specimens), angle burins (3 specimens), an end scraper (1 specimen), and a knife (1 specimen).

Of the four inset blades, one has microdimensions. They were all made on the midsections of blades and none were worked by retouch.

The angle burins were made on broken blades (2 specimens) and a section of a microblade (1 specimen). Their working edges were formed by the plane of the break of the blade and burin spall scars directed toward it at a right angle. The length of the tools is 1.5 to 2.1 cm, the width 0.3 to 0.7 cm (Pl. 46:1, 2).

The knife was made on a whole knifelike blade 4.56 cm long and 0.6 cm wide. The working edge is on one of the long sides of the blade. It was partially worked by small edge retouch directed from dorsal to ventral (Pl. 46:5).

The end scraper was made on the lower end of a large blade. It has an ovally convex working edge and high back. The working edge of the tool was worked by pressure retouch directed from ventral to dorsal that left long and narrow parallel facets. The length of the scraper is 4.4 cm, the width of the working edge 1.7 cm, the width of the base 2.6 cm (Pl. 46:6).

Besides the stone tools, in the layer was the longitudinally split long-bone of a moose, which is the primary blank for a bone artifact, the form of which has not yet been determined (Pl. 47).

Two radiocarbon dates were obtained for Layer XVII: for the upper horizon on wood from Quadrant $H_{28–29}$, 8260 ± 80 BP (LE-745); for the lower horizon on wood charcoal from Quadrant F_{24}, 8060 ± 70 BP (LE-746).

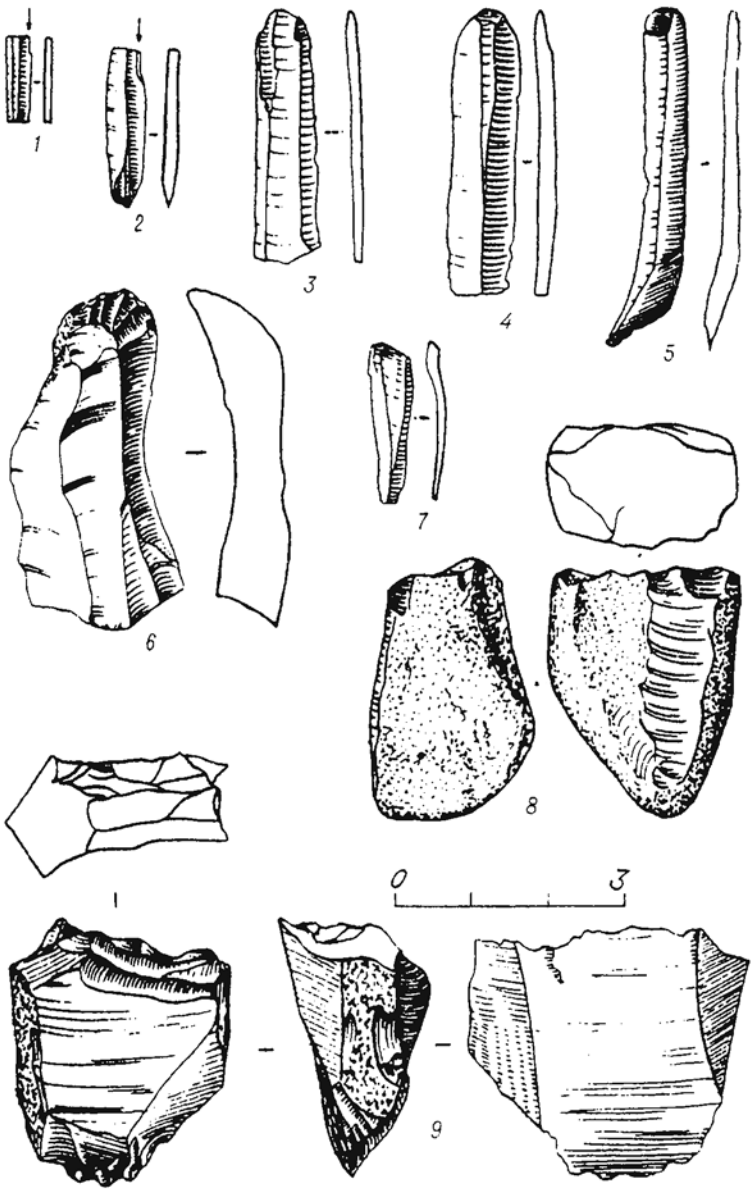


Plate 46. Bel’kachi I site. Stone assemblage from Layer XVII (7 from Layer XXIII).

Figure 26. Moose bones in cultural Layer XVIII at the Bel'kachi I site in Quadrant E_{36}–E_{37}.

Cultural Layer XVIII

Layer XVIII was excavated over an area of 318.5 m^2 (Fig. 26). Its thickness was 8 to 40 cm. In the layer were a total of 90 animal bones (Table 1) and 157 stone objects. The latter are represented by a core and core blanks (3 specimens), small flint flakes (138 specimens), small diabase flakes (3 specimens), flint flakelets (2 specimens), knifelike blades (8 specimens), tools on blades (2 specimens), and a diabase baton (1 specimen).

The core was made from a small flint pebble. Part of its lateral surface preserves pebble cortex. The form of the artifact is prismatic. The oval pressure platform, 2.2 cm long and 1.3 cm wide, was worked by flat pressure retouch and is situated perpendicular to the longitudinal axis of the core. The base was pointed with the aid of the same retouch. The length of the core is 3.4 cm (Pl. 48:4).

The core blanks are artifacts from oval flint pebbles. Their pressure platforms and longitudinal ribs were partially worked by flat retouch. Primary irregular knifelike blades were removed from the platform. The length of the blanks is 2.1 to 2.8 cm, the length of the platforms 3.8 to 4.1 cm, the width of the platforms 2.3 to 2.5 cm.

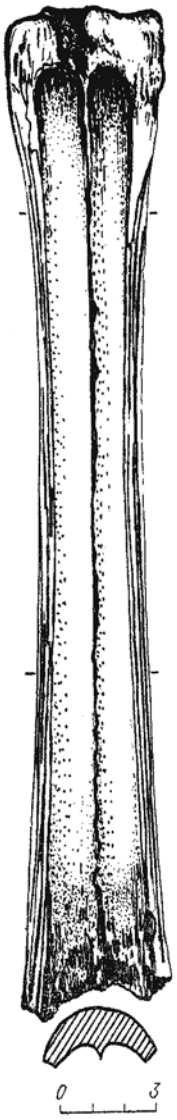


Plate 47. Bel'kachi I site. Worked bone from Layer XVII.

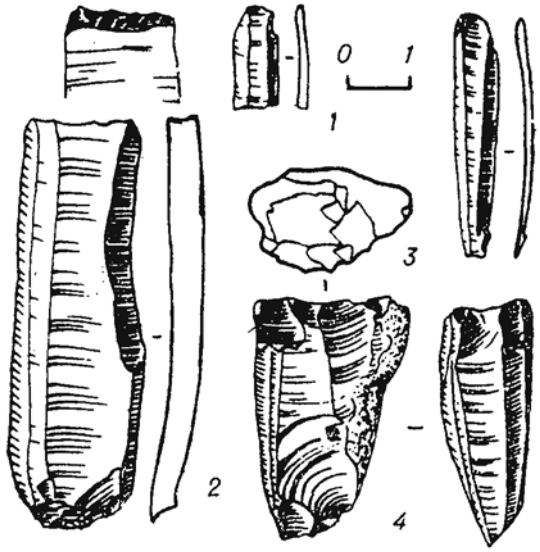


Plate 48. Bel'kachi I site. Stone assemblage from Layer XVIII.

The knifelike blades are 0.5 to 0.6 cm wide. One of the blades is whole. Its length is 3.3 cm, its width in the upper part 0.6 cm, in the lower part 0.4 cm (Pl. 48:3).

Two tools on blades include a graver and a chisel. The graver was made on a blade with a broken bottom. Its working edge is in the upper left corner. It was formed by the plane of the striking platform of the blade and an angular groove made by steep pressure retouch directed from ventral to dorsal. The length of the tool is 1.4 cm, the width 0.65 cm, the length of the groove 0.3 cm, the depth of the groove 0.1 cm (Pl. 48:1).

The chisel was made from a large knifelike blade with a broken bottom. The working edge is situated on the transverse plane of the break of the bottom of the blade (Pl. 48:2). It has an arced-grooved form and was worked by steep pressure retouch directed from dorsal to ventral. The length of the tool is 5.6 cm, the width of the working edge 1.6 cm, the width of the base 1.9 cm.

A radiocarbon date of 8360 ± 80 BP (LE-747) was obtained for Layer XVIII on wood from Quadrant E_{33}–E_{34}.

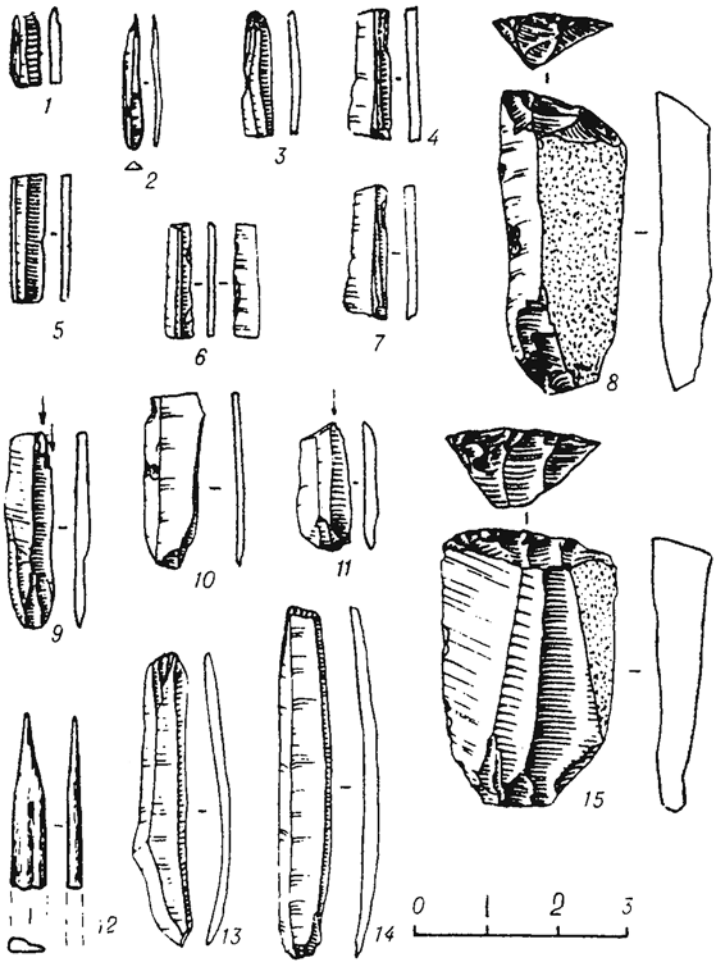


Plate 49. Bel'kachi I site. Stone and bone assemblage from Layer XIX.

Cultural Layer XIX

Layer XIX was excavated over an area of 336 m^2. Its thickness fluctuated between 3 and 20 cm. A total of 75 animal bones (Table 1), 2 fragments of bone artifacts, and 123 stone items was found in the layer. The last include flint flakelets (94 specimens), flint knifelike blades (4 specimens) and microblades (7 specimens), and flint tools (18 specimens).

The microblades are represented as whole specimens (Pl. 49:2) and broken ones (Pl. 49:1, 3). The knifelike blades have a width of 0.5 to 0.6 cm (Pl. 49:5, 13).

All the tools except the baton were made on knifelike blades (15 specimens) or microblades (2 specimens). The tools consist of inset blades (9 specimens), burins (2 specimens), gravers (2 specimens), and end scrapers (4 specimens).

The inset blades are represented as both retouched and unretouched tools. Three retouched inset blades include one microinset blade. They all have a single working edge, worked by the finest edge

retouch, which in one case is directed from ventral to dorsal (Pl. 49:7), and in two, from dorsal to ventral (Pl. 49:6). The length of the inset blades is 0.5 to 1.8 cm, the width 0.4 to 0.5 cm.

The burins were made on blades with a broken bottom. The working edges of the tools were formed by the removal of burin spalls directed at an acute angle to the plane of the break of the blade (Pl. 49:11). One of the burins bears traces of repeated rejuvenation of the working edge (Pl. 49:9). The length of the tools is 1.9 to 2.7 cm, the width 0.6 to 0.8 cm, the length of the burin spall scars 0.15 to 0.5 cm, their width 0.1 to 0.2 cm.

The gravers were made on a midsection of a knifelike blade (1 specimen) and on a blade with a broken bottom (1 specimen). Their working edges were made by retouch directed from ventral to dorsal and are situated at an acute angle to the plane of the break of the blade. The length of the tools is 1.9 to 2.4 cm, the width 0.6 to 0.8 cm (Pl. 49:4, 10).

The scrapers are represented by tools on a thin knifelike blade (1 specimen) and large primary blades (3 specimens). The working edges on all the scrapers are beveled to the right, the backs high. The working edges were worked by steep retouch directed from ventral to dorsal. Partial small edge retouch, also directed from ventral to dorsal, can be traced on the left lateral side of the tools. The length of the large scrapers is 3.9 to 4.3 cm, the width the working edges 1.9 to 2.55 cm (Pl. 49:8, 15). The length of the scraper on a thin blade is 4.9 cm, the width of the working edge 0.51 cm (Pl. 49:14).

Besides the stone artifacts in the layer there were two fragments of bone artifacts, on the surface of which were preserved notches and traces of grinding (Pl. 49:12).

A radiocarbon date of 8290 ± 80 BP (LE-760) was obtained on wood from Quadrant I_{25}–K_{25} for Layer XIX.

Cultural Layer XX

Layer XX was excavated over an area of 340 m^2. Its thickness was 20 to 45 cm.

The cultural remains in Layer XX were concentrated primarily in the upper humic level in Quadrants $D_{24–28}$ to $F_{25–28}$ at a depth of 6.3 to 6.5 m below the present ground surface. Here the 5 to 6 cm stratum of loam was intensely saturated with charcoal and ash, rendering it almost black in color. The area of the compressed black loam, oval in form, stretched along the Aldan (Fig. 27). The length of the area was 5.5 m, the width in the middle about 3 m. Only along Lines 24–26, where the layer dropped most toward the Aldan (13º), the width of the area increased to 3.5 to 4.0 m. Simultaneously in Quadrant $G_{24–26}$ the thickness of the loam diminished to 2 to 3 cm. Evidently the burnt loam, which until this time had an almost regular oval form, was slipping from the primary part of the area in these quadrants. In the northwest part of the area was an oval hearth stretched in a north-south direction (Fig. 28). Within and partially outside the hearth lay burned and cracked hearth stones, which consisted primarily of limestone slabs. Quartzite cobbles were encountered in smaller numbers. The average dimensions of the hearth stones were 5 x 10 cm and 10 x 12 cm. The small stones, as a rule, were pieces split from large cobbles. The thickness of the calcination in the hearth reached 10 cm. The hearth had the following sequence of strata: whitish compact ash (1.5 to 2.0 cm), brick-red sandy loam (3.5 to 4.0 cm), and black-brown argillaceous silt with a large amount of wood charcoal (4.0 to 5.0 cm).

The oval area of dense black loam with the hearth—around and within which were found 570 stone and 8 bone artifacts, as well as small pieces of ocher and the burned bones of animals and fish—was evidently the remains of the dirt floor of a frame surface dwelling like a tent. Its area before the slipping was probably 16 to 17 m^2. The time of existence of the dwelling can be judged by a radiocarbon date of 8370 ± 80 BP (LE-761) obtained from charcoal collected from the hearth in Quadrant D_{27}–E_{27}.

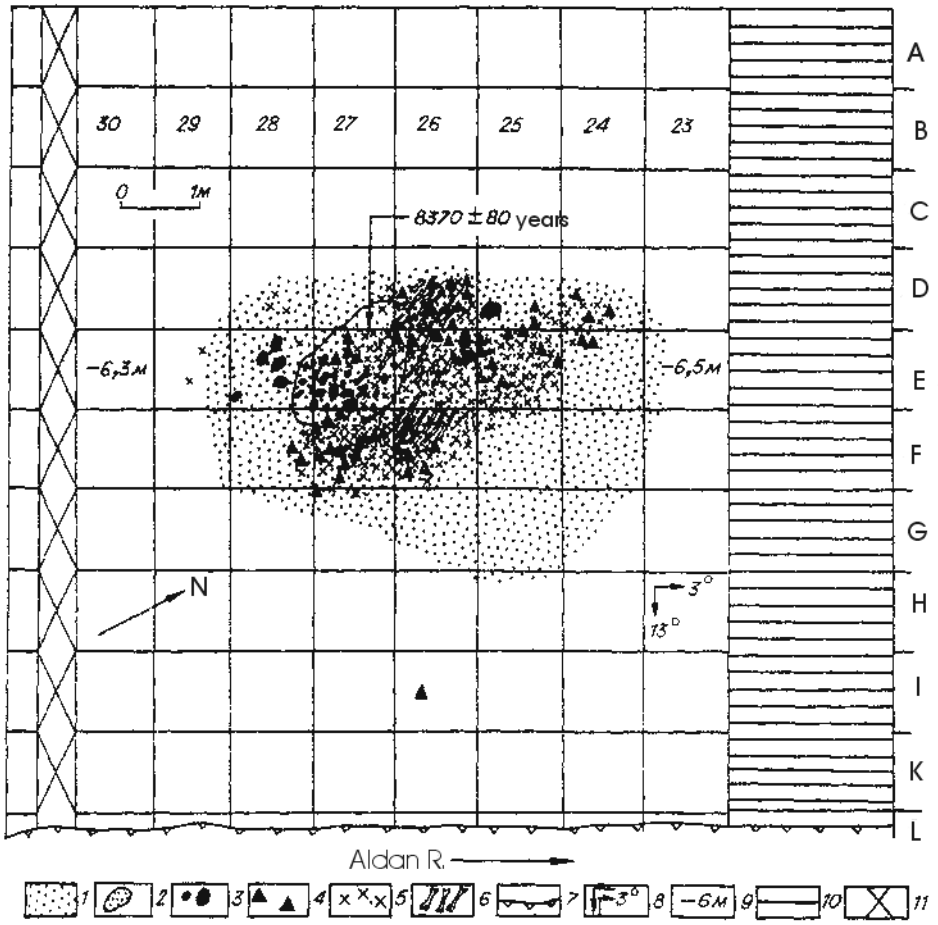


Figure 27. Plan of the house in cultural Layer XX of the Bel'kachi I site. 1) carbonaceous ash fill of the house; 2) outline of the hearth in the house; 3) hearth stones; 4) tools; 5) blades; 6) animal bones; 7) line of the bank edge; 8) angle of drop of the layer; 9) depth from the ground surface; 10) trench; 11) control balk.

In the immediate vicinity of the above-described complex in the upper loam level were two flint blades (Quadrant E_{29}) and a diabase skreblo (I_{26}).

In the lower level of the loam, 18 m southwest of the dwelling, were two flint blades (Quadrant E_{47}) and several small clusters of split animal bones. No other artifacts were noted in the excavated area.

Thus, a total of 73 specimens of animal bones (Table 1), 8 bone artifacts, and 575 stone items was found in Layer XX. The last are represented by flint flakes (1 specimen), flint flakelets (74 specimens), flint knifelike blades (201 specimens), flint microblades (80 specimens), tools on flint blades and microblades (218 specimens), and a diabase cobble skreblo (1 specimen).

Almost all the microblades are broken (Pl. 50:5), only a few whole specimens being found, which reached a length of 4.0 to 5.2 cm (Pl. 50:22). Most knifelike blades have a width of 0.5 to 0.8 cm (Pl. 50:18, 28), but 31 blades exceeded 1 cm in width (Pl. 50:29).

Figure 28. Hearth in cultural Layer XX of the Bel'kachi I site in Quadrant $D_{26–27}$–$E_{26–27}$.

The collection of tools on blades and microblades consists of inset blades (147 specimens), angle burins (47 specimens), gravers (11 specimens), blades with a beveled edge (3 specimens), scrapers (8 specimens), and blades with a groove (2 specimens).

The inset blades were made on 64 blades and 83 microblades. Among the inset blades, 14 are retouched and 133 unretouched (Pl. 50:23–26). All the retouched inset blades have a single working edge. The retouch forming the working edge on eleven tools was directed from dorsal to ventral (Pl. 50:10), and on two, from ventral to dorsal (Pl. 50:8). One tool had the working edge worked by bifacial edge retouch (Pl. 50:7). The unretouched inset blades are the midsections of blades (59 specimens) and microblades (74 specimens). The length of the inset blades is 0.6 to 1.8 cm, the width 0.3 to 0.7 cm.

Of all the angle burins found in the layer, 30 were made on blades and 17 on microblades. The burin working edges were obtained by the usual method of removing burin spalls at an acute (8 specimens) or right (39 specimens) angle to the plane of the break of the blade. The edges of the tools were not subjected to additional work by retouch (Pl. 50:1, 3, 4, 9, 11, 12). One specimen is a double angle burin, on which the working edges were on the upper left and lower left corners of the blade (Pl. 50:2). Two burins have the working edges situated on the upper left and upper right corners of the tools (Pl. 50:13). The length of the burins varies from 0.8 to 2.2 cm, the width 0.4 to 0.8 cm, the length of the burin spall scars 0.18 to 1.5 cm, their width 0.1 to 0.2 cm. Eight tools preserved on the working edges traces of rejuvenation that has the form of two- or three-stepped serrations (Pl. 50:4).

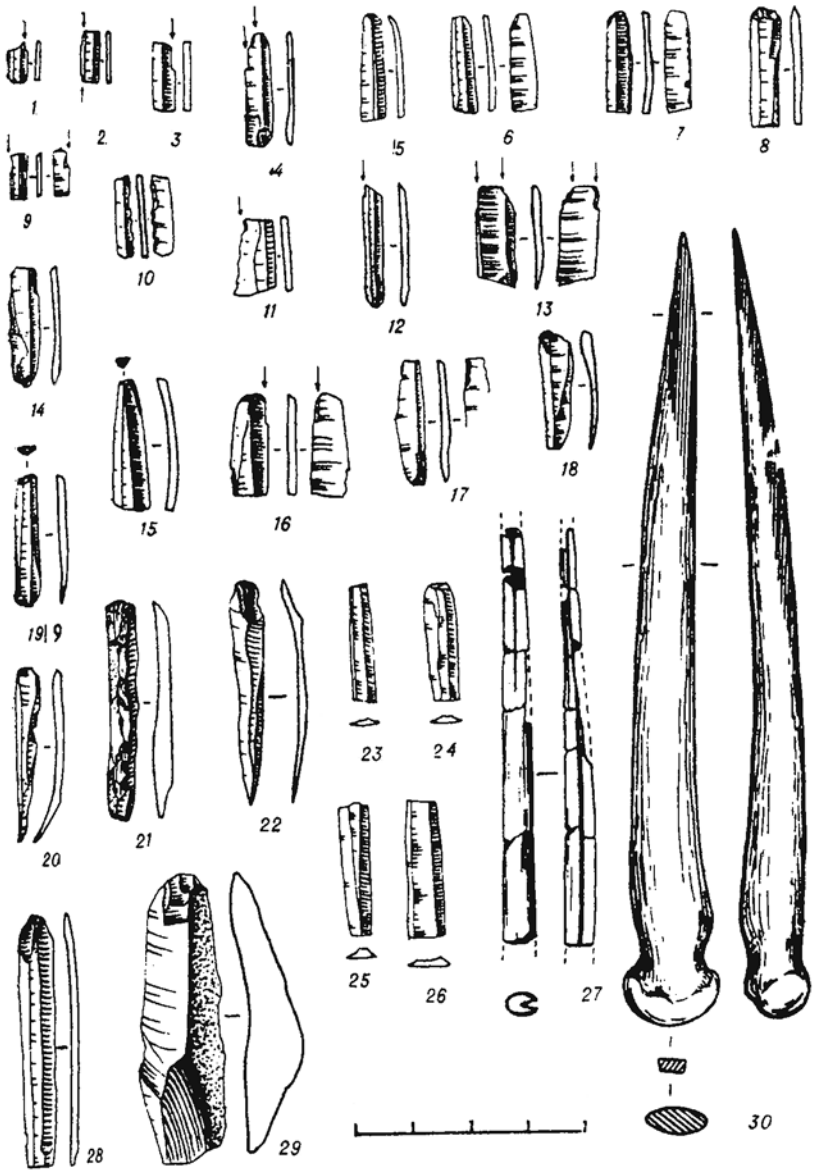


Plate 50. Bel'kachi I site. Stone and bone assemblage from Layer XX.

The gravers were made on broken blades. The groove forming the working edge of the graver was made by small steep retouch directed both from dorsal to ventral (Pl. 50:17) and from ventral to dorsal (Pl. 50:14). In all cases there is a right angle between the plane of the break of the blade and the retouched groove. The length of the tools is 1.0 to 1.2 cm, the width 0.5 to .07 cm, the length of the groove 0.2 to 0.5 cm.

The blades with a beveled edge are broken. The beveled edges are situated in the lower part of the blades. They were formed by the finest steep retouch directed both from dorsal to ventral (1 specimen) (Pl. 50:6) and from ventral to dorsal (2 specimens). The length of the specimens is 0.8 to 2.2 cm, the width 0.5 to 0.7 cm.

All the scrapers on blades are end scrapers. Six of them were made on blades, two on microblades. Based on the form of the working edge they are subdivided into tools with an ovally convex working edge (3 specimens) and with a beveled working edge (5 specimens). The working edges were made by steep pressure retouch directed from ventral to dorsal (Pl. 50:15, 19, 21) and are located on the lower curved ends of the blades. One of the end scrapers is a combination tool that served both as a lateral burin and a graver (Pl. 50:16). The burin spall was directed at a right angle to the retouched plane of the working edge of the scraper, while the graver is located on the opposite end of the tool. The length of the scrapers is 0.9 to 3.9 cm, the width of the working edges 0.2 to 0.7 cm, the width of the bases 0.4 to 0.8 cm.

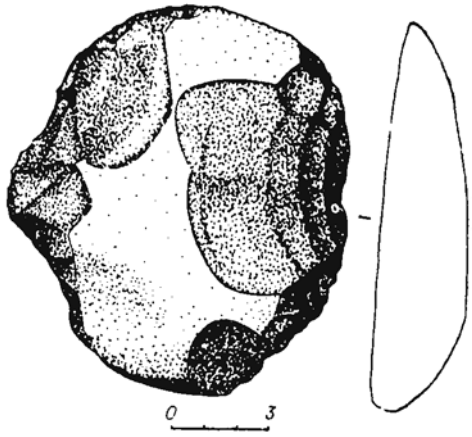


Plate 51. Bel'kachi I site. Stone tool from Layer XX.

The blades with grooves are represented by tools on whole and broken blades. The grooves are located on the long sides of the blades. They were formed by steep pressure retouch directed from ventral to dorsal (Pl. 50:20). The length of the tools is 1.2 to 3.0 cm, the width 0.5 to 0.6 cm. The length of the groove is 0.6 cm, the depth 0.15 cm.

An oval skreblo with segmentlike longitudinal and transverse sections was made from a longitudinally split diabase cobble. The working edges are situated on opposite sides of the tool. One of the working edges is flat and of ovally convex form. The other working edge is steep, with a projecting "beak." The ventral side of the skreblo retained the undulating surface of the split. The dorsal surface is partially covered with cobble cortex, though a large part was worked by steep flat retouch. The working edges were trimmed by edge retouch. Some areas of the working edges show polish from use. The length of the skreblo is 12.2 cm, the width 10.5 cm (Pl. 51).

In addition to the stone tools, one whole and seven fragments of bone tools were found in Layer XX. The whole tool is an awl made from the metacarpal of a moose. The working part of the tool is smoothly narrowed and pointed. On the base was preserved the oval top typical for the metacarpal. The cross section of the working part of the tool is triangular, and the base, oval. The working end of the awl was ground. The length of the awl is 14.3 cm, the width of the base 1.7 cm, the thickness of the section in the middle part 0.7 cm (Pl. 50:30).

Of the remaining bone artifacts, only one, glued together from twelve burned fragments, had a rather definite assignment. It is the middle part of a spindle-shaped rod, the tip and base of which were not preserved (Pl. 50:27). The length of the piece is 12.0 cm, the width 0.6 cm. The artifact has an oval cross section. Along one of the narrow sides of the rod runs a longitudinal slot 3.5 mm deep. It was evidently intended to have flint microinset blades placed in it. In addition to the slot in one of the lateral sides of the rod, there is a very narrow groove 0.7 mm wide and 0.4 mm deep. The described artifact is most probably a piece of a compound dart or arrow (?) point.

Cultural Layer XXIII

Layer XXIII was excavated over an area of 269 m^2. Its thickness was 6 to 38 cm. Between Layers XX and XXIII were Layers XXI and XXII, excavated over an area of 328 m^2, but not producing any artifacts except eight small split bones of moose or reindeer (Layer XXII).

Upon excavating Layer XXIII in Quadrant F_{29} a knifelike blade of gray flint was found (Pl. 46:7). Its length is 2.1 cm, its width in the middle part 0.4 cm. Together with the blade were small pieces of ocher and isolated charcoal bits.

At the very bottom of Layer XXIII, 15 cm below the blade, in Quadrant E_{29} was the scapula of a roe deer, and in Quadrant C_{21}, a fragment of a moose long-bone.

Wood from Quadrant G_{50}, from the middle part of Layer XXIII, provided a radiocarbon date of 9190 ± 80 BP (LE-763), and wood from Quadrant G_{30}, collected in the contact zone between Layer XXIII and the lower-lying deposits, gave a date of 9045 ± 210 BP (IM-243).

In order to determine the lower boundary of human occupation at the Bel'kachi I site, the deposits of the lowest parcel of the floodplain facies of the alluvium, which lay under Layer XXIII to a depth of 65 to 80 cm, were excavated to the channel alluvium over an area of 269 m^2. One split moose (?) long-bone was all that was found in the excavated area. It could not be stated with confidence that the bone was connected with human occupation. The materials obtained with the excavation of the floodplain deposits lying lower than cultural Layer XX did not completely exclude the supposition that people episodically could have appeared at the place of the Bel'kachi I site as early as 10,500 to 8,500 years ago. As if to support this, isolated charcoal stains, a flint blade, and a split animal bone were found at various depths below Layer XX.

However, almost all these finds were in quadrants containing cultural remains in Layer XX. Therefore, though excavation did not successfully establish that the flint blade and animal bones were directly connected with the frost cracks located nearby, we cannot exclude the possibility of their falling in from Layer XX. Considering the exceptional scarcity of finds recorded below Layer XX over an area of about 300 m^2, taken to a depth of 1.2 to 1.3 m, as well as some doubts concerning their redeposition, we can conclude that people began to regularly appear at the Bel'kachi I site only about 8,500 years ago. The cultural remains of this time are represented by the materials from Layer XX.

* *

*

Analysis of the materials from cultural Layers VIII to XX shows that they are all characterized by the following general features: the absence of ceramics and ground and bifacially retouched stone tools (with the exception of one scraper from Layer X—Plate 35:25); the absolute predominance of tools on blades over tools on flakes (Table 2) and the presence of a large number of tools on microblades (Table 2); the same types of tools and techniques of making them; and monotypic prismatic cores. All of these features attest to the fact that in Layers VIII to XX were found the remains of one archaeological culture, named Sumnagin (Mochanov 1966a).

Table 2. Multicomponent Belkachi I site. Stone tools (distribution by layer).

Tool Type	**XX**	**XIX**	**XVIII**	**XVII**	**XVI**	**XV**
1	2	3	4	5	6	7
Retouched insets – B*	5 2.28	2 11.11	–	3 33.33	–	2 5.88
Retouched insets – MB**	9 4.11	1 5.56	–	1 11.11	3 30	1 2.94
Unretouched insets – B	59 26.94	5 27.78	–	–	–	17 50
Unretouched insets – MB	74 33.79	1 5.56	–	–	6 60	10 29.41
Knives – B	–	–	–	1 11.11	–	–
Knives – F***	–	–	–	–	–	–
Blades with beveled edge	2 1.37	–	–	–	–	1 2.94
Microblades with beveled edge	–	–	–	–	–	–
Blades with groove	2 0.91	–	–	–	–	–
Microblades with groove	–	–	–	–	–	–
End scrapers – B	6 2.74	4 22.22	–	1 11.11	–	–
End scrapers – MB	2 0.91	–	–	–	–	–
End scrapers – F	–	–	–	–	–	–
Laterally grooved scrapers – B	–	–	–	–	–	–
Laterally grooved scrapers – MB	–	–	–	–	–	–
Laterally grooved scrapers – F	–	–	–	–	–	–
Angle burins – B	30 13.7	2 11.11	–	2 22.22	–	2 5.88
Angle burins – MB	17 7.76	–	–	1 11.11	1 10	1 2.94
Lateral burins – B	–	–	–	–	–	–
Lateral burins – MB	–	–	–	–	–	–
Lateral burins – F	–	–	–	–	–	–
Gravers – B	11 5.02	2 11.11	1 33.33	–	–	–
Gravers – MB	–	–	–	–	–	–

XIV	XIII	XII	XI	X	IX	VIII	Total
8	9	10	11	12	13	14	15
–	–	–	12 3.23	14 6.12	2 1.53	–	40 3.25
2 1.56	–	6 9.37	5 1.34	16 7.05	4 3.05	–	48 3.91
56 43.75	3 30	22 34.37	133 35.72	81 35.68	52 39.69	3 75	431 35.07
52 40.63	–	21 32.81	81 21.77	50 22.03	20 15.27	–	315 25.63
–	–	–	–	1 0.44	1 0.76	–	3 0.24
–	–	1 1.56	1 0.27	–	–	–	2 0.16
2 1.56	–	–	10 2.69	8 3.52	2 1.53	–	26 2.12
–	–	–	12 3.23	2 0.88	–	–	14 1.14
–	–	1 1.56	2 0.54	2 0.88	–	–	7 0.57
–	–	–	–	1 0.44	–	–	1 0.08
8 6.25	2 20	3 4.69	23 6.18	10 4.40	15 11.45	1 25	73 5.94
–	–	–	1 0.27	4 1.76	1 0.76	–	8 0.65
2 1.56	–	–	5 1.34	3 1.32	3 2.21	–	13 1.06
–	–	–	–	–	1 0.76	–	1 0.08
–	–	–	–	–	2 1.53	–	2 0.16
–	–	–	1 0.27	1 0.44	–	–	2 0.16
3 2.34	–	4 6.25	56 15.05	15 6.61	9 6.87	–	123 10.01
1 0.78	1 10	–	12 3.23	4 1.76	1 0.76	–	39 3.17
–	–	–	3 0.81	2 0.88	–	–	5 0.41
–	–	–	–	2 0.88	–	–	2 0.16
–	–	–	–	–	1 0.76	–	1 0.08
1 0.78	1 10	3 4.69	2 0.54	1 0.44	2 1.53	–	24 1.95
1 0.78	–	–	1 0.27	1 0.44	1 0.76	–	4 0.32

Table 2 (cont.). Multicomponent Belkachi I site. Stone tools (distribution by layer).

Tool Type	**XX**	**XIX**	**XVIII**	**XVII**	**XVI**	**XV**
1	2	3	4	5	6	7
Punches & perforators – B	–	–	–	–	–	–
Punches & perforators – MB	–	–	–	–	–	–
Punches & perforators – F	–	–	–	–	–	–
Chisel-like tools – B	–	–	1 33.33	–	–	–
Chisel-like tools – MB	–	–	–	–	–	
Skreblos	1 0.46	–	–	–	–	–
Axes	–	–	–	–	–	–
Hammerstones	–	1 5.56	–	–	–	–
Pressure flakers	–	–	1 33.33	–	–	–
Abraders	–	–	–	–	–	–
Total tools Percent	219 100	18 100	3 100	9 100	10 100	34 100
Of all tools, the percent on blades	99.54	94.44	66.67	100	100	100
Percent of tools on blades/ Percent of tools on microblades	53.21 46.79	88.23 11.76	100 0	77.78 22.22	0 100	64.70 35.29
Total tools on flakes Percent	–	–	–	–	–	–
Total “cobble” tools Percent	0.46	–	–	–	–	–

Note: The numerator indicates the number of tools; the denominator – the percent.

* = on blades; ** = on microblades; *** = on flakes.

The primary economy of the Sumnagin people, judging from the faunal remains (Table 1), was hunting moose and in smaller degree roe deer and reindeer. Occasionally they hunted brown bear and maral (Siberian stag). With the exception of six fish bones, no traces of fishing were found among the Sumnagin people.

The cultural remains in all layers were in small clusters, and rather often concentrated around a shallow hearth. Sometimes the clusters of artifacts had an oval form with average dimensions of 2 x 3 m or 3 x 5 m. They were evidently left at the location of frame surface dwellings.

The radiocarbon dates and stratigraphic position of the finds indicate that the Sumnagin people more or less constantly occupied the Bel’kachi I site from 8,500 to 6,000 years ago. The earliest traces of the Sumnagin culture meanwhile are recorded on the Aldan at the Ust’ Timpton site.

XIV	XIII	XII	XI	X	IX	VIII	Total
8	9	10	11	12	13	14	15
–	–	–	2 0.54	1 0.44	1 0.76	–	4 0.32
–	1 10	–	–	–	–	–	1 0.08
–	–	–	–	1 0.44	–	–	1 0.08
–	–	1 1.56	1 0.27	–	1 0.76	–	4 032
–	–	–	–	2 0.88	–	–	2 0.16
–	1 10	–	3 0.81	2 0.88	3 2.21	–	10 0.81
–	–	1 1.56	–	1 0.44	1 0.76	–	3 0.24
–	1 10	1 1.56	–	2 0.88	–	–	5 0.41
–	–	–	–	–	2 1.53	–	3 0.24
–	–	–	6 1.61	–	6 4.56	–	12 0.96
128 100	10 100	64 100	372 100	227 100	131 100	4 100	1229 100
98.44	80	95.31	95.70	95.59	87.02	100	95.68
55.56 44.44	75 25	55.74 44.26	68.54 31.46	62.21 37.79	74.56 25.44	100 0	62.92 37.07
1.56	10	1.56	2.69	2.64	4.58	–	2.11
–	–	1.56	–	0.88	2.29	–	0.56

Figure 29. View of excavation at the Ust' Timpton site.

The Multicomponent Ust' Timpton Site

The Ust' Timpton site was discovered in June 1964 during work of the Aldan Expedition (of the Institute of Language, Literature, and History) on the right bank of the Aldan, 1,559 km from its mouth. At this place the Timpton River enters the Aldan, one of latter's largest right-bank tributaries. Topographically the site is confined to a point on the high floodplain that lies at the mouth between the right bank of the Aldan and the left bank of the Timpton.

Along the Aldan the 12-meter-high floodplain stretches for 350 to 400 m, and along the Timpton, 120 to 150 m. Its rear side is connected to the 18-meter Terrace III (?) above the floodplain, on the specified point of which the Ust' Timpton II site is located. In places on the outer edge of the high floodplain, primarily at the tip of the point, is connected the 6-meter middle floodplain, the width of which is 2 to 10 m.

The Ust' Timpton site, as the test pits showed, was situated over a rather broad part of the point. In width it stretched parallel to the Timpton 45 to 50 m, and along the Aldan 120 to 150 m. Based on preliminary calculations, its area consisted of not less than 5,500 to 6,000 m^2. The least forested part of the point was selected for excavation (Fig. 29). The area of excavation was 468 m^2: the maximum length along the Aldan 19 m, along the Timpton, 27 m.

Excavation of the cultural layers was conducted in quadrants (1 x 1 m). The line, running along the Timpton, received numerical designation (1, 2, 3, etc.), and along the Aldan, alphabetic (A, B, C, etc.). Consequently, the quadrants have alphanumeric designations (A_1, B_6, G_{10}, etc.).

A large part of the surface of the excavation was a comparatively level area with a lowering from its center toward the Aldan and the Timpton of 0.5 to 2º. However, from the areas standing 8 to 9 m from the edge of the point, the angle of descent increased toward the Aldan to 11º and along the Timpton to 6º.

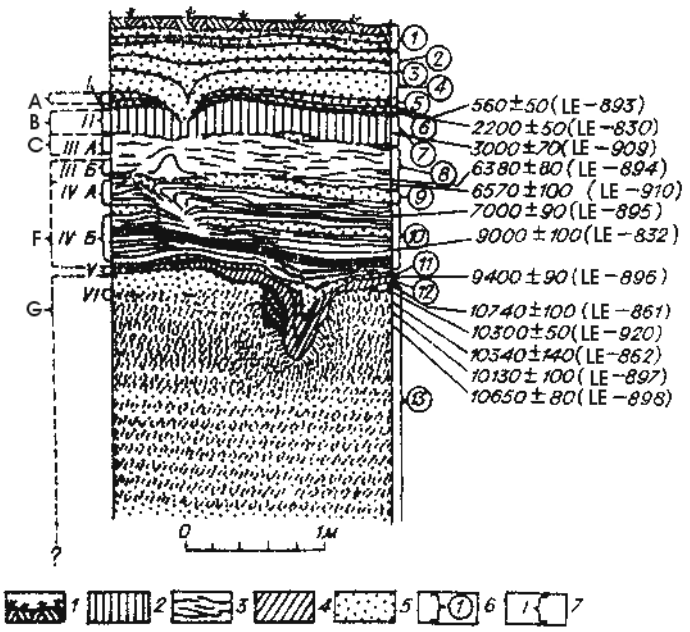


Figure 30. Stratigraphic profile of deposits at the multicomponent Ust' Timpton site. 1) sod; 2) buried covering sandy loam; 3) silts with humus and woody material; 4) loam; 5) sand; 6) number and boundary of geological layer; 7) number and boundary of cultural layer. A) cultural complexes of the early Iron Age; C) Ymyyakhtakh culture (Late Neolithic); D) Bel'kachi culture (Neolithic); F) Sumnagin culture (final stage of the Upper Paleolithic); G) Dyuktai culture (Upper Paleolithic).

The Stratigraphy of the Site

Geological observations made during the study of the Ust' Timpton site show that its deposits can be clearly separated into three parcels by their genesis, age, lithology, lamination, color, and some other features (Fig. 30).

Deposit I. At the base of the opened stratum lies a horizontally laminated parcel of alternating bluish-gray gleying or beigish oxidized loams and inequigranular beigish-grayish sands (Layer 13 in Figure 30). In the test pit placed in the site, the visible thickness of this parcel amounted to 160 cm. However, judging by observations made in the trench running from the excavation to the Aldan, its thickness is substantially greater. This parcel may go to the mean water level of the Aldan or even deeper.

The thickness of the loam interlayers varies from 0.2 to 2.0 cm. The beige loams are encountered primarily in the upper horizon of the parcel. Most often their thickness is less than 1 cm. The thickness of the interlayers of sand is 5 to 25 cm, generally increasing toward the top of the parcel. Sometimes very thin lenses of plant detritus and flecks of charcoal were encountered in the loams, but the humic interlayers characteristic for the high floodplain were absent. Here and there were traced threadlike rootlets 3 to 7 cm long, spread throughout the whole opened stratum. In structure, lamination, and color the loam-sand parcel was on the whole sharply different from the above-lying layers, and evidently represented the alluvial deposits of the facies of the fluvial shoal.

Cultural remains were found in the uppermost beige loam interlayer of the buried fluvial shoal. This interlayer was distinguished as cultural Layer VI. In several places, primarily in the direction toward the Aldan, the beige loam was replaced by two or three interlayers of bluish loam. Here Layer VI was subdivided into Horizons VIa and VIb. No cultural remains were found in the lower-lying deposits. But they may be encountered later since the loams below are no different in their character than the loam to which the cultural remains of Layer VI were confined.

Based on samples of carbonized wood collected from various horizons of Layer VI, several radiocarbon dates were obtained: for Horizon VIb, 10,650 ± 80 BP (LE-898) and 10,130 ± 100 BP (LE-897); for Horizon Via, 10,340 ± 140 BP (LE-862); for the carbonized lens of sand covering Layer VI, 10,300 ± 50 BP (LE-920).

Palynological analysis of the sample from this sand, conducted by A. I. Tomskii and G. M. Savvinova, showed that the pollen-spore spectrum of this interlayer consists of pollen of tree and shrub plants (19%), grass and herb plants (66.4%), and spores (14.6%). In the first group, alder pollen is 38.4%, shrub species of birch 36%, tree species of birch 15%, pine 9%, and larch 1.5%. In the second group the heather pollen amounts to 26%, goose-foot 24.7%, willow-herb 22.6%, and cereals 20%. Spores are represented by ferns (74%) and green mosses (24%).

The deposits of the fluvial shoal were everywhere covered by brownish-yellow loam 6 to 10 cm thick (Layer 12 in Figure 30). In the top and bottom of the shoal can be traced a purplish-black humic interlayer and an interlayer saturated with charcoal. In some places they lay almost horizontal, parallel to each other, and in others undulating, with substantial turbulence. And in some places the interlayers were joined.

The brownish-yellow loam with humic interlayers was deformed in many places by erosion, solifluctional processes, and epigenetic frost cracking. The cracks are generally represented by comparatively large primordial earth veins of fill, buried (Fig. 31), and having a Y-shaped cross section. Their width in the upper part reaches 50 to 60 cm. They go into the lower-lying deposits to a depth of 70 to 90 cm. These veins have in plan the form of joining ditches. They extend 10 to 15 m into the excavation. Ultimately, however, their length was not established since they run beyond the bounds of the excavation. Evidently these veins represent relatively large polygons, the development of which began after the formation of the upper humic interlayer.

The cultural remains are confined to both humic interlayers and the loam contained between them. These deposits were distinguished as cultural Layer V, separated from Layer VI by a sterile interlayer of sand 15 to 25 cm thick. Wood charcoal provided a radiocarbon date for the lower humic interlayer of 10,740 ± 100 BP (LE-861) and for the upper, 9460 ± 90 BP (LE-896).

The substantial difference between LE-861 and LE-896 (considering that the first was probably approximately 10,500 ± 100 BP, judging by the dates below), given the insignificant thickness of the deposits from which they these dates were established, probably indicates an interruption in the process of accumulation of the alluvium. The loam with the humic interlayers is a soil layer, the formation of which began after the cut of the Aldan and the Timpton. This cut, judging by the radiocarbon dates, took place about 10,500 ± 100 BP, that is, at the boundary of the Pleistocene and Holocene, and was probably connected with certain climatic changes.

The character of Deposit I in the parcel (Layers 12 and 13 in Figure 30) and the radiocarbon dates confirm that Deposit I represents Terrace I above the floodplain of the Aldan. At the time when contemporary Terrace II above the floodplain of the Aldan was the high floodplain, it was most probably the fluvial shoal or the low floodplain.

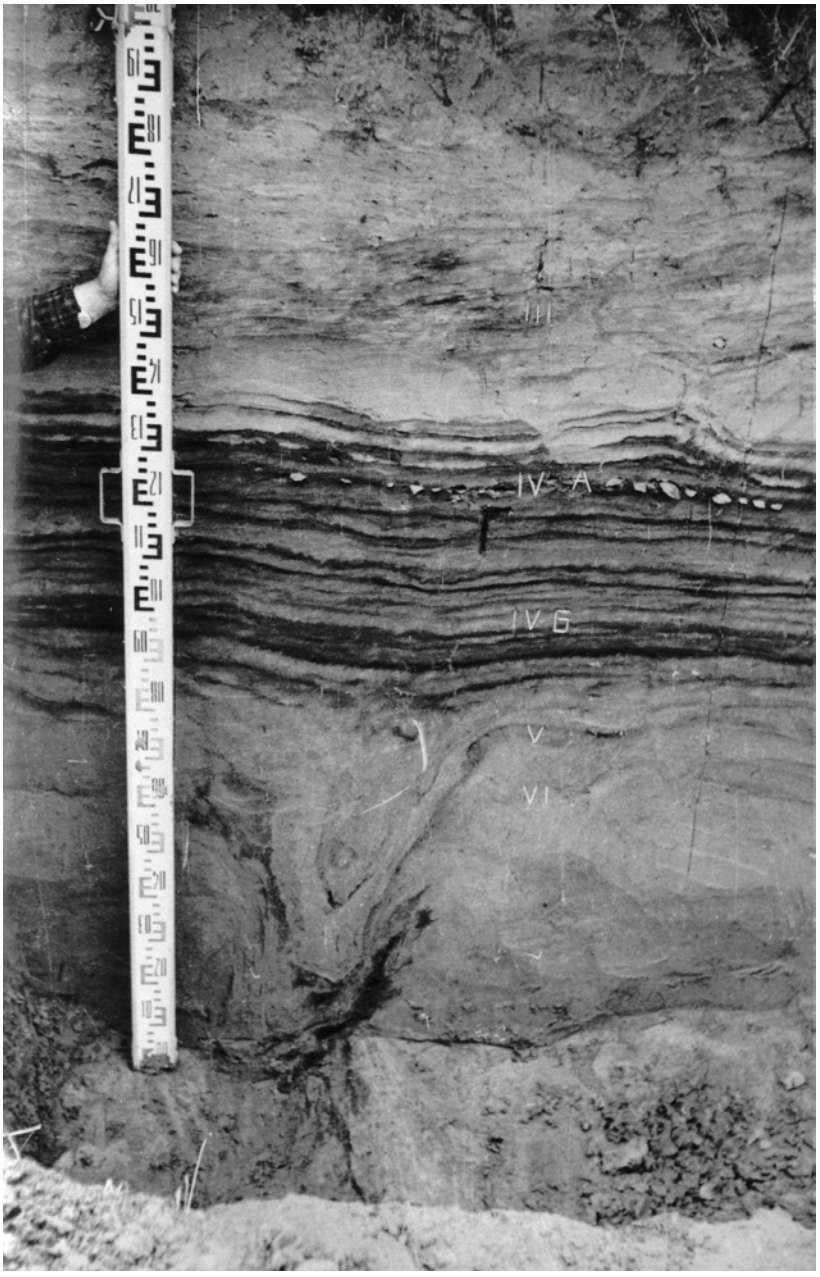


Figure 31. Soil vein of fill breaking through cultural Layers V–VI in Quadrant M_{12} of the Ust' Timpton site.

Deposit II. The second parcel is represented by typical deposits of floodplain facies of the alluvium of the channel bank (Layers 11 to 8 in Figure 30) and the buried soil covering them (Layer 7 in Figure 30). The thickness of the alluvial deposits in the excavation is 70 to 90 cm, while the soil is 8 to 25 cm.

The floodplain alluvium can be separated clearly into two horizons based on the character of the lamination and color. The lower horizon (Layer 10 in Figure 30) is represented by horizontally laminated black humic sandy loams and inequigranular yellowish-gray sands. Due a small amount of humus introduced into them,the bottom and top of the sandy interlayers had a darker color.

The thickness of some interlayers of both sandy loams and sands mostly amounted to 1 to 2 cm, rarely to 5 to 6 cm.

The number of dark humic interlayers varied from 10 to 16. These interlayers were quite saturated with wood charcoal. Examination through four-power magnification revealed that each individual humic interlayer contained a multitude of very thin (less than 0.5 mm) lenses of pure sand and humic sandy loam. The exact number could not be determined since they very often pinched out or were pressed into one another. The total thickness of the lower horizon fluctuated from 40 to 60 cm, diminishing sometimes to 20 cm. A radiocarbon date of 7000 ± 90 BP (LE-895) was obtained for the upper part of the alluvium, and for the lower part, 9000 ± 100 BP (LE-832).

In several places the clear lamination of the deposits was broken due to solifluction processes and the bending of torn layers by small frost cracks. Some frost cracks are represented by small soil veins of fill. The last is most characteristic for the bottom of the floodplain alluvium.

Many of the remains of the Sumnagin culture were confined to the dark humic interlayers. The deposits with these finds are distinguished as cultural Layer IV, separated from Layer V by a sterile interlayer of inequigranular sand 3 to 10 cm thick. This sand (Layer 11 in Figure 30) everywhere covered the large soil veins of fill, which run into the upper part of the deposits of the buried terrace. No evidence suggests that the deposits of cultural Layer IV penetrated into these veins.

The upper horizon of floodplain alluvium, 15 to 40 cm thick (Layer 8 in Figure 30) was separated from the lower over the whole area of the excavation by inequigranular sand 8 to 15 cm thick (Layer 9 in Figure 30). The alluvium was represented by a weakly humic dark-gray sandy loam with lenses of light-gray inequigranular sand. The lamination of the parcel was not clear, mostly not horizontal, but rather undulating with various breaks. The sandy interlayers 0.5 to 1.0 cm thick often pinched out, and several sandy-loam interlayers were fused into one undifferentiated stratum. However, where the lamination is exposed more or less clearly (basically in the lower part), the number of humic interlayers was 7 to 10. The humic nature of some interlayers of sandy loam is connected with the presence of insignificant decayed plant remains and small wood charcoal. These deposits were substantially reworked by cryogenic processes occurring in the active layer. Because of frost warping and solifluctional slipping, the deposits lost their original structure in many areas.

In the uppermost part of the alluvium were cord-wrapped ceramics and stone tools, the remains of the Bel'kachi Neolithic culture. Sometimes they were confined to two or three upper humic interlayers. The deposits with Bel'kachi remains were distinguished as cultural Layer III. Its thickness on average was 5 to 10 cm. In the lower-lying deposits of the upper horizon of alluvium no cultural remains were found, with the exception of isolated fragments of Bel'kachi ceramics that had penetrated from above by way of the frost cracks.

Charcoal was collected in the seventh and eighth humic interlayers from the top for analysis. The radiocarbon date of the first sample was 6380 ± 80 BP (LE-894), and of the second, 6570 ± 100 BP (LE-910). The dates show that the lower part of the deposits accumulated at the time when the Sumnagin culture was distributed along the Aldan. The middle part evidently must have been deposited during the existence of the Early Neolithic Syalakh culture—fourth millennium B.C. However, traces of this culture

presently have not been found at the Ust' Timpton site. The upper layers of alluvium are dated, judging by the Bel'kachi remains, to the third millennium B.C.

The total thickness of the floodplain facies of alluvium of Parcel II amounts to 70 to 90 cm. Judging by the radiocarbon dates and the cultural remains, the alluvium accumulated during the course of approximately 5,500 years (9400 ± 100 to 3900 ± 100 BP). As can be seen in the profile of the Bel'kachi I site, over this period on the normal accumulative high floodplains, about 6 to 8 m of floodplain alluvium were deposited, that is, almost ten times more than at the Ust' Timpton site. The likely reason for this volume of deposit is that the sinking of Terrace I (?), located above the floodplain of the Aldan in the vicinity of the Ust' Timpton site, was comparatively insignificant, and was in a regime of the high floodplain, which was only episodically inundated. Normal accumulative modern high floodplains at that time were the annually flooded low floodplains.

All this is attested by the substantially greater humic nature of the alluvium and its saturation with cultural remains at the Ust' Timpton site in comparison with the Bel'kachi I site. A noticeable slowing of accumulation of alluvium of the high floodplain occurred about 4,000 years ago, which is evidently connected with the cut in the Aldan.

At approximately this time a clearly defined soil (Layer 7 in Figure 30) was formed at the Ust' Timpton site, represented by an orangish-yellow sandy loam 8 to 25 cm thick. Its primary bulk consists of fine-grained sand in which rounded kernels of compact loam 0.1 to 1.5 mm in diameter were uniformly scattered. The sandy loam was evidently formed as a result of the reworking of the top of the lower-lying alluvial stratum under the action of soil-forming processes and intermixed. Probably during the formation of the sandy loam the surface of the area was very poorly sodded. The orangish-yellow color attests to the oxidation of the sandy loam, which occurred when it was in an above-water position.

To the lower and middle horizons of the sandy loam were confined the remains of the Late Neolithic Ymyyakhtakh culture, which permitted distinguishing cultural Layer II of the site. Based on charcoal collected near a crushed Ymyyakhtakh vessel, a radiocarbon date of 3000 ± 70 BP (LE-909) was obtained for the upper horizon of Layer II, and based on charcoal from the upper part of the sandy loam, 2200 ± 50 BP (LE-830). Judging by the latter date, the bearers of the Ust' Mil' culture of the Bronze Age could have lived after the Ymyyakhtakh people during the period of accumulation of the upper part of the sandy loam at the site. However, no traces of them have presently been found here. In some areas of the excavation, in the cover of sandy loam, an almost black humic interlayer 1 to 2 cm thick can be easily traced. Meanwhile no cultural remains were recorded in it. At the Ust' Timpton II site a radiocarbon date of 1130 ± 80 BP (LE-918) was obtained for this interlayer.

Deposit III. The third parcel is represented by deposits of floodplain facies of alluvium, covered by modern sod (Layers 1 to 6 in Figure 30). In a large part of the excavation this parcel was reworked by modern cultivation and almost did not preserve its original structure and thickness. Where it survived, it is 60 to 65 cm thick. The alluvium here is characterized by a clearly defined horizontal lamination owing to the alternation of dark-brown sandy loam 2 to 4 cm thick and light-gray inequigranular sands. The thickness of the latter on average is 10 to 25 cm, decreasing in the lower and upper parts of the parcel to 1 to 2 cm. All the interlayers of sandy loam, with the exception of two lower ones (Layer 5 in Figure 30), contained a large number of well preserved compressed small twigs, leaves, needles, and remains of moss. These interlayers can be considered thin buried sods. The two lower interlayers, having the same origin, contained strongly deformed plant remains and small bits of charcoal. Beginning with the middle interlayers of sandy loam (Layer 3 in Figure 30), various frost deformities in the form of soil veins with bending and small wedging were often recorded in the parcel.

In two lower interlayers of sandy loam (Layer 5 in Figure 30), separated by sand, were some early Iron Age remains. These interlayers were distinguished as cultural Layer I with the subdivision into two horizons—Ia and Ib. A radiocarbon date of 560 ± 50 BP (LE-893) was obtained for Horizon Ib based on

charcoal. Horizon Ib was separated from the top of the second parcel by thin lenses of light-gray sand (Layer 6 in Figure 30), the thickness of which did not exceed 1.5 cm. This sand marks the lower boundary of the overlying alluvial parcel.

The alluvial deposits covering the sod layer of the second parcel confirm that after a substantial break, which lasted about 3,000 years, the terrace above the floodplain in the vicinity of the Ust' Timpton site was again brought into the sphere of fluvial accumulation. The increase in thickness of the alluvial deposits in all the profiles of the high floodplain and the slipping areas of the terrace above the floodplain are characteristic for the whole Aldan valley. Judging by the radiocarbon dates and the early Iron Age remains buried under the overlying alluvium, substantial increase in the level of flood waters of the Aldan began everywhere from the upper reaches to the mouth about 1,000 years ago. Maximal flooding has been restricted approximately to this level up to present.

In some places the alluvial deposits presently reach 14 to 15 m above the Aldan river level.

Excavations at the Ust' Timpton site established that six cultural layers are represented in it, one above the other, with most of them in some areas divided into separate horizons.

Cultural Layer I contains remains from the early Iron Age; Layer II, the Late Neolithic Ymyyakhtakh culture; Layer III, the Neolithic Bel'kachi culture; and Layers IV, V, and VI, pre-Neolithic cultural remains. In the present work only materials of the three lower cultures are examined.

Cultural Layer IV

Cultural Layer IV was opened over an area of 468 m^2 (Fig. 32). In a large part of the excavation its top was at a depth of 60 to 70 cm below the present ground surface. The layer was separated from the overlying deposits by a sterile interlayer of sand 8 to 15 cm thick. At the base of the layer was a sterile interlayer of sand 3 to 10 cm thick. Throughout almost the whole excavation the thickness of the layer was on average 40 to 60 cm. The layer was almost horizontal, but in places from Line A and Line 1 it dropped toward the Aldan and the Timpton at an angle of 5 to 10º, with which its thickness sometimes diminished to 20 cm.

Cultural Layer IV was confined to the lower horizon of alluvium of the second geological parcel (Layer 10 in Figure 30). The cultural remains were recorded in the dark humic interlayers of sandy loam, numbering 10 to 16 in various places and separated by interlayers of sand 1 to 2 cm thick. The last were often pinched out over the extent of several meters and the humic interlayers became joined. As a consequence, the assignment of material to separate interlayers was very difficult.

In the direction toward the Timpton, approximately from Line 6, as well as in the quadrants subjected to cryogenic deformation, the alluvium almost lost its characteristic horizontal lamination. In these areas the layer was distinguished as a special "unified cultural horizon." Upward, along the Aldan, approximately from Line 6, Layer IV is rather clearly separated into two parcels, separated by a sterile interlayer of sand 2 to 6 cm thick. Each of them consisted of 7 to 9 humic interlayers. The lower parcel was identified as cultural Horizon IVb, and the upper as cultural Horizon IVa.

Cultural Horizon IVa

Horizon IVa was excavated over an area of 220 m^2. It basically occupied the quadrants located west of Line 6. Its total thickness was 20 to 30 cm, and included 5 to 7 humic interlayers, which often became joined. The cultural remains were distributed rather evenly both in individual interlayers and over the whole excavated area. As a rule, the remains did not form special clusters.

A single hearth was found in the third upper humic interlayer in Quadrants $D_{11–12}$, in the form of an oval. It was 1.5 m long and 0.8 m wide. In the hearth fill, which consisted of brick-red burned sandy loam, were noted pieces of fire-cracked granite cobbles, wood charcoal, fragments of moose teeth, and diabase flakes and flakelets. Around the hearth the cultural layer was saturated with diabase flakes, flint knifelike blades, and tools.

In Quadrant F_{11} in an upper humic interlayer was a cluster of eight flat oval diabase cobbles 7 to 9 cm long and 5 to 6 cm wide, having small grooves on the long sides formed by bifacial pecking. It is possible that these cobbles could have been used as sinkers for fish nets.

In cultural Horizon IVa was a total of 1,229 stone objects, represented by cores (6 specimens), flint flakes (22 specimens) and flakelets (49 specimens), diabase flakes (654 specimens) and flakelets (303 specimens), knifelike blades (80 specimens), and microblades (20 specimens), as well as various tools (95 specimens).

The cores are of cylindrical form. They all have two pressure platforms. Most of the blades were removed from the upper platforms, which created rounded outlines. The form of the lower platforms approaches trapezoidal. The plane of the upper platforms was covered by small spall scars of pressure retouch, while the lower ones were left without additional work. The diameter of the upper platforms is 0.7 to 0.8 cm, the lower 0.3 to 0.4 cm. The length of the whole cores is 2.4 to 4.2 cm (Pl. 52:31, 39).

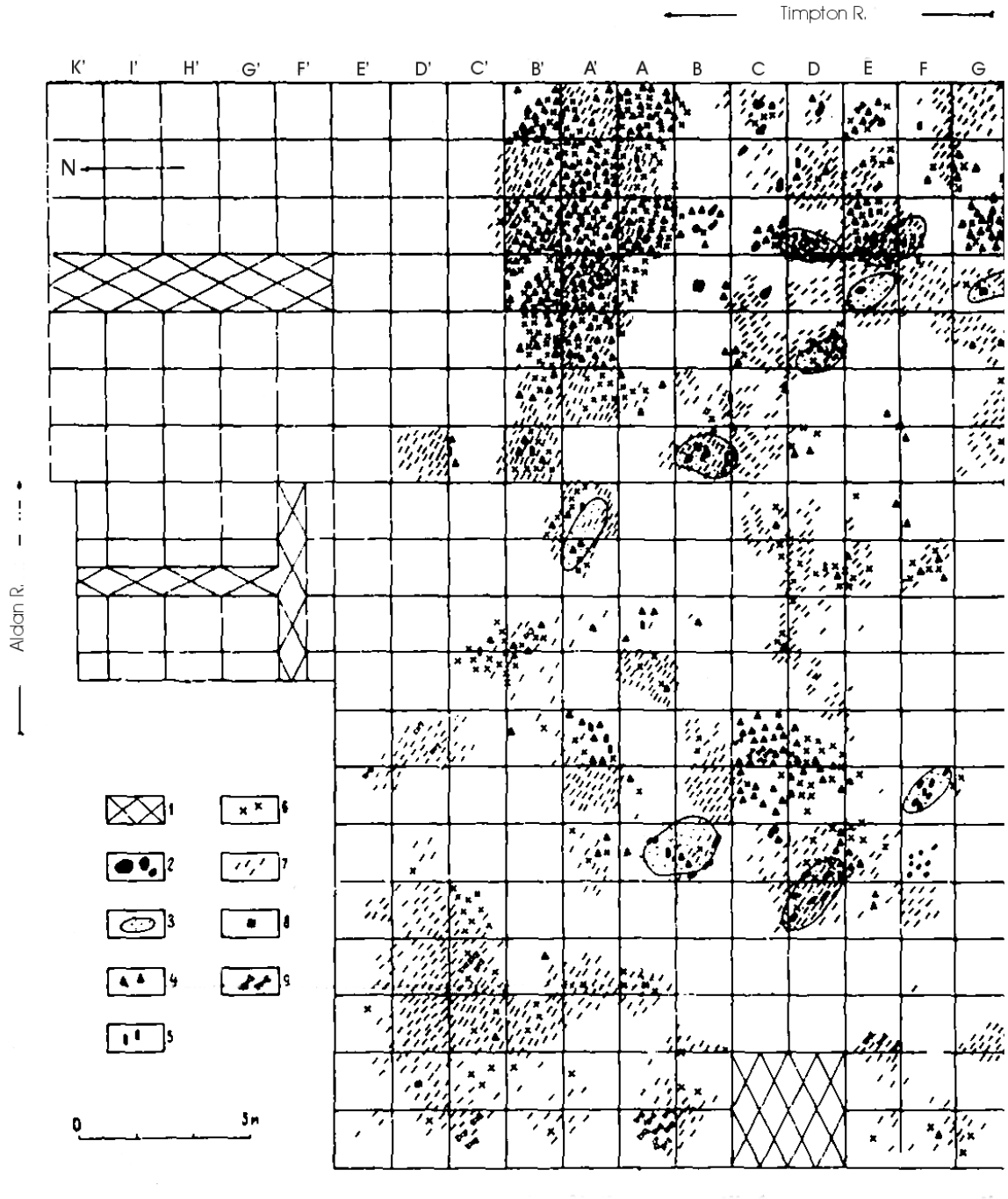
The flint flakes have medium and small dimensions. The medium flakes vary from 3 to 5 cm (4 specimens), the small 1.5 to 3 cm (18 specimens). The flint flakelets do not exceed 1 cm in length and 0.1 to 0.15 cm in thickness. Some flakelets are entirely flat, their thickness about 0.02 cm.

The number of diabase flakes and flakelets is substantially greater than that of flint. Among the flakes are large ones with a length of more than 5 cm (228 specimens), medium ones (371 specimens), and small ones (55 specimens).

The knifelike blades were made from flint of various colors. There are eight whole blades, whose length is 1.5 to 5.7 cm. The remaining blades are broken. There are blades 0.5 to 0.7 cm wide (60 specimens) (Pl. 52:28), 0.8 to 1.0 cm wide (10 specimens) (Pl. 52:32), 1.1 to 1.5 cm wide (5 specimens) (Pl. 52:26), over 1.5 cm (5 specimens).

The microblades 0.2 to 0.4 cm wide were found broken. As a rule, they have a regular edge (Pl. 52:7).

The stone tools are represented by inset blades (58 specimens), scrapers (11 specimens), burins (13 specimens), a graver (1 specimen), a punch (1 specimen), blades with a beveled edge (6 specimens), a skreblo (1 specimen), an adze (1 specimen), axes (2 specimens), and a chisel-like artifact (1 specimen).


Timpton R.
K' I' H' G' F' E' D' C' B' A' A B C D E F G
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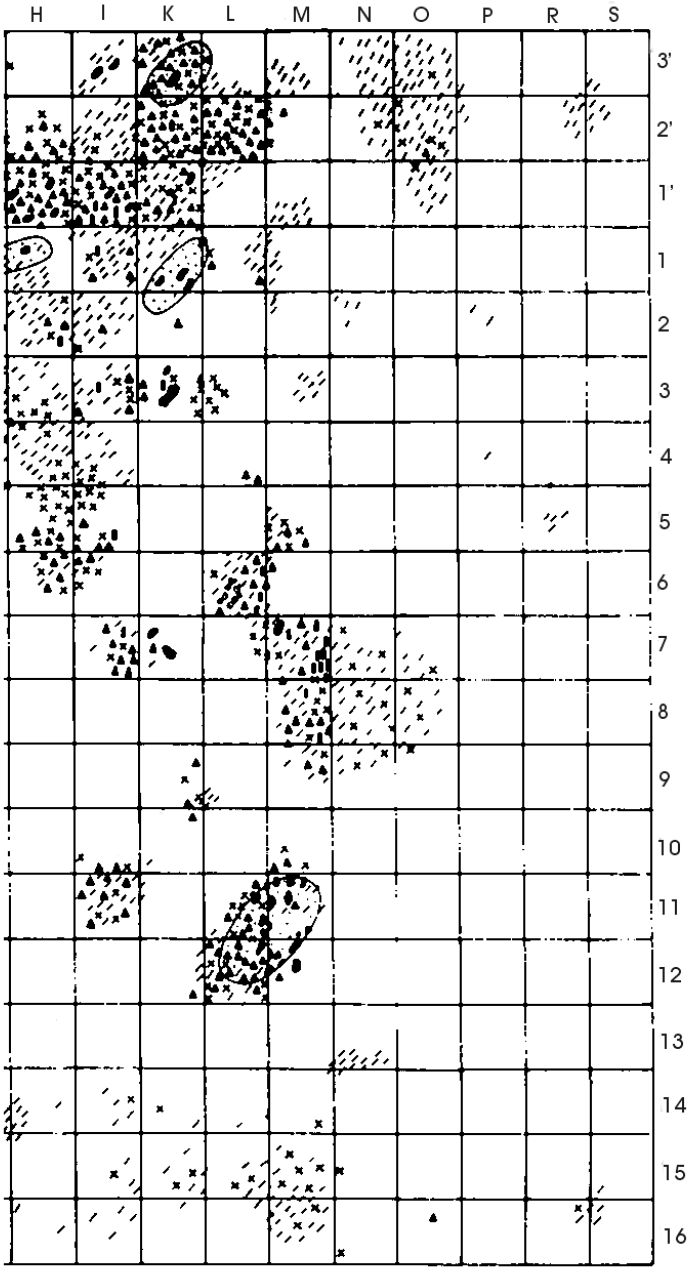

Figure 32. Plan of the finds in combined Layer IV of the Ust' Timpton site. 1) control points; 2) hearth stones; 3) hearths; 4) cores; 5) tools; 6) blades; 7) flakes; 8) graphite; 9) animal bones.

The inset blades were made on flint blades (31 specimens) and microblades (27 specimens). By the character of the work they are separated into retouched (12 specimens) and unretouched (46 specimens). The retouched inset blades are the midsections of blades (1 specimen) and microblades (11 specimens), one side of which was worked by small retouch directed from dorsal to ventral (Pl. 52:4–6, 9, 10, 15). The unretouched inset blades are also midsections of blades, with traces of use in the form of the finest dents on the sharp longitudinal edges in most cases. The length of the inset blades is 0.6 to 3.3 cm, the width of the microinset blades 0.2 to 0.3 cm, the width of the inset blades 0.5 to 0.8 cm.

Burins are represented by two types: angle (11 specimens) and lateral (2 specimens).

The angle burins were made on flint knifelike blades. Their working edges were formed by the removal of burin spalls directed at a right or acute angle to the transverse plane of the break of the blades (Pl. 52:12, 14, 19–21, 24, 27, 37). The long sides of the tools, as a rule, were not trimmed by retouch, with the exception of one burin (Pl. 52:33). One specimen is a double angle burin, with working edges situated on the lower right and left corners of the blade (Pl. 52:25). Besides longitudinal burin-spall scars it has burin micro-spall scars on the transverse plane of the break of the blade. It was trimmed at a right angle to the right burin-spall scar. The length of the angle burins is 1.3 to 4.7 cm, the width 0.6 to 1.0 cm.

The lateral burins were made on a flint blade (1 specimen) and a flint microblade (1 specimen). Their working edges were formed by the removal of burin spalls directed at an acute angle to the retouched transverse plane of the blade. The length of the burins is 1.1 to 1.9 cm, the width 0.3 to 0.7 cm (Pl. 52:1, 23).

The graver was made on a flint microinset blade (Pl. 52:3). Its working edge was worked by small steep retouch directed from ventral to dorsal. The length of the tool is 1.4 cm, the width 0.35 cm, the length of the working edge 0.5 cm.

The scrapers were made on flint knifelike blades (9 specimens) and lamellar flint flakes (2 specimens). All are end scrapers. The working edges of the scrapers on blades are on the lower curved end of the blades. They were formed by the finest edge retouch, directed from ventral to dorsal. The remaining surface of the tools was not subjected to additional work. The working edge on three scrapers is beveled (Pl. 52:36, 38), and ovally convex on the remaining (Pl. 52:16, 18). One of the scrapers is a combination tool, combining the working edge of a scraper and the working edge of an angle burin, which are located on opposite corners of the blade (Pl. 52:11). The length of the tools is 1.3 to 3.9 cm, the width of the working edges 0.3 to 0.8 cm, the width of the bases 0.5 to 1.2 cm.

The working edge of scrapers on lamellar flakes is convexly arced. Not only the working edges of the tools, but partially their longitudinal edges as well were worked by edge retouch. In all cases the retouch is directed from ventral to dorsal. The length of the tools is 3.5 and 5.8 cm, the width of the working edges 2.2 and 1.3 cm (Pl. 52:35, 41).

The punch was made on the lower curved end of a flint knifelike blade 3.4 cm long and 1.0 cm wide. The tip of the tool was trimmed by unifacial edge retouch directed from ventral to dorsal. The retouch also partially runs onto the left longitudinal edge of the punch (Pl. 52:29).

Among the blades with a beveled edge, one has microdimensions (0.3 cm wide, 1.3 cm long). The remaining were made on blades 0.5 to 1.2 cm wide and 1.8 to 4.8 cm long. The beveled edges of the tools were formed by the finest pressure retouch directed both from dorsal to ventral (Pl. 52:2, 22) and ventral to dorsal (Pl. 52:8, 17, 30). One of the blades with a beveled edge has a groove on the long side that was formed by retouch directed from dorsal to ventral (Pl. 52:42).

The chisel-like tool was made on a flint blade 0.6 cm wide and 0.5 cm long. The working edge of the tool is on the transverse break of the blade. It has a grooved arc-like shape and was formed by steep edge retouch directed from dorsal to ventral.

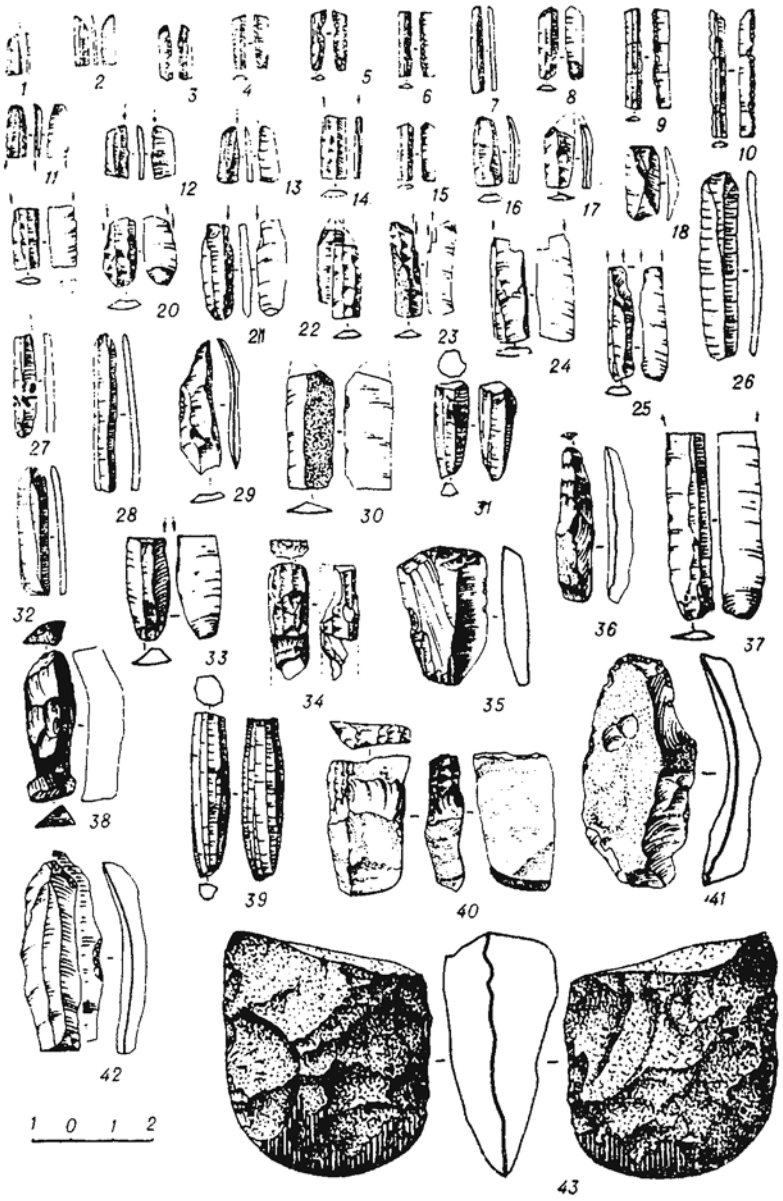

Plate 52. Ust' Timpton site. Stone assemblage from Layer IVa.

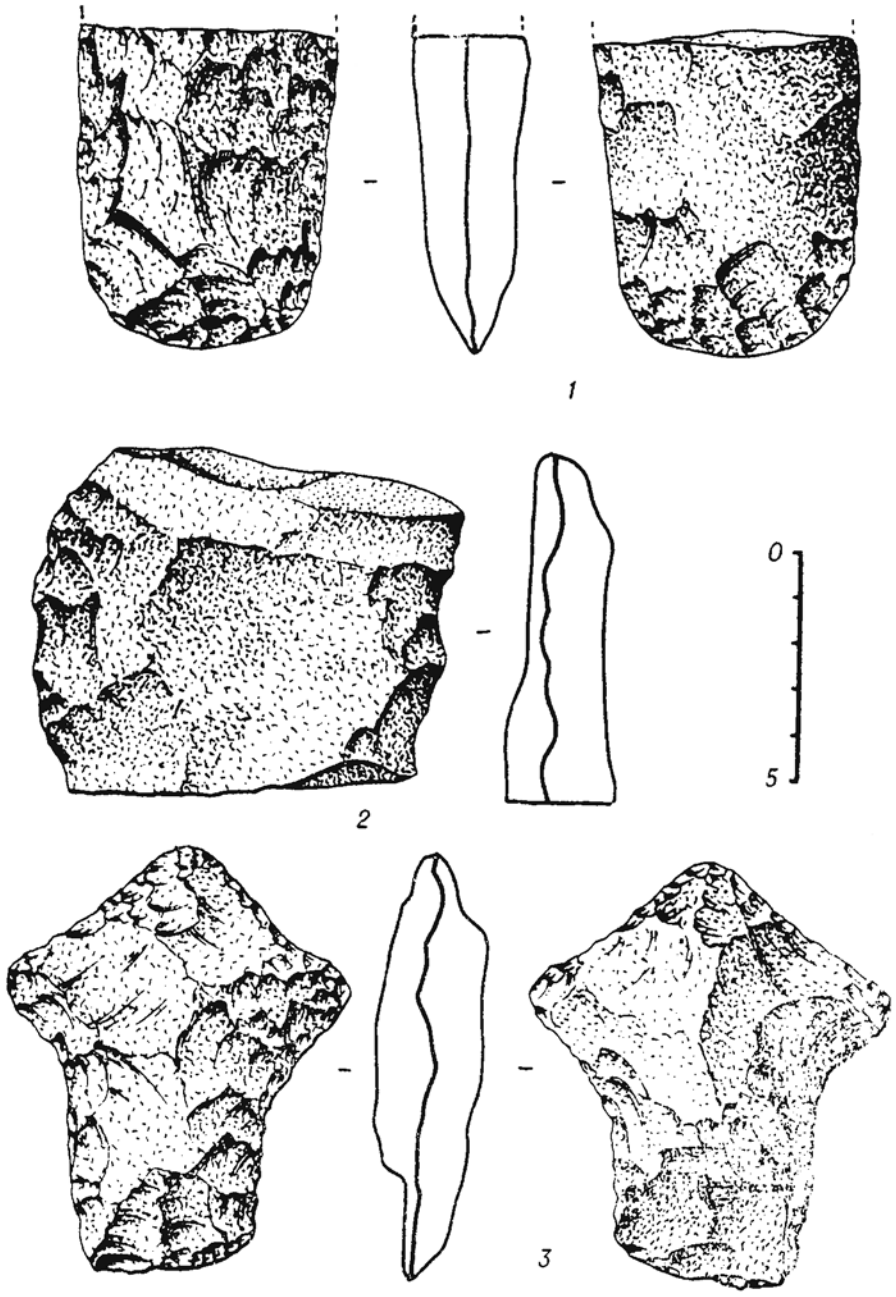

Plate 53. Ust' Timpton site. Stone assemblage from Layer IVa.

The skreblo was made on a large diabase flake with a subrectangular outline. The tool has two laterally opposite working edges that were worked by flat retouch directed from ventral to dorsal. The cross section of the skreblo is trapezoidal. The length of the working edges is 7.5 and 6.0 cm (Pl. 53:2).

The adze was made from a diabase cobble. The working part of the adze has a subrectangular form and an almond-shaped cross section. The butt was worked in the form of a cross with clearly marked lateral ears. On the whole, both broad surfaces of the adze were worked by flat retouch and the edges trimmed by secondary retouch. The length of the adze is 9.6 cm, the width of the working edge 3.5 cm, the width of the butt 7.5 cm (Pl. 53:3).

Both axes, represented by fragments of the working part of the tools, were made from large diabase cobbles. The axes have an almond-shaped cross section. The form of the working edges is convexly arced. On the whole, the broad surfaces were worked by flat retouch. The edge of the working edge on one axe was formed by small secondary retouch (Pl. 53:1), while the other was partially ground (Pl. 52:43). The length of the fragments is 5.6 and 7.0 cm, the width in the middle part 5.0 and 5.5 cm, the width of the working edges 4.5 cm.

A radiocarbon date of 7000 ± 90 BP (LE-895) was obtained on charcoal taken from the third and fourth humic interlayers, lying at a depth of 10 to 12 cm below the top of cultural Horizon IVa.

Cultural Horizon IVb

Horizon IVb was excavated over an area of 238 m^2. Its total thickness was, like the one above, 20 to 30 cm. Horizon IVb consisted of 10 to 11 dark humic interlayers that often were broken, merged, and separated by permafrost wedges.

Three hearths were found here, within which lay burned quartzite and granite cobbles. The first hearth recorded was in Quadrants A_{11}–B_{11} in the second upper humic interlayer. The form of the hearth was oval; it was oriented north-south; and its dimensions were 0.9 x 1.5 m. The color of the fill was dark brown. The thickness of the calcined area was 2 cm. In the hearth were small bits of wood charcoal, flakes, and a knifelike blade. Northeast of the hearth a cluster of flakes, knifelike blades, cores, and tools was noted. The second hearth was in the seventh upper interlayer in Quadrant F_{10}. Its dimensions were 0.5 x 1.5 m; the thickness of the calcined area was 1 cm. In the fill were individual bits wood charcoal and very small pieces of burned animal bones. Around the hearth were knifelike blades. The third hearth was situated in the fourth upper humic interlayer in Quadrants $L_{11–12}$–$M_{11–12}$. Its dimensions were 1 x 2 m; the thickness of the calcined area was 1.5 cm. Between the burned hearth stones were flakes, knifelike blades, and tools.

A large cluster of finds were arranged in Quadrants $M_{7–9}$–$O_{7–9}$. Here besides flakes and blades was a concentration of prismatic cores and their blanks. One of the cores was broken into 19 pieces through fire action. Seven blanks of prismatic cores were made from a single large flint nodule. All the blanks have the longitudinal rib partially worked and the pressure platforms prepared for the removal of blades.

A total of 2,366 stone items was found in cultural Horizon IVb, represented by cores (19 specimens), flint flakes (92 specimens) and flakelets (135 specimens), diabase flakes (482 specimens) and flakelets (1,005 specimens), flint knifelike blades (277 specimens) and microblades (67 specimens), and various tools (289 specimens).

The cores include whole artifacts (5 specimens), pieces (5 specimens), and blanks (9 specimens). They were made from flint nodules and belong to cores of the single-platform type intended for the removal of blades around the whole circumference. The bases of both the blanks and the finished artifacts are pointed. An exception is one longitudinally broken double-platform core (Pl. 54:20).

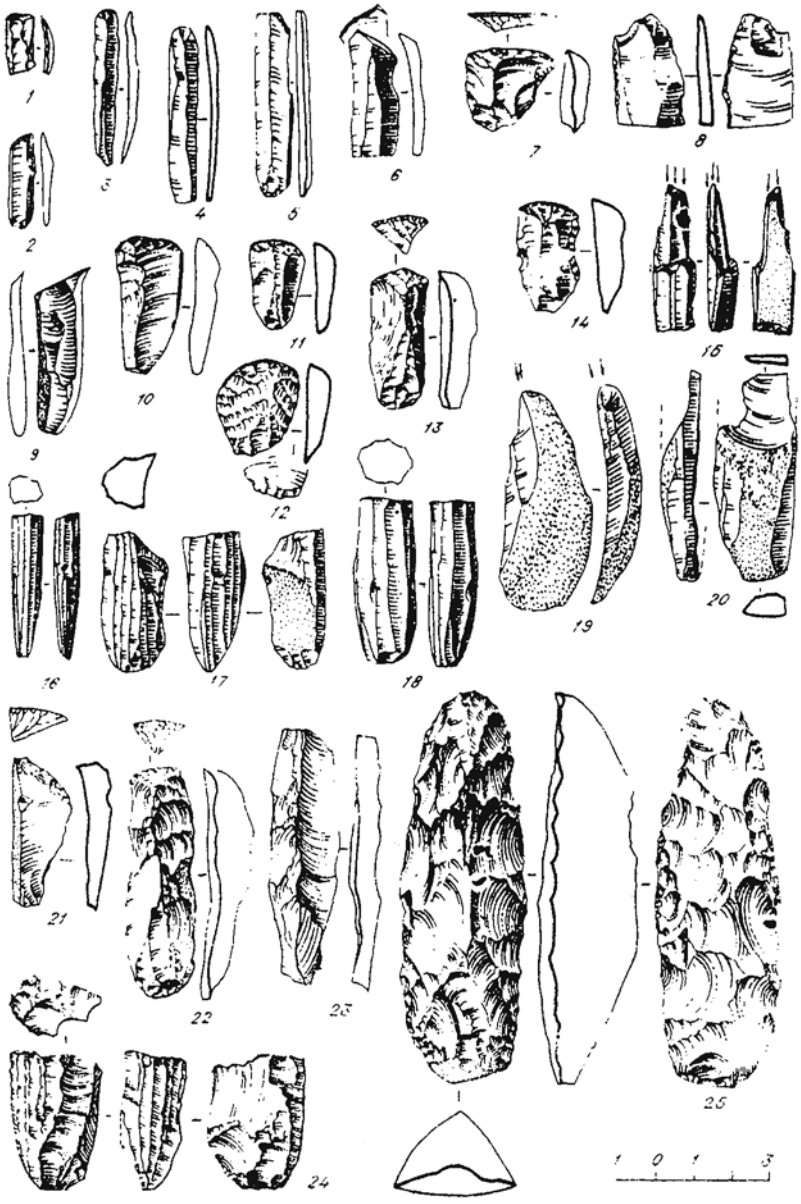

Plate 54. Ust' Timpton site. Stone assemblage from Layer IVb.

The form of the pressure platforms of the blanks approaches subrectangular (Pl. 56:2). The pressure platforms on cores in the initial stages of use are subrectangular or multiangular (Pls. 54:24; 56:3). The pressure platforms on cores from which the longitudinal rib and regular thin blades were removed around the whole circumference have a segmented or oval form (Pl. 54:16, 18). The length of the blanks is 5 to 7 cm, the dimensions of the platforms 1.5 x 2.5 cm and 3.1 x 4.0 cm. The length of the finished artifacts is 3.5 to 5.9 cm, the dimensions of the platforms 0.7 x 0.9 cm and 2.2 x 3.5 cm.

Most of the flint flakes are small (79 specimens). The remaining flakes (13 specimens) are of medium size, not exceeding a length of 4.5 cm.

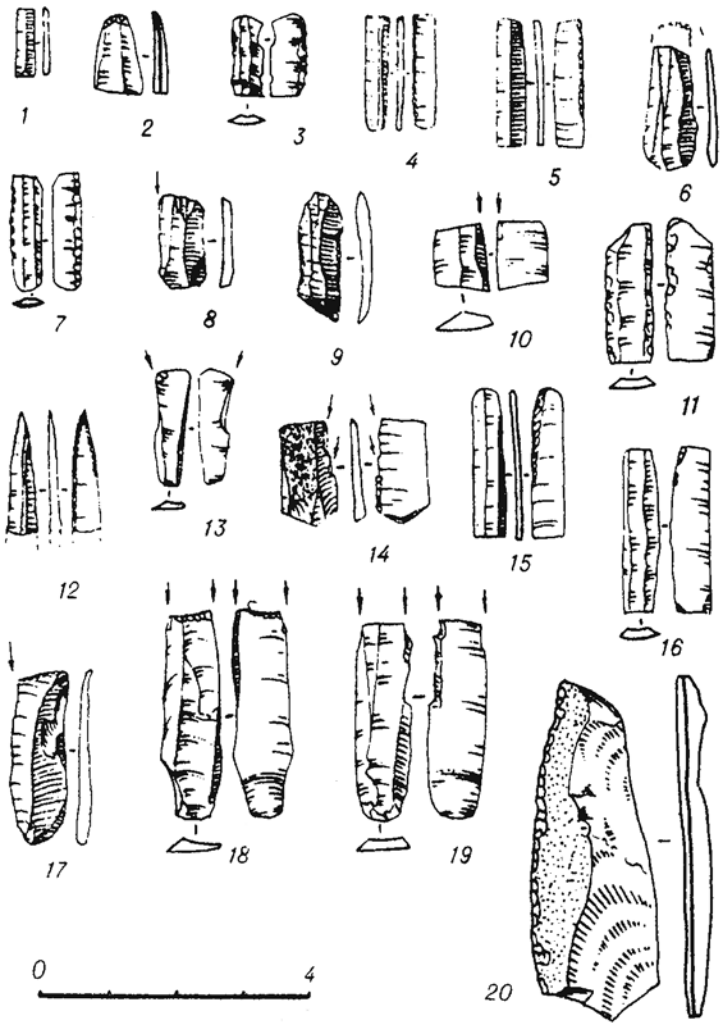

Plate 55. Ust' Timpton site. Stone assemblage from Layer IVb.

The diabase flakes number 104 large specimens, reaching a length of 5 to 8 cm, while 157 diabase flakes have a length of 3 to 5 cm, and 221 have a length less than 3 cm.

All the knifelike blades were taken from flint cores, with 26 whole specimens among them; the rest are broken. The length of the whole blades varies from 1.4 to 6.8 cm. Nodule cortex is encountered on the backs of the large blades. Most knifelike blades (190 specimens) have a width of 0.5 to 0.75 cm (Pl. 54:3). There are 62 blades 0.76 to 1.0 cm wide (Pl. 54:4); 18 blades 1.1 to 1.5 cm wide (Pl. 54:9); and 7 blades exceeding 1.5 cm in width (Pl. 54:23).

The microblades, as a rule, have a width of 0.3 to 0.4 cm (Pl. 55:1). Their length varies from 0.5 to 2.5 cm.

The stone tools are represented by inset blades (171 specimens), knives (7 specimens), burins (43 specimens), gravers (3 specimens), scrapers (24 specimens), blades with a beveled edge (12 specimens), a punch (1 specimen), blades with a groove (8 specimens), chisel-like artifacts (5 specimens), skreblos (4 specimens), axes and adzes (9 specimens), and whetstones (2 specimens).

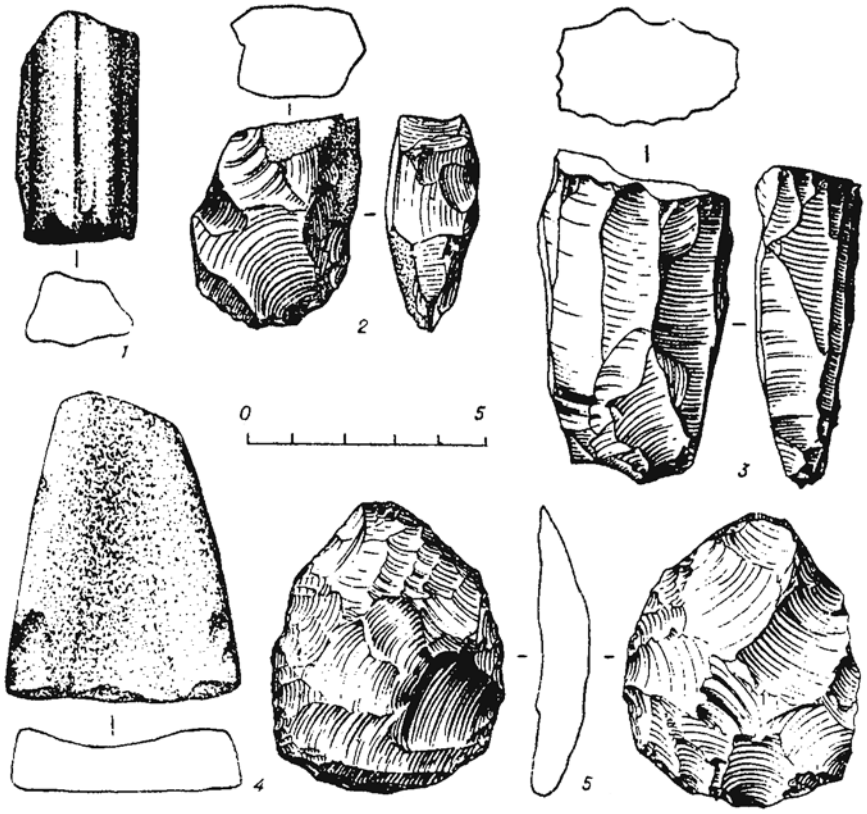

Plate 56. Ust' Timpton site. Stone assemblage from Layer IVb.

Inset blades make up the most numerous group of tools. One hundred and six inset blades were made on flint blades, 65 on flint microblades. By the character of the work they can be divided into tools that are retouched and those that are not retouched. Among those worked by retouch, 7 inset blades were made on blades and 16 on microblades. Twelve tools were worked by unifacial edge retouch directed from dorsal to ventral (Pl. 55:4, 15). Two inset blades were worked on both sides by retouch directed from ventral to dorsal (Pl. 55:9). The remaining inset blades were partially formed by bifacial edge retouch directed both from ventral to dorsal and from dorsal to ventral (Pl. 55:3, 5, 7, 11, 16). The inset blades not worked by retouch are the midsections of blades (99 specimens) and microblades (49 specimens). The length of the inset blades varies from 0.8 to 2.5 cm, their width 0.3 to 0.9 cm.

The knives were made on flint blades (5 specimens) and on lamellar flint flakes (2 specimens). Large blades 0.9 to 1.8 cm wide served as the source material for making tools of the first type. The working edge is located on the long sharp edges of the blades. They were formed by small edge retouch directed both from dorsal to ventral and ventral to dorsal (Pl. 54:8). The working edge on the knives of the second type are on the long sharp edges of the flakes. They also were worked by small edge retouch directed from ventral to dorsal (Pl. 55:20).

The burins can be divided into three types: angle burins (40 specimens), lateral burins (2 specimens), and a multifaceted burin (1 specimen).

The angle burins were made on flint blades (35 specimens), flint microblades (4 specimens), and a flint flake (1 specimen). Thirty burins on blades each had one burin spall removed, directed at a right or acute angle to the transverse plane of the break of the blades (Pl. 55:8, 10, 13); five burins on blades are

double angle burins (Pl. 55:19). Individual specimens of burins have the sharp lateral edge of the blade below the burin spall scar trimmed by edge retouch (Pl. 55:14). The length of the burins is 1 to 3 cm, the width 0.4 to 0.9 cm.

One angle burin was made on a large lamellar flint flake. Its working edge was formed by the removal of two parallel burin spalls directed at an acute angle to the transverse edge of the flake. The length of the burin is 5.7 cm, the width 2.0 cm, the length of the burin spall scars 2.0 and 2.7 cm, their width 0.2 and 0.5 cm (Pl. 54:19).

The lateral burins were made on flint blades 2.6 to 3.1 cm long and 0.8 cm wide. The working edges of the tools were formed by the removal of burin spalls directed at a right angle to the retouched transverse edge of the break of the blades. The retouch in both cases was directed from ventral to dorsal (Pl. 55:17, 18). One tool has burin spalls removed that were directed toward both ends of the retouched transverse edge of the tool.

The multifaceted burin was made on a piece of a unifacial prismatic flint core (Pl. 54:15). The working edge of the burin was formed by six converging burin spall scars 1.7 to 2.1 cm long and 0.2 to 0.5 cm wide. The tool has a corelike handle. Its length is 1.7 cm, its width 1.0 cm. The length of the burin is 4.0 cm.

The gravers were made on pieces of flint knifelike blades 1.9 to 2.3 cm long and 0.5 to 0.7 cm wide. The working edges of the gravers were directed at a right angle to the transverse edge of the break of the blades and have the form of a shallow notch shaped by steep retouch directed from ventral to dorsal. The length of the working edges of the gravers is 0.2 to 0.8 cm.

The scrapers are represented by 18 tools on flint knifelike blades and 6 tools on flint flakes. All the scrapers on blades are end scrapers. Their working edges are on the lower transverse edge of the blades and were formed by steep edge retouch directed from ventral to dorsal. Only the working edges of scrapers on thin flat blades were worked by retouch. The form of the working edges on these tools is ovally convex, straight, or beveled (Pls. 54:1; 55:2). Scrapers on large blades have, in addition to the working edges, the adjoining parts of the lateral sides trimmed in some cases by edge retouch. Small raised "ears" adjoining the sides of the working edges were also elaborated by retouch (Pl. 54:14).

The scrapers on flakes were subdivided, based on the disposition of the working edge, into end scrapers (4 specimens) and side scrapers (2 specimens). The end scrapers were made on lamellar flakes; by the form of the working edges and the method of working they are indistinguishable from scrapers on large blades (Pl. 54:7, 10, 21). Also, one or two "ears" were made along the edges of the working edge on each of them. The exception is an oval, almost round scraper on a flake, which has the whole back worked by narrow parallel facets of pressure retouch and the ventral side partially trimmed by edge retouch (Pl. 54:12). The length of the scrapers is 2.0 to 3.9 cm, the width of the working edge 1.7 to 2.4 cm.

The side scrapers were made on flat lamellar flakes. Their working edges are situated along the arc-like curved longitudinal sides of the flakes. The working edge of one scraper was worked by bifacial edge retouch, the other, by unifacial retouch directed from ventral to dorsal. The length of the scrapers is 5.5 and 6.1 cm, the width 2.5 and 4.0 cm.

The tools with a beveled edge were made on blades (9 specimens) and microblades (3 specimens). The beveled edges are located on the transverse plane of the break of the blades and were worked by small steep retouch directed from ventral to dorsal (6 specimens) and dorsal to ventral (3 specimens). The length of the tools is 1.9 to 5.0 cm, the width 0.3 to 1.2 cm (Pls. 54:2, 5, 6; 55:6).

The punch was made on a microblade 1.9 cm long and 0.4 cm wide. The base of the tool is broken. The tip was worked by the finest edge retouch directed from dorsal to ventral (Pl. 55:12).

The tools with a groove were made on blades 0.5 to 0.9 cm wide and 1.6 to 2.4 cm long. The grooves are located on the long longitudinal sides of the blades. They were formed by retouch directed both from ventral to dorsal and from dorsal to ventral. The length of the grooves is 0.2 to 0.5 cm, the width 0.1 to 0.2 cm.

The chisel-like tools were made on pieces of blades (2 specimens), microblades (2 specimens), and a flint flake (1 specimen). The tools on blades and microblades have a width of 0.4 to 0.7 cm and a length of 1.5 to 2.2 cm. Their working edges are located on the transverse plane of the break of the blades and were formed by the finest retouch directed from ventral to dorsal. The form of the working edges is arced indented (2 specimens) and straight (2 specimens).

The chisel-like tool on a flint flake has a subdiscoid form. Its broad surfaces were worked by bifacial flat retouch, whereas the edges were partially trimmed by secondary retouch. The transverse and longitudinal sections of the tool are crescent-shaped. Parts of the edge, worked by secondary retouch, reveal wear in the form of impact dots. The length of the chisel-like tool is 5.7 cm, the width 4.6 cm (Pl. 56:5).

The skreblos were made on flint (1 specimen) and diabase (2 specimens) flakes, as well as on a split diabase cobble (1 specimen).

The skreblo on a flint flake of trapezoidal form has a steep lateral working edge, worked by edge retouch directed from ventral to dorsal. The length of the skreblo is 7.0 cm, the width 3.8 cm.

The skreblos on diabase flakes are oval in form. Their working edges are situated on one of the lateral sides and the transverse edge of the tools. The end working edges were worked by unifacial edge retouch directed from ventral to dorsal. The lateral working edge of one tool was worked by unifacial retouch, and the other, by bifacial edge retouch. The length of the skreblos is 9.0 to 9.9 cm, the width 5.3 to 5.7 cm (Pl. 57:1, 4).

The skreblo on a split diabase cobble is large, with two working edges. Both are lateral working edges. One working edge is convexly arced, worked by bifacial edge retouch. The second working edge is straight and was worked by unifacial edge retouch directed from ventral to dorsal. The length of the skreblo is 10 cm, the width 11 cm (Pl. 57:8).

There are three axes with ears. One of them was made on a large diabase flake and two on split diabase cobbles. The butts are cross-shaped, the working edges straight, and the lateral sides sharpened. The cross sections of the axes are almond-shaped. All the tools were worked by bifacial edge retouch. The length of the axes is 8.3 to 13.3 cm, the width of the working edge 3.5 cm (Pl. 57:2, 6, 10).

Adzes are represented by both whole finished tools (2 specimens) and pieces of blanks (4 specimens). The finished adzes have an oval form. They are slightly expanded toward the working edge and narrowed toward the butt. The working edges of the tools are beveled, the lateral edges are pointed, and the cross section is triangular. Both broad surfaces on the whole were worked by flat pressure retouch. The length of the adzes is 10.4 to 11.5 cm, the width of the working edges 2.0 to 2.8 cm, the width of the butts 1.7 cm, the width in the middle part 3.3 to 4.0 cm (Pls. 54:25; 57:7). One of the blanks of the adzes has a teardrop form (Pl. 57:3); the remaining blanks are broken (Pl. 57:5, 9).

The fragments of whetstones were made from fine-grained sandstone. On their broad surfaces are even shallow grooves; traces are preserved of sharpening the working edges evidently of cutting tools (Pl. 56:1, 4).

Based on charcoal taken from the fourth humic interlayer, a radiocarbon date of 9000 ± 100 BP (LE-832) was obtained for the middle part of cultural Horizon IVb.

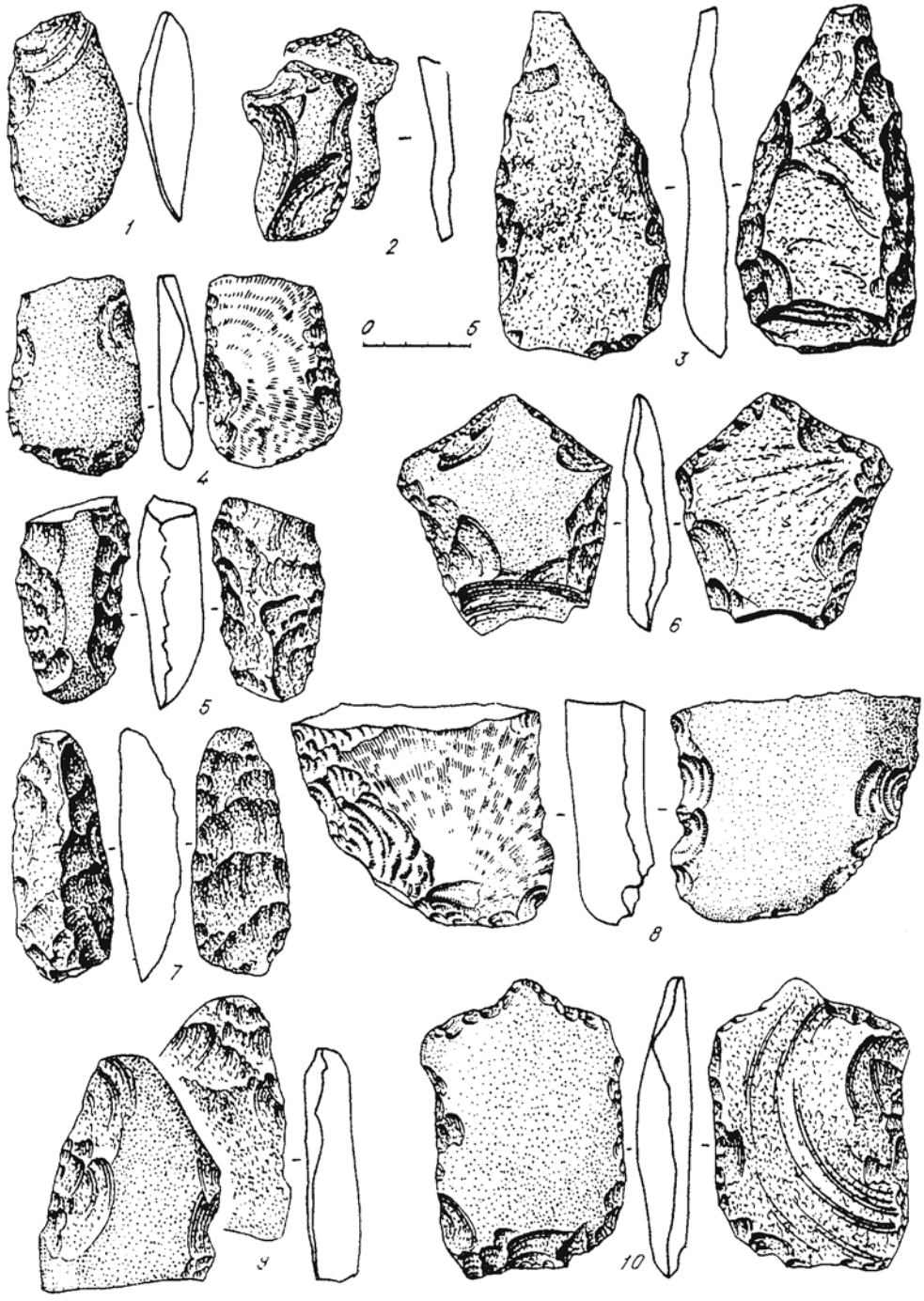

Plate 57. Ust' Timpton site. Stone assemblage from Layer IVb.

Combined Cultural Horizon IV

Cultural Layer IV was studied over an area of 248 m^2 without separating Horizons IVa and IVb. Solifluction processes exerted most influence on the deposit that lay in the part between Line 7 and the Timpton edge of the excavation. Here the individual humic interlayers merged into one almost undifferentiated stratum 20 to 35 cm thick. Consequently, recording finds by individual interlayers was practically impossible.

The cultural remains of the combined Horizon IV were primarily grouped around nine hearths (Fig. 32). Hearth 1 occupied Quadrant $K_{3'}$ and partially Quadrants $K_{2'}$ and $L_{3'}$. The form of the hearth is oval, the orientation northwest. The dimensions of the hearth are 0.6 x 1.0 m, the thickness of the calcination 2.0 cm. The hearth was filled with reddish-brown burned sandy loam. Within it were one burnt quartzite cobble, small pieces of wood charcoal, flakes, blades, inset blades, burins, punches, and scrapers.

Hearth 2 was located in Quadrants $D_{1'}$, $C_{1'}$, and D_1. Its form is oval; it is oriented northeast. The dimensions of the hearth are 0.6 x 1.0 m, the thickness of the calcination 3 cm. Within the fill of brick-red color were many cracked burnt granite cobbles, around which lay flakes, blades, cores, and inset blades. Hearth stones and isolated artifacts were also noted outside the fill.

Hearth 3 occupied Quadrants $E_{1'}$, $F_{1'}$, and part of Quadrant E_1. It had an oval form. Its length was 1.5 m, its width 0.85 m, the thickness of the calcination 12 cm. In the fill of dark-brown color lay hearth stones—small granite and quartzite cobbles. Within the hearth and around it were found small pieces of wood charcoal, adzes, scrapers, inset blades, cores, blades, flakes, and small fragments of burned animal bones.

Hearth 4 was found in Quadrant E_1. Its form was oval; it was oriented northwest. The dimensions of the hearth were 0.5 x 1.4 m, the thickness of the calcination 12 cm. In the fill of brick-red color were flakes and small pieces of wood charcoal, and beside the hearth, a diabase adze.

Hearth 5 was confined to Quadrants G_1–H_1. The form was oval, the orientation northwest. The dimensions of the hearth were 0.4 x 1.35 m, the thickness of the calcination 1 cm. Within the hearth were two burnt granite cobbles; around it, knifelike blades and flakes, fragments of burned animal bones, and small pieces of wood charcoal.

Hearth 6 was found in Quadrant K_1, and reaching Quadrants K_2, L_1. It had the form of a stretched oval oriented east-west. The dimensions of the hearth were 0.5 x 1.4 m. The fill was brick-red sandy loam burned to a depth of 10 cm. In it were two cracked quartzite cobbles, small pieces of burned animal bones, and a flint scraper. In the northeast part of the hearth was a cluster of diabase flakes. These flakes were noted beyond the limits of the hearth.

Hearth 7 was located in Quadrants D_2–D_3. Its form was oval. Its dimensions were 0.6 x 1.0 m, the thickness of the calcination 3 cm. In the brick-red fill of the hearth lay small cracked granite cobbles, wood charcoal, diabase flakes, flint knifelike blades, and tools on blades. In areas adjoining the hearth was a large quantity of flakes as well as a diabase skreblo.

Hearth 8 occupied Quadrants B_4–C_4. It had an oval form. The dimensions of the hearth were 0.7 x 1.4 m, the thickness of the calcination 10 cm. Within the hearth were burnt granite cobbles, and between them, flakes, blades, and a scraper. Beside the hearth were also flakes, blades, a baton, an inset blade, and scrapers.

Hearth 9 was lodged in Quadrant $A'_{5–6}$. Its dimensions are 0.5 x 1.3 m. The hearth was oval and stretched east-west. No hearth stones were found in it. In the reddish-brown fill were small pieces of red ocher, inset blades, a multitude of microblades, and a pencil-shaped core. Finds associated with the hearth were also outside the fill.

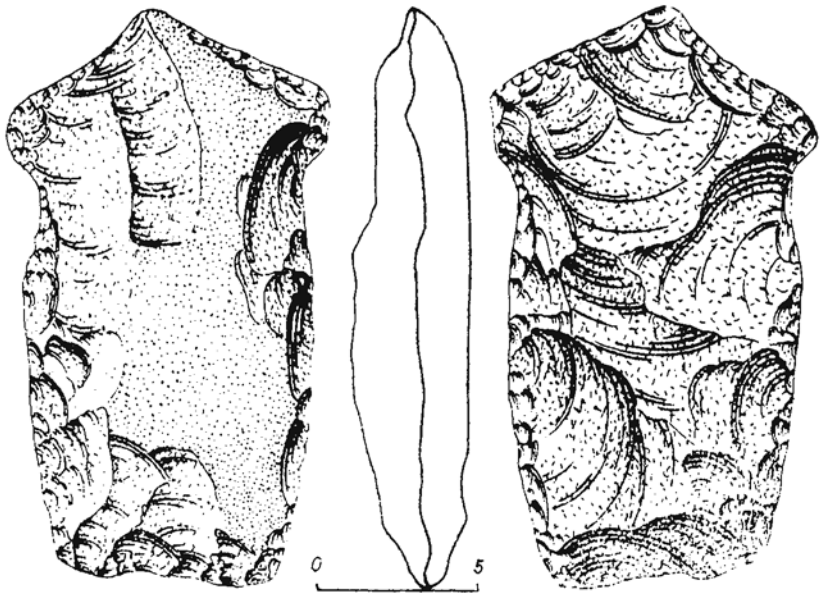

Plate 58. Ust' Timpton site. Stone assemblage from Layer IVb.

A large cluster of flint knifelike blades, microblades, and tools on them was found in the northeast corner of the excavation in an area of about 20 m^2.

The total in the combined cultural Horizon IV was 17,542 stone items represented by cores and their blanks (28 specimens), flint flakes (245 specimens), flint flakelets (330 specimens), diabase flakes (11,335 specimens), diabase flakelets (4,202 specimens), flint knifelike blades (594 specimens), flint microblades (193 specimens), and various tools (615 specimens).

All the cores and their blanks were made from flint. There are 2 blanks, 5 fragments of cores, and 21 whole finished cores. Typologically they are prismatic cores.

The blanks are subrectangular flint nodules; on one work was begun on the pressure platform, and on the other, a lateral rib formed and cobble cortex removed from the broad lateral surfaces. The length of the blanks is 4.8 and 8.0 cm, the width 2.0 and 3.0 cm.

Five varieties could be distinguished among the finished cores:

(1) Single-platform cylindrical cores with the removal of blades around the whole circumference (6 specimens). They have a regular edge and narrow (0.1 to 0.5 cm) facets left by the removed blades. The pressure platforms are rounded and carefully worked by retouch, and are situated almost perpendicular to the long axis of the cores. The diameter of the cores ranges from 0.5 to 1.2 cm. The length of the cores is 2.1 to 4.5 cm (Pl. 59:6).

(2) Double-platform cylindrical cores with blades removed along the whole perimeter (4 specimens). They, like the preceding ones, have narrow regular edges. The upper and lower rounded pressure platforms are directed perpendicular to the long axis of the cores. The upper platforms were more carefully formed by retouch. A larger quantity of knifelike blades was removed from them than from the lower platforms. The diameter of the upper platforms is 0.5 to 0.6 cm, of the lower 0.3 to 0.5 cm. The length of the cores is 3 to 4 cm (Pl. 59:5).

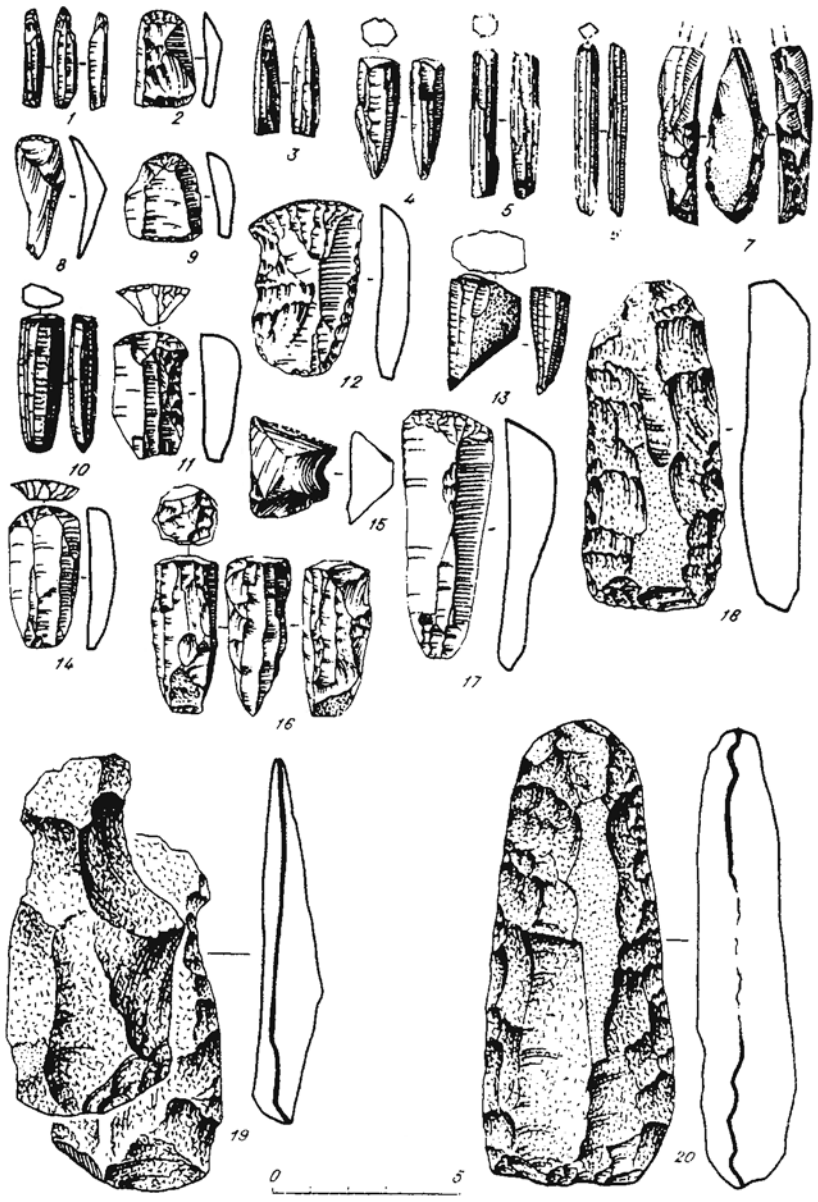

Plate 59. Ust' Timpton site. Stone assemblage from Layer IV.

(3) Single-platform flattened cores with the removal of blades around the whole circumference (2 specimens). The pressure platforms, worked by retouch, have an almost almond-shaped form. They are situated perpendicular to the long axis of the artifacts. The length of the platforms is 1.0 and 1.2 cm, the width 0.7 and 0.5 cm. The base of one core is pointed, the other, beveled toward the long axis. The length of the cores is 3.4 and 3.6 cm.

(4) Single-platform pencil-shaped cores with blades removed around the whole circumference (5 specimens). Their difference from the first variety is only the pointed base; they are the same in other respects. The diameter of the pressure platforms is 0.5 to 1.0 cm. The length of the cores is 3 to 4 cm (Pl. 59:4, 10, 16).

(5) Single-platform cores with blades removed from the end of the core (4 specimens). On two cores, the part opposite the end has the form of a wedge and on the whole is covered with cobble cortex. On two others this part was knocked off and on the straight wall that was formed elaboration of a longitudinal rib was begun. Narrow regular blades were also taken from these cores. Their pressure platforms have the form of an irregular oval; they were carefully worked by retouch and are directed perpendicular to the long axis of the cores. The length of the platforms is 1.1 to 2.0 cm, the width 1.0 to 1.5 cm. The length of the cores is 3.4 cm (Pl. 59:13).

Most of the flint flakes (196 specimens) were small ones. There are 17 large flakes and 32 medium ones. The diabase flakes include 689 large, 2,182 medium, and 8,464 small specimens.

The knifelike blades and microblades were taken from flint cores. The width of the microblades is 0.3 to 0.4 cm (Pl. 60:1). The knifelike blades are distributed in the following way based on width: 389 are 0.5 to 0.75 cm wide (Pl. 60:38); 180 are 0.76 to 1.0 cm wide (Pl. 60:48); 17 are 1.0 to 1.5 cm wide (Pl. 60:46); and 8 are wider than 1.5 cm (Pl. 60:53). Most of the blades are broken, while 38 are whole blades. Their length varies from 1.3 to 8.1 cm.

The stone tools are represented by inset blades (356 specimens), knives (5 specimens), burins (124 specimens), gravers (7 specimens), scrapers (66 specimens), punches (11 specimens), blades with a beveled edge (22 specimens), blades with a groove (2 specimens), chisel-like artifacts (3 specimens), perforators (2 specimens), skreblos (7 specimens), axes and adzes (9 specimens), and a baton (1 specimen).

The inset blades were made on flint blades (205 specimens) and microblades (151 specimens). Based on the character of the work they can be divided into retouched and unretouched. There are 28 retouched inset blades on blades and 40 on microblades. There are 177 unretouched inset blades on blades and 111 on microblades. The unretouched inset blades are midsections of blades and microblades. Many of them have traces of use-wear along the edges.

Most retouched blades (42 specimens) have only one working edge, worked by small edge retouch directed from dorsal to ventral (Pl. 60:21, 22). Almost all the inset blades of this variety are characterized by microdimensions.

The second variety of inset blades is made up of double-working edge tools (3 specimens) worked by unifacial edge retouch directed from dorsal to ventral (Pl. 60:23). To the third variety belong nine single-working edge inset blades, worked by retouch from ventral to dorsal (Pl. 60:15).

The fourth variety is represented by eight double-working edge inset blades worked by edge retouch directed from ventral to dorsal (Pl. 60:42).

To the fifth variety belong three double-working edge inset blades, on which one working edge is trimmed by retouch from the dorsal, and the other, from the ventral (Pl. 60:24, 29).

To the sixth variety belong two single-working edge inset blades, on which the working edge was worked by bifacial edge retouch (Pl. 60:25).

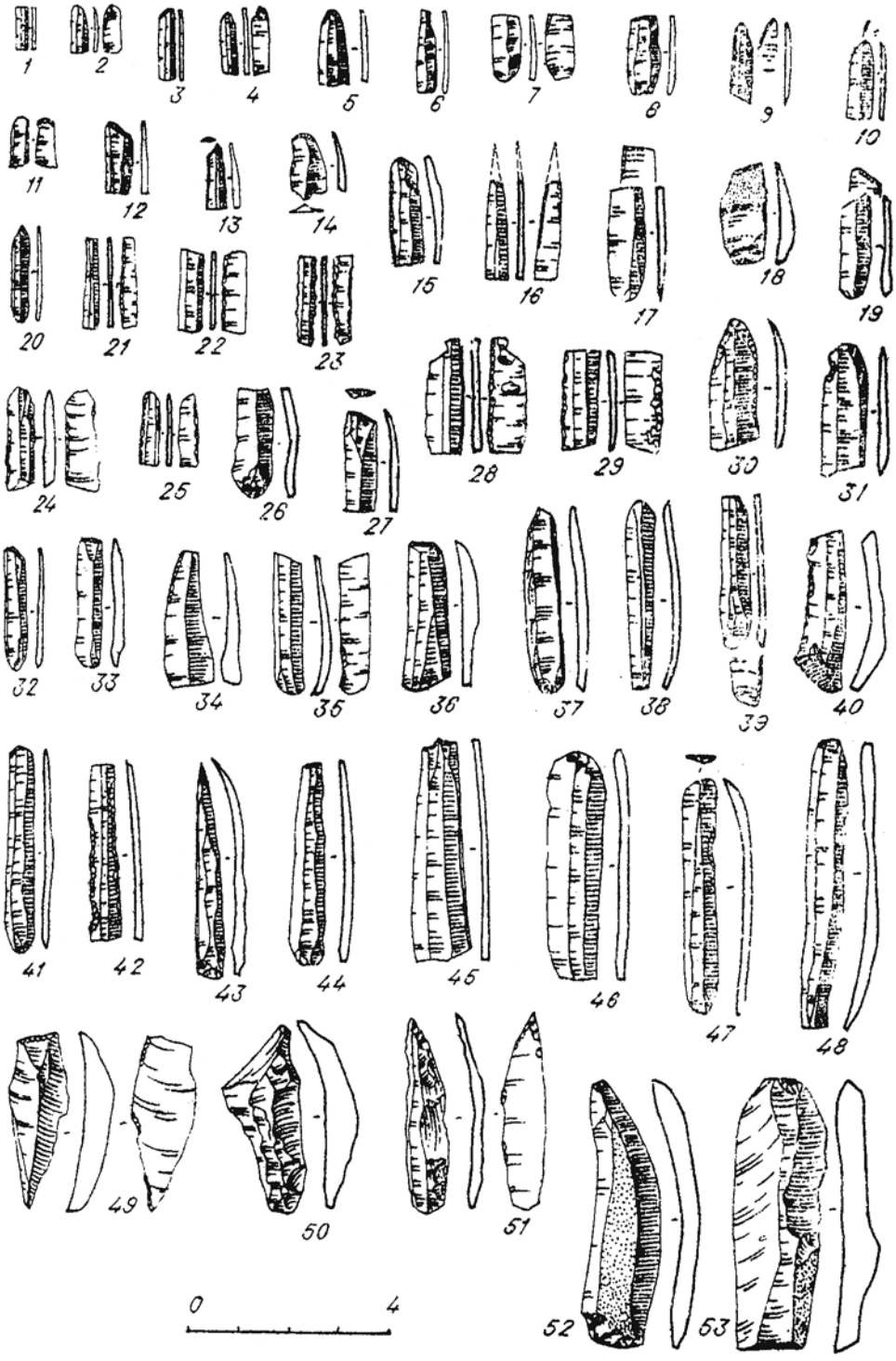

Plate 60. Ust' Timpton site. Stone assemblage from Layer IV.

The seventh variety is represented by one double-working edge inset blade, on which one working edge was worked by unifacial edge retouch directed from dorsal to ventral and the other, by bifacial retouch (Pl. 60:28).

The knives were made on flint blades (4 specimens) and a diabase flake (1 specimen). Large knifelike blades were used for tools of the first type, the longitudinal edges of which were worked by small retouch (Pls. 60:34, 40; 61:36). The length of the tools is 3.0 to 4.1 cm, the width 1.2 to 2.1 cm.

The knife on a diabase flake is semilunar in form. A flat primary flake taken from a cobble was used for its preparation. The working edge of the tool is situated on the ovally convex edge of the flake. It was worked by small edge retouch directed from dorsal to ventral. The edge of the working edge was polished during the process of work. The length of the tool is 11.3 cm, the width 6.1 cm (Pl. 62:4).

The burins are surpassed in numbers only by the inset blades. Of 123 burins, only 1 was made on a flake, the remaining of flint knifelike blades. The burins can be divided typologically into angle burins (114 specimens), lateral burins (7 specimens), dihedral burins (2 specimens), and a multifaceted burin (1 specimen).

The angle burins were made on blades (97 specimens) and microblades (17 specimens). As a rule, they were made on broken blades. The exception is a burin on a ribbed blade (Pl. 61:37). On all the tools the working edges were formed by the removal of burin spalls directed almost at a right angle to the transverse plane of the break of the blades. In some cases, the working edges were rejuvenated by repeated removal of burin spalls (Pl. 61:2, 4, 7, 11, 12). There are 12 double angle burins (Pl. 61:1, 3, 8, 24, 31) and 2 triple angle burins (Pl. 61:7). One angle burin was made on the opposite end of the blade from a beveled edge. In some cases the edges of the tools were trimmed under the burin spall scars by small pressure retouch (Pl. 61:10, 19). The length of the angle burins varies between 0.7 and 4.3 cm, the width 0.3 to 1.1 cm; the length of the burin spall scars is 0.2 to 1.0 cm, the width 0.03 to 0.1 cm.

The lateral burins were made on blades, five of them on blades with beveled edges (Pl. 61:9, 14, 21, 29), one on a blade with straight retouched plane of the break (Pl. 61:22), and one on a blade with two beveled edges. The removal of burin spalls was in all cases directed at an acute angle to the retouched transverse plane of the blade. The length of the burins is 1.0 to 2.3 cm, the width 0.5 to 0.7 cm. Among the lateral burins can be distinguished a double lateral burin, the working edges of which are located on the upper left and lower right of the tool. The retouched edges of the tool and its burin spall scars are strictly symmetrical with each other. The length of the burin is 2.1 cm, the width 0.5 cm; the length of the burin spall scars is 0.3 to 0.4 cm, the width 0.02 cm (Pl. 61:16). One burin has two opposite-lying working edges, the upper of which is the working edge of a lateral burin, while the lower is the working edge of an angle burin. Its length is 2.1 cm, its width 0.6 cm; the length of the burin spall scars is 1.0 to 1.1 cm, the width 0.1 and 0.06 cm (Pl. 61:25).

The dihedral burins were made on blades. The working edge of one tool was formed by the convergence at an acute angle of two symmetrical burin spall scars (Pl. 61:28), and the other by two burin spall scars converging at a right angle to the lower end of the large knifelike blade (Pl. 61:38). The length of the tools is 2.1 and 7.0 cm, the width 0.6 and 2.1 cm, the length of the burin spall scars 0.4 to 3.3 cm.

The multifaceted burin was made on a large flint flake. It has an elaborated lenticular form and rectangular cross section. The broad surfaces of the tool were not subjected to work. One of them is covered with cobble cortex, while the other preserved the natural surface of the split. Both end surfaces were subjected to very careful work. The handle was formed by the removal of transverse spalls with flat pressure retouch; its edges were trimmed by secondary retouch. The working edge of the burin was formed by the removal of six burin spalls coming together at an acute angle at the end the tool, with three spalls on each side. The length of the burin is 4.6 cm, the width of the handle 1.6 cm, the length of the handle 2.6 cm, the length of the burin spall scars 1.5 to 2.1 cm, their width 0.4 and 0.6 cm (Pl. 59:7).

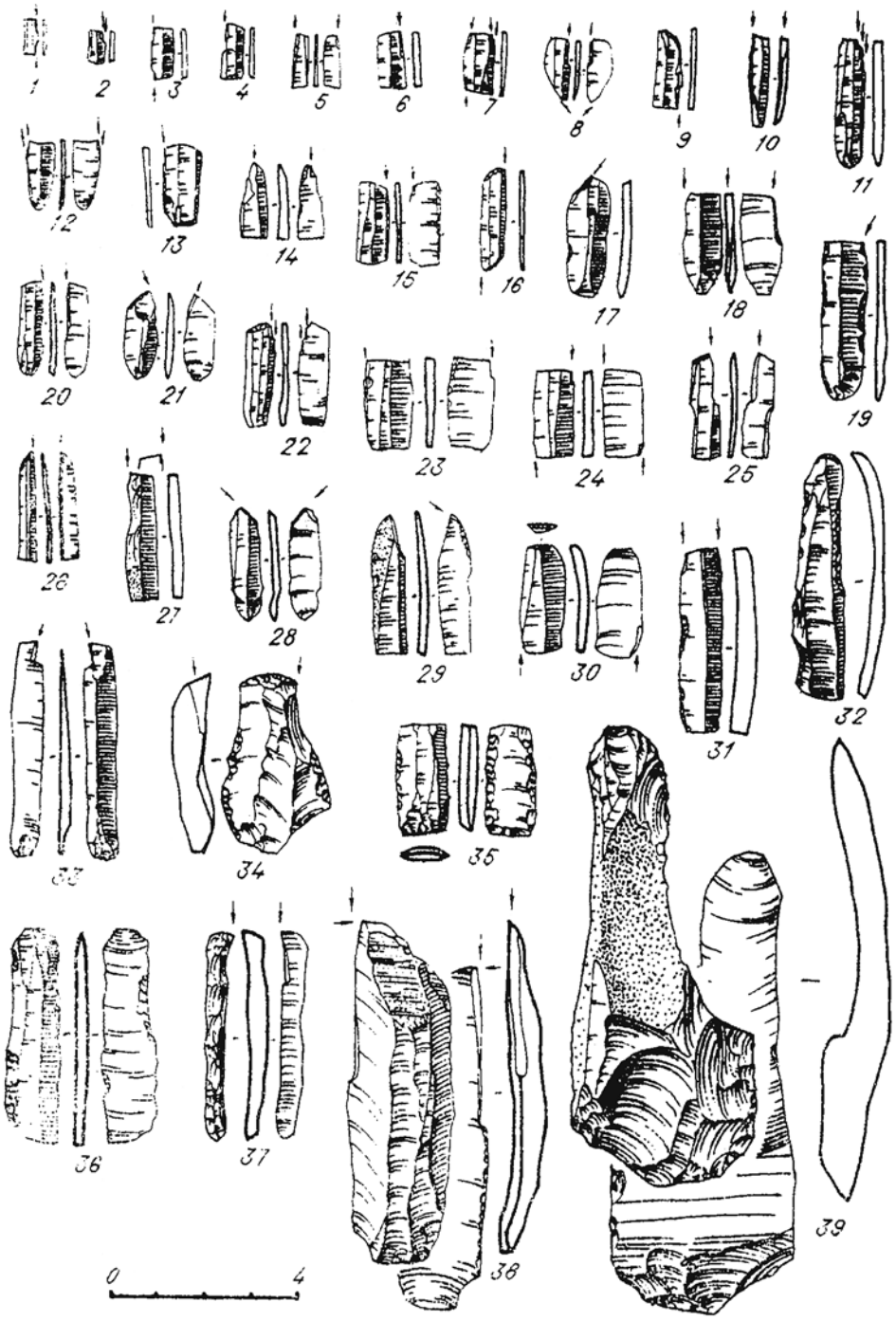

Plate 61. Ust' Timpton site. Stone assemblage from Layer IV.

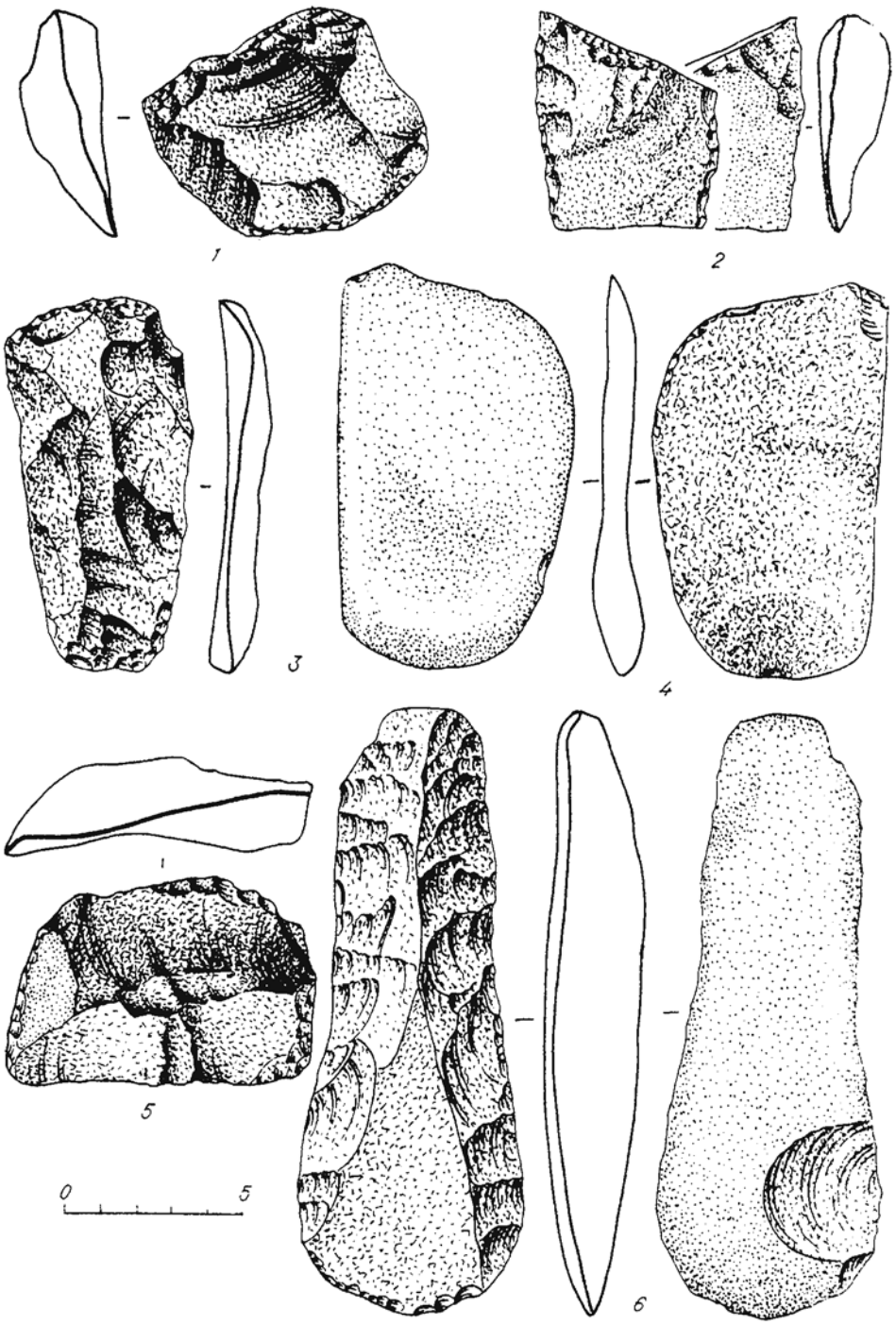

Plate 62. Ust' Timpton site. Stone assemblage from Layer IV.

The gravers were made on flint blades (5 specimens) and microblades (2 specimens). Their working edges were positioned at a right angle to the plane of the break of the blade. They were formed by small edge retouch directed on five specimens from dorsal to ventral (Pl. 60:7, 17, 35), and on one specimen from ventral to dorsal (Pl. 60:6). The length of the gravers is 1.3 to 2.8 cm, the width 0.4 to 0.7 cm.

The scrapers are represented by tools on flint blades (55 specimens) and microblades (4 specimens), flint flakes (6 specimens), and a diabase flake (1 specimen). Based on the position of the working edge, all are end scrapers.

The scrapers on blades and microblades have a working edge that is convexly arced (Pls. 59:14; 60:11,14, 36, 41; 61:32), concavely arced (60:44, 45), beveled (60:27, 47, 50, 52), and straight (Pl. 61:30). As a rule, their working edges were worked by steep pressure retouch directed from ventral to dorsal. Only one tool has the retouch directed from dorsal to ventral (Pl. 60:11). In some cases partial edge retouch is also encountered on the lateral sides of the tool. The length of the tools is 1.3 to 6.6 cm, the width of the working edge 0.4 to 2.2 cm. One of the scrapers has two working edges. The working edges are situated on opposite transverse ends of the tool. The upper working edge has a convexly arced form, and was carefully worked by pressure retouch directed from ventral to dorsal with long narrow facets. The second working edge was in the place of the break at the base of the scraper. It was formed by small steep retouch directed from ventral to dorsal. The length of the scraper is 2.3 cm, the width of both working edges is 1.3 cm (Pl. 59:9).

Three scrapers made on large broad flint flakes with the aid of retouch had small “ears” that were made along the edges of the working edge (Pl. 59:11).

The scrapers on flint lamellar flakes cannot be distinguished by form and method of working from large scrapers on blades. They have a convexly oval or beveled working edge, which was worked by edge pressure retouch directed from ventral to dorsal. “Ears” were elaborated along the edges of the working edges (Pl. 59:12). The length of the scrapers is 2.7 to 4.6 cm, the width of the working edges 1.2 to 3.0 cm.

One end scraper on a lamellar flake was also used as a lateral burin. The burin working edge is on the right end of the working edge of the scraper (Pl.61:34).

A scraper 10.4 cm long and 4.8 cm wide was made on a flat lamellar flake of diabase. The tool is subrectangular, the form of its working edge an arced bevel. The working edge of the tool, as well as a small area of the base, was worked by steep retouch directed from ventral to dorsal (62:3).

Punches were made on flint knifelike blades (7 specimens) and microblades (4 specimens). They can be separated into two varieties of tools by the method of working the tip: punches made on the ends of blades (7 specimens) and punches on blades with a beveled edge (4 specimens). The tips of the tools of the first variety are curved like a beak, following the natural curve of the lower part of the blade. Only the tip was worked by the smallest steep edge retouch. The retouch is directed from dorsal to ventral (Pl. 60:16, 43, 51). The length of the punches is 3.5 to 4.0 cm, the width 0.5 to 0.8 cm. The tips of the punches of the second variety were formed in some cases using the retouched beveled edge of the blades, and in others, by retouch along the sharp longitudinal edge of the blades. The retouch in all cases was directed from ventral to dorsal (Pl. 60:13, 20). The length of the tools is 1.3 to 1.9 cm, the width 0.3 to 0.4 cm.

The artifacts on a beveled edge are represented by 20 tools on blades 0.5 to 0.7 cm wide and 2 tools on microblades. Their beveled transverse edges were worked by steep retouch directed from ventral to dorsal on 19 specimens, and from dorsal to ventral on 3 specimens. The length of the artifacts is 1.0 to 3.6 cm (Pl. 60:2, 3, 9, 10, 12, 19, 26, 32, 37, 39).

Blades with a groove have a length of 2.6 to 2.8 cm and a width of 0.6 to 0.9 cm. The grooves are located on one of the longitudinal sides of the tools. They were formed by retouch directed from ventral to dorsal. The width of the grooves is 0.5 cm, the depth is 0.3 to 0.5 cm (Pl. 60:31).

The chisel-like tools were made on thin flint knifelike blades (2 specimens) and a large lamellar flint flake (1 specimen). The working edges of the tools on the blades are located on the transverse plane of the break of the blades. The form of the working edges is straight. One of the tools has steep edge retouch, which forms the working edge, directed from ventral to dorsal (Pl. 60:33). On another, which serves at the same time as an angle burin, the working edge was worked by the smallest bifacial retouch (Pl. 61:33). The length of the tools is 3.4 to 4.3 cm, the width of the working edges 0.2 to 0.5 cm.

The working edge of the chisel on a lamellar flake is located on the lower transverse plane of the tool. It was formed on both sides of the plane by pressure retouch. Use-wear can be seen on the end of the working edge. The length of the tool is 9.5 cm, the width of the working edge 1.5 cm (Pl. 61:39).

The perforators were made on the pointed ends of exhausted pencil-shaped cores. They are reminiscent of core-like multifaceted burins. The working edges of the tools were trimmed by the removal of burin spalls. Use-wear in the form of concentric cracks easily can be seen on them. The length of the tools is 2.6 to 3.0 cm, the width 0.6 to 0.7 cm (Pl. 59:1, 3).

The skreblos were made on very large diabase flakes. They are represented by blanks (2 specimens), fragments (2 specimens), and whole finished artifacts (3 specimens). Two skreblos have a rectangular form, and one is trapezoidal. The subrectangular skreblos have lateral and terminal working edges formed by unifacial edge retouch directed from ventral to dorsal (Pl. 62:2, 5). The length of the tools is 6.3 to 8.6 cm, the width 5.0 to 5.7 cm. The trapezoidal skreblo has an end working edge of convexly arced form. It also was worked by edge retouch directed from ventral to dorsal (Pl. 62:1). The base of the skreblo was worked by blunting steep retouch. The length of the artifact is 6.1 cm, the width of the working edge 6.8 cm, the width in the middle part 8.2 cm.

The chopping tools are represented by an axe (1 specimen), whole adzes (4 specimens), adze blanks (2 specimens), and pieces of butts (2 specimens). They were all made from large diabase cobbles.

The axe has an oval form. The tool broadens toward the working edge and narrows toward the butt. The long edges of the axe are sharpened. The transverse and longitudinal sections are almond-shaped. The working edge is slightly beveled. Both broad surfaces were worked by flat pressure retouch. On the working edge and the lateral edges can be seen bifacial secondary retouch. The length of the axe is 9.6 cm, the width of the working edge 3.8 cm, the width of the butt 1.8 cm (Pl. 63:3).

The adzes are represented by three types: subrectangular with “ears” (1 specimen), trapezoidal with smoothed outlines (2 specimens), and an oval adze that narrows in the middle and broadens toward the working edge and butt (1 specimen).

The adze with the “ears” is in the blank stage. It has a beveled working edge, a pointed butt, and a trapezoidal cross section. The back of the tool was worked by flat retouch. Steep retouch, forming an “ear,” was applied along the left long edge of the ventral side. The length of the tool is 9.6 cm, the width the working edge is 4.0 cm, the width of the butt 3.0 cm (Pl. 59:19).

The trapezoidal adzes have a finished form and their working edges are severely worn. The working edges are beveled, the butts slightly rounded. The cross sections of the adzes are trapezoidal. The ventral sides of the tools were not subjected to retouch. Areas of cobble cortex are preserved in the middle of the back. Almost the whole dorsal side of the tools was worked by retouch. The length of the adzes is 8.7 and 12.3 cm, the width of the working edge 5.1 and 4.0 cm, the width of the butts 2.0 and 2.5 cm (Pl. 59:18, 20).

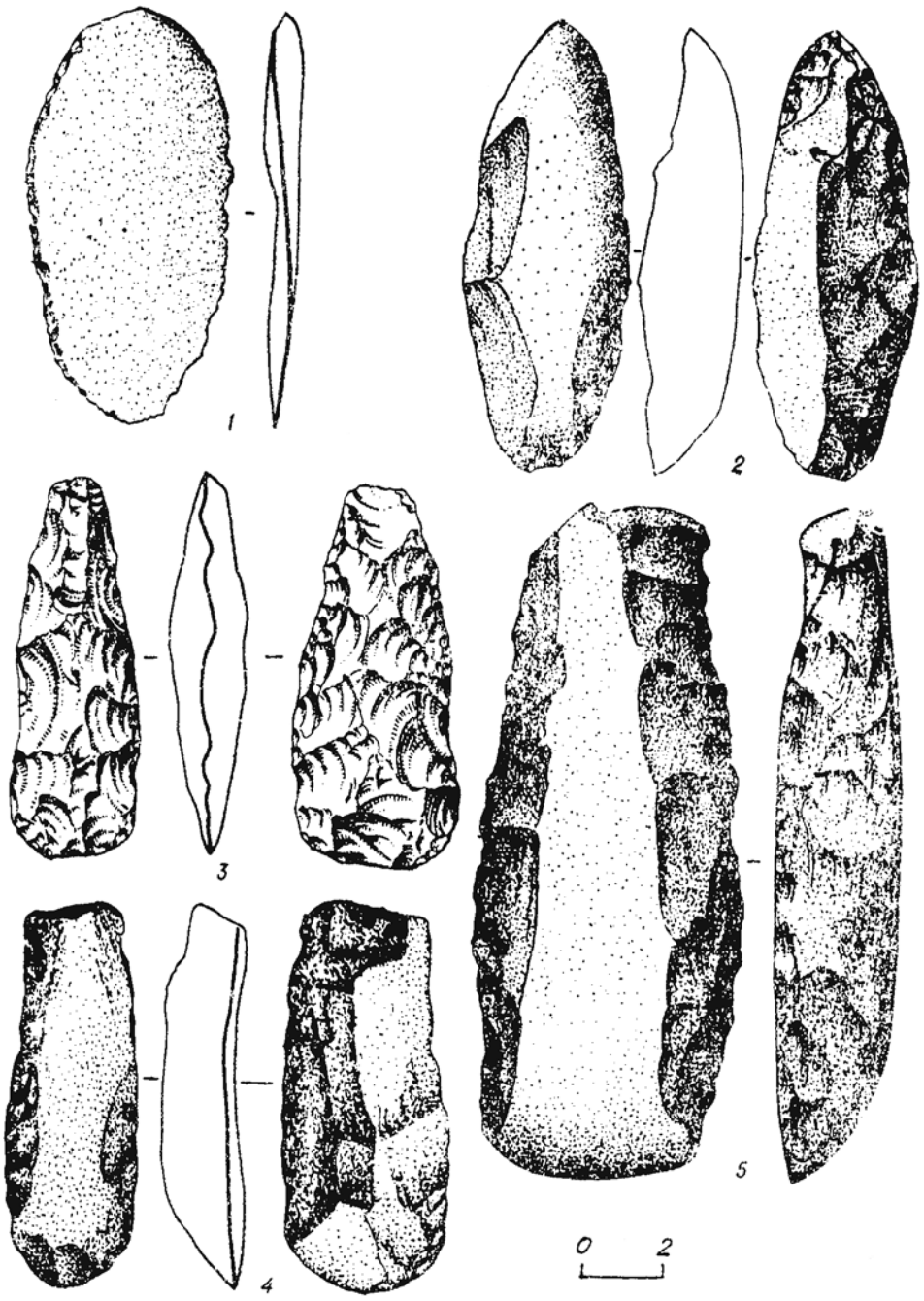

Plate 63. Ust' Timpton site. Stone assemblage (1, 2, 4, 5 from Layer V; 3 from Layer IV).

The oval adze has a convexly arced working edge and a straight pointed butt. The cross section in the butt area of the tool is triangular, at the working edge, trapezoidal. Its longitudinal section is almond-shaped. The ventral side of the adze is covered with cobble cortex, while the back is almost wholly worked by flat retouch. The working edge was formed by edge retouch directed from ventral to dorsal. The length of the adze is 17.2 cm, the width of the butt 3.0 cm, the width of the working edge 6.3 cm, the width of the middle part 4.3 cm (Pl. 62:6).

Cultural Layer V

Cultural Layer V was taken down over an area of 468 m^2. It is confined to a brownish-yellow loam; in each of the lower and upper parts could be traced a purplish-black humic interlayer (Layer 12 in Figure 30). The thickness of the loam together with the interlayers amounted to 6 to 10 cm. Layer V can be separated from Layer IV by an interlayer of sand 3 to 10 cm thick, and from Layer VI by an interlayer of sand 15 to 25 cm thick.

The humic interlayers were examined separately where this was possible (especially in areas most distant from the spit at the end of the point). In doing this, the upper interlayer was identified as cultural Horizon Va, and the lower one, Horizon Vb. However, the loam with the humic interlayers was quite deformed in a large part of the excavation through the influence of solifluction, permafrost cracking, and erosion. In these areas the finds were assigned to a single combined cultural Horizon V.

Cultural Horizon Va

Horizon Va could be traced most clearly in Quadrants $E_{12–16}$–$M_{12–16}$. The thickness of the upper humic interlayer amounted to 2 to 4 cm here.

A large number of artifacts was confined to a hearthlike area in Quadrants $G_{14–15}$–$K_{13–15}$, which turned out to be the remains of a washed-out hearth. The hearth spot had the form of an irregular oval stretching toward the Aldan. Its dimensions were 1.95 x 2.5 m. In the hearth fill were large burned and cracked quartzite and diabase cobbles, burned pieces of animal bones, flakes, blades, scrapers on flint flakes, and inset blades.

In the area of $A'_{12–16}$–$E'_{13–16}$ the thickness of the upper interlayer of Layer V increased to 6 cm. The color of the interlayer was ashy black, though in places brick red. In it were noted many pieces of wood charcoal, flakes, and blades, as well as tools on blades and flakes, and pieces of animal bones.

A total of 837 stone items was found in Horizon Va, represented by cores (2 specimens), flint flakes (102 specimens), flint flakelets (20 specimens), diabase flakes (388 specimens), diabase flakelets (235 specimens), flint knifelike blades (42 specimens), a flint microblade (1 specimen), and various tools (47 specimens).

Both cores are prismatic. One is in the blank stage, with two subrectangular pressure platforms slightly worked by flat retouch. Cobble cortex was preserved on the back of the tool. Several primary knifelike blades had been removed from the blank. The length of the blank is 4.7 cm, the dimensions of the upper pressure platform 2.4 x 2.1 cm, of the lower 2.5 x 1.3 cm (Pl. 64:9). The core blank has a regular cylindrical form and two oval pressure platforms, carefully worked by the removal of small spalls of flat retouch. Thin knifelike blades were removed around the whole circumference of the artifact from both platforms. The length of the core is 4.6 cm, the dimensions of the upper and lower platforms 1.0 x 1.2 cm (Pl. 64:3).

The flint flakes were subdivided into large (5 specimens), medium (12 specimens), and small (85 specimens). Among the diabase flakes small predominated as well (177 specimens), but there were also large (69 specimens) and medium (142 specimens).

Among the knifelike blades were 12 whole ones, the remaining 30 being broken. The length of the whole blades was 4 to 6 cm (Pl. 64:2). Knifelike blades 0.5 to 0.7 cm wide predominate (26 specimens) (Pl. 65:10, 12). Thirteen knifelike blades 0.7 to 1.0 cm wide were noted, as well as three 1.1 to 1.5 cm (Pl. 64:1, 2). The widths of two large knifelike blades used as tools are 2.8 and 3.6 cm (Pl. 64:7). Microblades are represented by only one specimen, 0.4 cm wide.

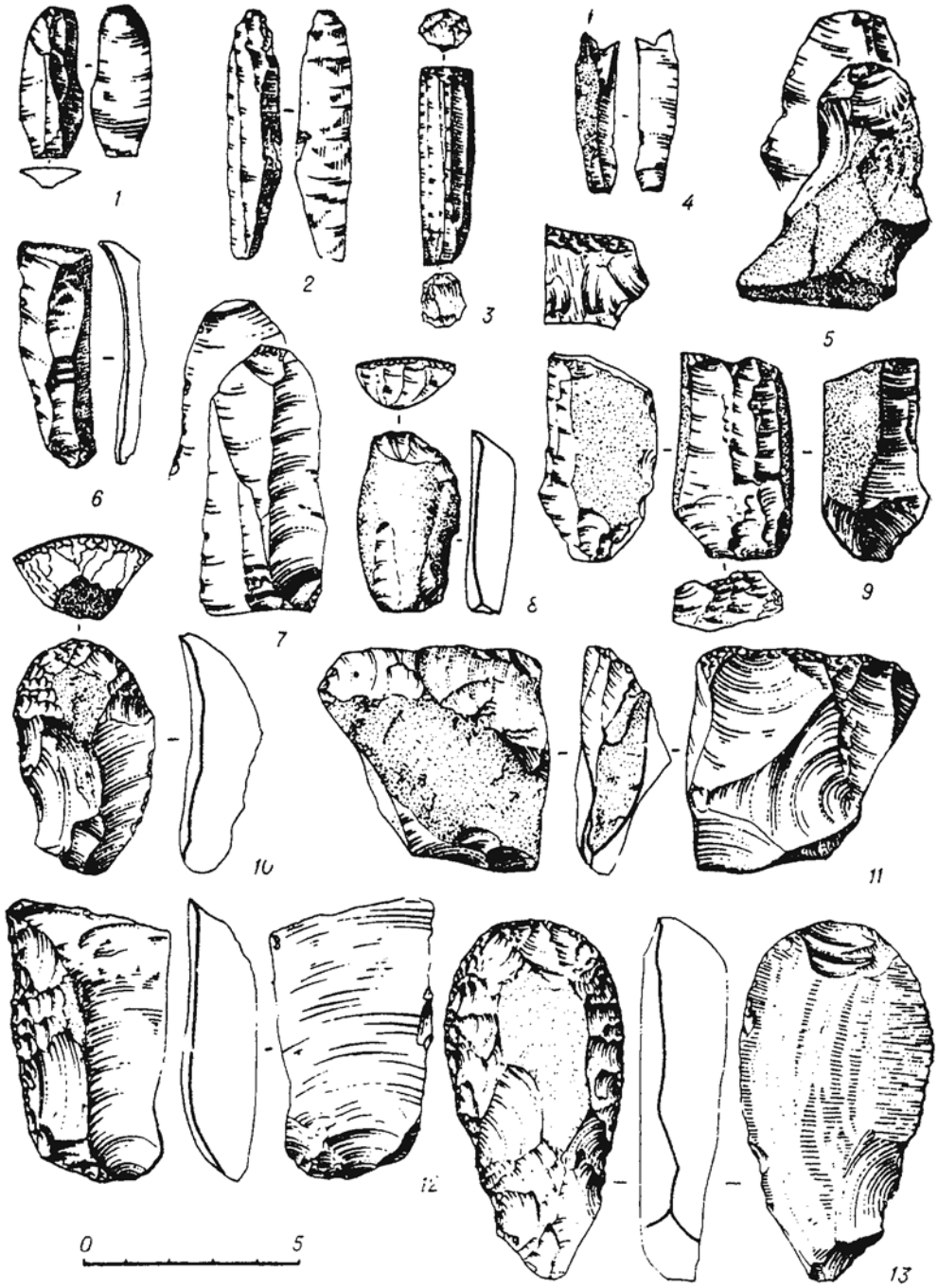

Plate 64. Ust' Timpton site. Stone assemblage from Layer Va.

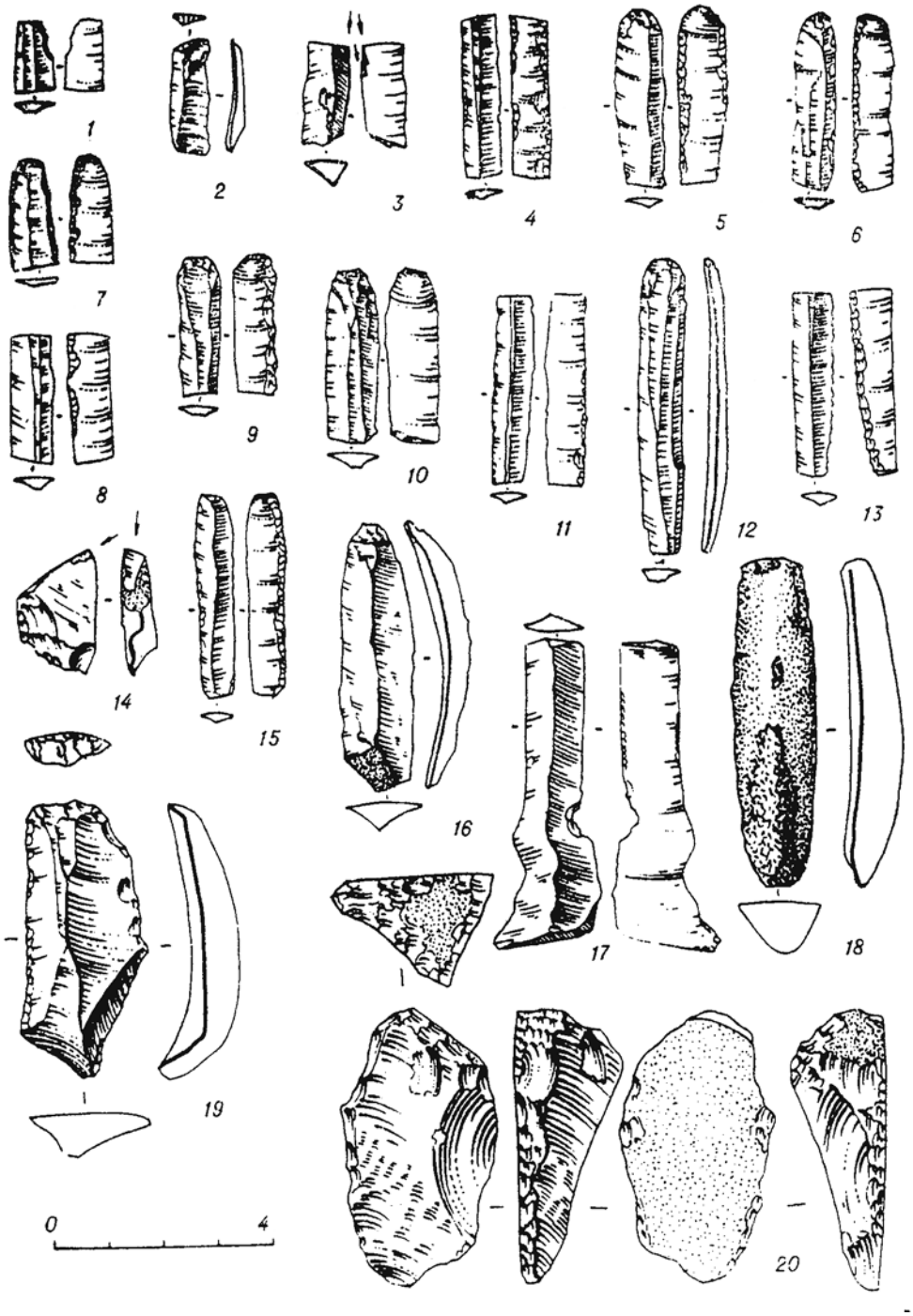

Plate 65. Ust' Timpton site. Stone assemblage from Layer Va.

The stone tools include inset blades (29 specimens), scrapers (9 specimens), burins (3 specimens), knives (2 specimens), blades with grooves (2 specimens), a blade with a beveled edge (1 specimen), and a skreblo (1 specimen). The material from which all the tools found in the layer were made was flint. In spite of the presence in the collection of a rather large quantity of diabase flakes, no tools of diabase were found.

All the inset blades were made on broken knifelike blades 0.7 to 0.8 cm wide. Unretouched inset blades included 13 midsections of blades, while retouched included 16. Based on the character of the work, 10 inset blades were found with one working edge, on which the edge retouch was directed from dorsal to ventral (Pl. 65:8, 9, 13); 3 bifacially retouched inset blades with one working edge (Pl. 65:6, 11, 15); 2 inset blades with two working edges, on which the retouch was directed from dorsal to ventral (Pl. 65:4, 5); and 1 inset blade with two working edges, on which the retouch along one working edge is directed from dorsal to ventral and along the other, from ventral to dorsal (Pl. 65:7).

The scrapers were made on blades (4 specimens) and flakes (5 specimens). The scrapers on blades are represented by three tools with the working edge on the end and one with it on the side. The working edges on two end scrapers are beveled, on a third, ovally convex. They were all worked by steep edge retouch directed from ventral to dorsal (Pls. 64:6; 65:2, 19). The length of the scrapers is 2.0 to 5.2 cm, the width of the working edges 0.7 to 1.6 cm. The side scraper was made on a large primary blade 3.6 cm wide by 6.2 cm long. The straight working edge is on the long side of the blade. The working edge was worked by flat pressure retouch directed from ventral to dorsal and reaching the longitudinal ridge on the back of the tool. The edge of the working edge was secondarily trimmed by fine steep retouch (Pl. 64:12).

Primary lamellar flakes were used for making scrapers on flakes, thus areas of cobble cortex were preserved on the backs of tools. Two tools do not have a developed form. Their beveled working edges were worked by small edge retouch directed from ventral to dorsal (Pl. 64:5, 8). Two tools were given an oval form by the use of retouch. Their convexly oval working edges were worked by pressure retouch with long and narrow facets directed from ventral to dorsal; the lateral sides were trimmed by small edge retouch (Pls. 64:10; 65:20). One scraper has a teardrop form. Its ovally convex working edge, as well as almost all the dorsal surface, was carefully worked by pressure retouch directed from ventral to dorsal. Partial edge retouch can also be seen on the ventral side of the tool (Pl. 64:13). The length of the scrapers is 4.2 to 8.2 cm, the width of the working edges 2.3 to 3.5 cm.

The burins are of the angle type. Two tools were made on blades, one on a flake. The burins on blades each have one working edge, one formed by the removal of a burin spall directed at an acute angle, the other at a right angle to the transverse plane of the break of the blade. The working edge of one burin was rejuvenated by secondary burin-spall removal; the working edge of the other is partially broken (Pls. 64:4; 65:3). The length of the burins is 1.8 and 3.8 cm, the width 0.8 and 0.9 cm, the length of the burin spall scars 0.5 cm, their width 0.07 cm. The burin on a flake has a subtriangular form. A moderate sized flake was used for making it. The working edge of the tool was formed by the removal of a burin spall 0.7 cm long and 0.4 cm wide directed at an acute angle to the transverse plane of the break of the lower part of the flake. The length of the burin is 2.3 cm, the width 1.4 cm (Pl. 65:14).

Knives were made on large broad flakes. The working edges of the tools are on the long edges of the blades. They were worked by small bifacial edge retouch (Pl 64:7). The length of the knives is 6.2 and 5.1 cm, the width 3.0 and 2.4 cm.

The tool with a beveled edge was made on a midsection of a knifelike blade 0.7 cm wide and 1.2 cm long. The beveled edge was formed by steep pressure retouch directed from ventral to dorsal (Pl. 65:1).

One blade with a groove is 5.3 cm long and 1.0 cm wide. The groove is in the middle of the longitudinal edge of the blade. It was formed by steep retouch directed from ventral to dorsal. The longitudinal edges of the tool were partially worked by small retouch directed from dorsal to ventral (Pl. 65:17). The other tool is broken.

The skreblo was made on a large primary flake of subtriangular form. The tool has a straight working edge worked by flat retouch and secondarily trimmed by steep retouch. The length of the skreblo is 5.3 cm, the width of the working edge 4.8 cm (Pl. 64:11).

A radiocarbon date of 9400 ± 90 BP (LE-896) was obtained on charcoal collected from cultural Horizon Va.

Cultural Horizon Vb

Horizon Vb, like the one above, can be most clearly traced in Quadrants $E'_{9–16}$–$S_{12–16}$. Its thickness here is 1 to 3 cm. The cultural remains are lodged primarily in two small clusters in Quadrants $E'_{11–15}$–C'_{13} and $F_{14–16}$–$L_{14–16}$.

A total of 91 stone objects was found in Horizon Vb. They are represented by cores and core blanks (4 specimens), flint flakes (21 specimens), flint flakelets (20 specimens), diabase flakes (22 specimens), diabase flakelets (13 specimens), flint knifelike blades (3 specimens), and various tools (8 specimens). All the cores and tools were made from flint.

The cores are of two types: prismatic (2 specimens) and wedge-shaped (2 specimens). Both prismatic cores are in stages of primary blanks, one of which is broken. The whole blank has a three-edged form. The tool has one pressure platform prepared for the removal of blades, with two primary blades removed from it. The longitudinal ridge of the core was formed by retouch. The length of the blank is 5 cm, the dimensions of the platform 1.0 x 1.5 cm (Pl. 66:14).

The wedge-shaped cores are represented by a finished artifact (1 specimen) and a blank (1 specimen). The finished core is small with a length of 3.3 cm and height of 2.5 cm. The outline of the core and its longitudinal and transverse sections are triangular. Both broad surfaces of the artifact were worked by flat pressure retouch. The pointed base was trimmed by secondary edge retouch. The pressure platform has a triangular form and was not subjected to retouch. The platform is beveled along the long axis of the core. The length of the platform is 3.3 cm, the width 1.0 cm (Pl. 66:3). The removal of knifelike blades occurred on the end of the core. Three regular blades and two short, clearly unsuccessful, blades had been removed from the core. The blank of a wedge-shaped core has a subrectangular form. One broad surface and the pressure platform were completely worked on the artifact by flat retouch, but no knifelike blades had been removed. The length of the blank is 3.7 cm, the height 3.1 cm, the dimensions of the platform 3.7 x 1.8 cm (Pl. 66:13).

Among the flint flakes, 2 are large, 2 medium, and the remainder small. Among the diabase flakes 2 are large, 1 medium, and 19 small.

All the blades are whole (Pl. 66:4, 8, 12), and only one of them is primary. The width of the blades is 0.9 to 1.3 cm, the lengths 3.5, 6.3, and 8.6 cm. The presence of large knifelike blades attests to the use of large prismatic cores, none of which were found.

The stone tools include an inset blade (1 specimen), scrapers (5 specimens), a transverse burin (1 specimen), and a punch (1 specimen). The inset blade is the midsection of a knifelike blade 0.6 cm long and 0.5 cm wide. It was not worked by retouch.

The scrapers were made on knifelike blades (2 specimens) and flakes (3 specimens). The scrapers on blades are end scrapers. Large broad blades were used for making them. Only their working edge was worked, by retouch, and given an ovally convex form. The retouch was directed from ventral to dorsal. The length of the scrapers is 4.5 to 4.8 cm, the width of the working edge 2.0 to 2.4 cm (Pl. 66:6, 7).

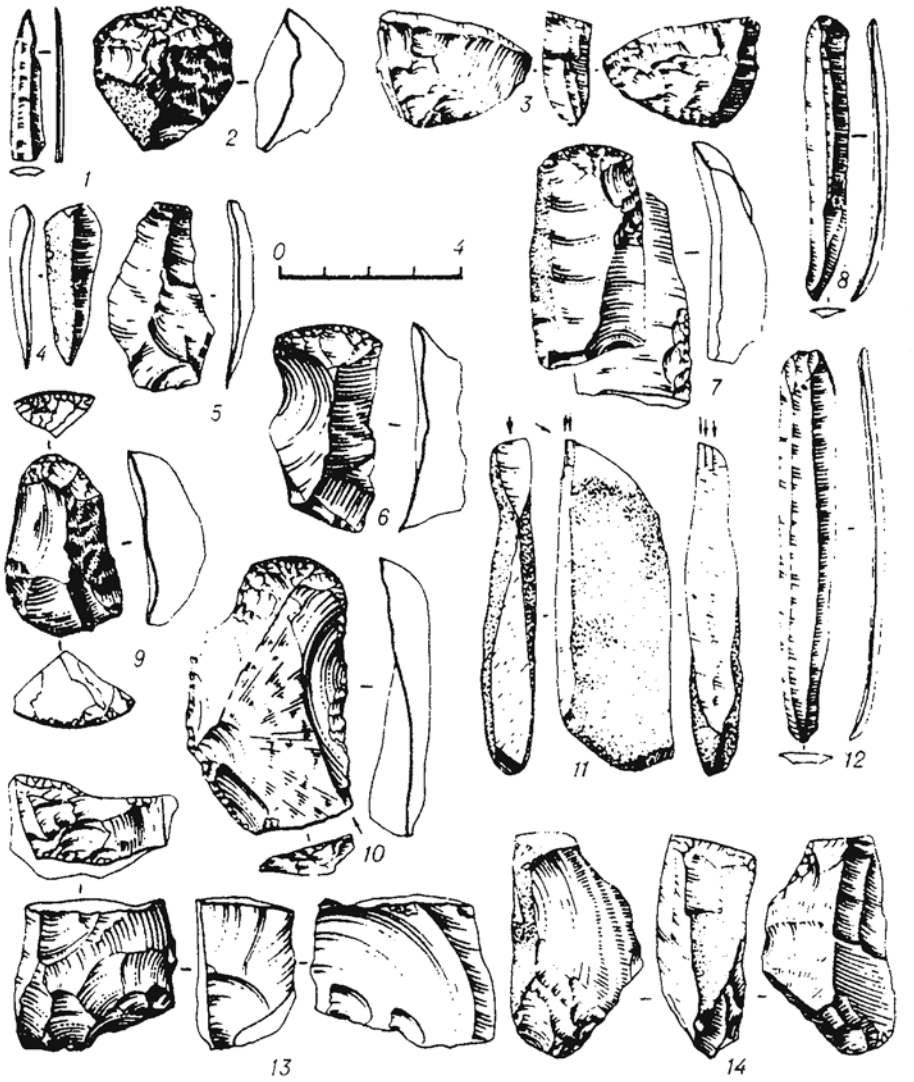

Plate 66. Ust' Timpton site. Stone assemblage from Layer Vb.

The scrapers on flakes were also end scrapers. One scraper has an almost rounded form, high back, and ovally convex end working blade, worked by unifacial retouch directed from ventral to dorsal (Pl. 66:2). The length of the scraper is 3.1 cm, the width of the working edge 3.0 cm. Another has an oval form. The tool has two working edges, on opposite ends, that are of ovally convex outline. The upper working edge was worked by pressure retouch with long narrow facets directed from ventral to dorsal. The lower working edge was worked by small edge retouch directed from ventral to dorsal. The lateral sides of the tool were not worked by retouch. The length of the scraper is 4.0 cm, the width of the upper working edge 2.0 cm, the lower working edge 2.6 cm (Pl. 66:9).

The third scraper was also used as a knife and a burin. The working edges of the scraper are on the upper and lower opposite ends of the tool, as well as on its left longitudinal side. They all are of convexly arced form. The upper end and lateral working edges were worked by pressure retouch directed from ventral to dorsal, the lower end by steep retouch directed from dorsal to ventral. The width of the end working edges is 2 cm, of the lateral working edges 4.5 cm. The working edge of the knife is on the right

longitudinal edge of the tool. It is straight and was worked by unifacial edge retouch directed from ventral to dorsal. Its length is 2.5 cm. The working edge of a lateral burin was formed by the removal of a short burin spall directed at a right angle to the edge of the lower working edge of the scraper. The length of the burin spall scar is 0.5 cm, the width 0.4 cm. The length of the tool 6 cm (Pl. 66:10).

A flat subrectangular slab of flint was used for making the transverse burin. Its working edge was formed by the removal of broad diagonal burin spalls from the transverse plane of the slab and the removal of three short longitudinal burin spalls converging with a diagonal burin spall scar at an acute angle. The length of the diagonal burin spall scar is 2.3 cm, the width 0.7 cm. The length of the longitudinal spall scars is 0.6 to 0.9 cm, their width 0.1 to 0.15 cm. The length of the tool is 7.3 cm, the width 2.1 cm (Pl. 66:11).

The punch was made on a knifelike blade 0.8 cm wide. The point of the tools was worked by unifacial edge retouch directed from ventral to dorsal. The length of the punch is 3.4 cm (Pl. 66:1).

A radiocarbon date of 10,740 ± 100 BP (LE-861) was obtained on charcoal collected from cultural Horizon Vb.

Combined Cultural Horizon V

The cultural remains for the combined horizons were recorded primarily at the center of the excavation where in Quadrants $C_{3–5}$–$D_{3–5}$ an oval hearth measuring 1.2 x 1.8 m was found. The hearth was bordered by granite cobbles arranged in the form of a horseshoe.

A second hearth, beside which were artifacts, was found in Quadrant K_{12}. Its dimensions were 0.3 x 0.5 m. Within the hearth were three burnt granite cobbles.

A third hearth was located in the center of combined Quadrants H_3–$I_{2–3}$. Its dimensions were 0.8 x 1.4 m. It contained five burnt granite cobbles. However, no cultural remains were noted within it or beside it. A rather thick cluster of stone tools, knifelike blades, and flakes, not connected with the presence of the hearth, were found in Quadrant $B'_{2'}$ and in part in neighboring quadrants.

A total of 431 stone items was found in the combined cultural Horizon V, including flint cores and core blanks (9 specimens), flint flakes (49 specimens) and flakelets (30 specimens), diabase flakes (160 specimens) and flakelets (16 specimens), flint blades (71 specimens) and microblades (13 specimens), and various tools (83 specimens).

Prismatic cores are represented by double-platform cylindrical artifacts with blades removed around the whole perimeter (2 specimens), by single-platform pencil-shaped artifacts with blades removed around the whole perimeter (2 specimens), and by single-platform unifacial artifacts (2 specimens). The double-platform cores were heavily used. Their rounded pressure platforms were worked by retouch and were directed at a right angle to the longitudinal axis of the artifact. The length of the cores is 3.7 to 3.8 cm, the diameter of the platforms 0.4 to 0.6 cm (Pl. 67:16). Regular thin knifelike blades were removed from the pencil-shaped cores, as from the cylindrical ones. The rounded pressure platforms were worked by retouch and were directed at a right angle to the plane of removal of the knifelike blades (Pl. 67:21). One of the pencil-shaped cores was exhausted. Its length is 1.6 cm, the diameter of the platform 0.4 cm, and the width of the facets 1.0 to 1.5 mm (Pl. 67:3). The unifacial cores differ from the pencil-shaped ones only by the presence of a longitudinal rib (Pl. 67:15).

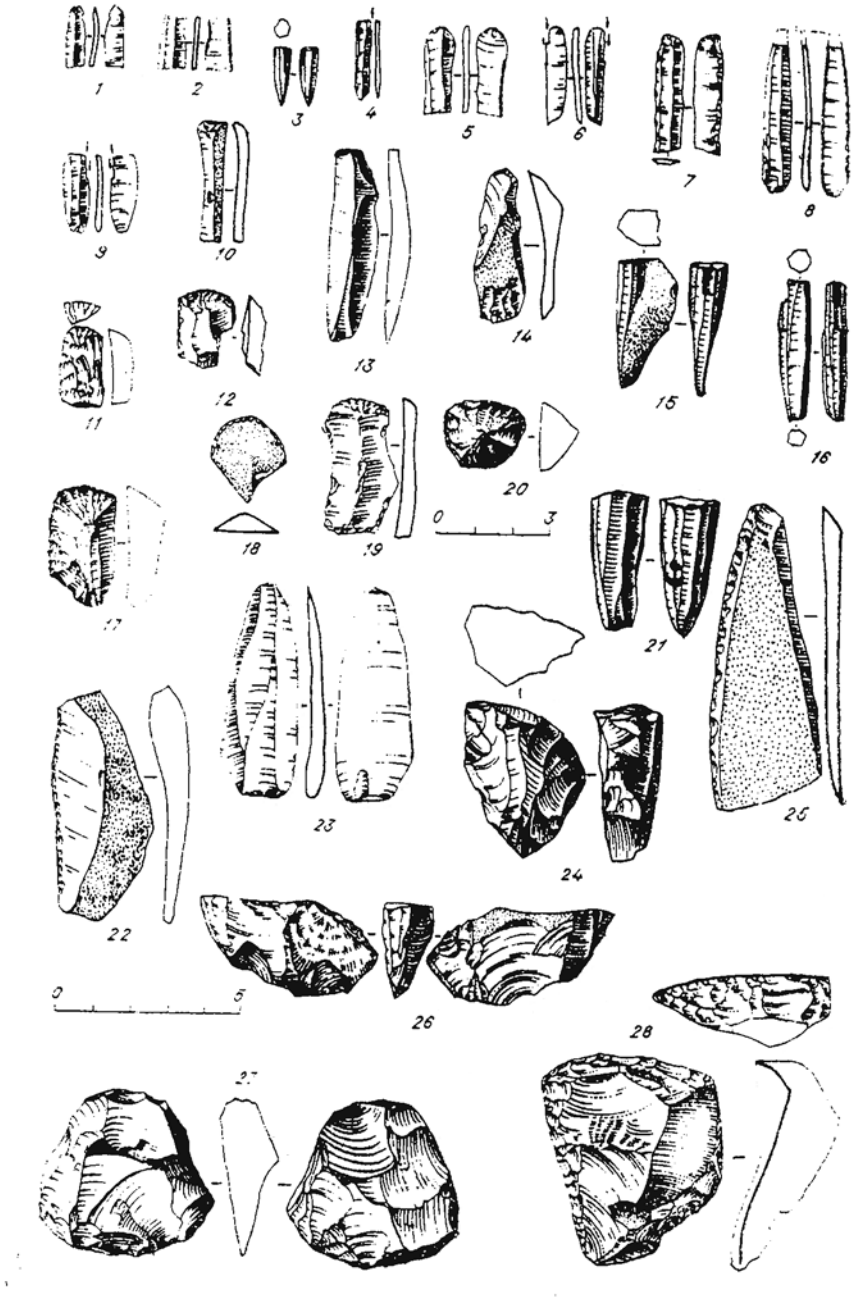

Plate 67. Ust' Timpton site. Stone assemblage from Layer V (28 from Layer VI).

The wedge-shaped cores (2 specimens) have subtriangular and boat-shaped forms. The removal of knifelike blades occurred at the end. The base and the rear rib of the cores were sharpened. The pressure platforms were beveled toward the longitudinal axis of the artifacts and were not worked by retouch. Both broad surfaces of the cores were covered by retouch. The length of the cores is 3.2 and 5.2 cm, the height 4.0 and 2.2 cm (Pl. 67:24, 26).

The flint flakes were divided into large (10 specimens), medium (25 specimens), and small (14 specimens). The diabase flakes were divided into large (30 specimens), medium (56 specimens), and small (74 specimens).

All the knifelike blades are from flint cores. There are 12 whole blades, the rest broken. The whole blades are 2.4 to 9.0 cm long. Most blades are 0.5 to 0.7 cm wide (52 specimens), but there are also blades 0.8 to 1.0 cm wide (9 specimens), 1.0 to 1.5 cm wide (9 specimens), and to 1.7 cm wide (1 specimen).

The stone tools include inset blades (40 specimens), burins (13 specimens), scrapers (16 specimens), knives (4 specimens), a punch (1 specimen), blades with grooves (2 specimens), chisel-like artifacts (3 specimens), skreblos (2 specimens), and adzes (2 specimens).

The inset blades were made on flint knifelike blades. Some of them were worked by retouch (14 specimens), others were not worked (26 specimens). The unretouched inset blades are midsections of blades (24 specimens) and microblades (2 specimens). Among those retouched, two inset blades have microdimensions. Based on the character of the work, the retouched inset blades were subdivided into those with a single working edge (8 specimens), on which the working edge was worked by small edge retouch directed from dorsal to ventral (Pl. 67:5); with a double working edge (2 specimens), both working edges of which were worked by small edge retouch directed from dorsal to ventral (Pl. 67:2); with a single working edge (2 specimens), worked by bifacial edge retouch (Pl. 67:7); with a single working edge (1 specimen), worked by edge retouch directed from ventral to dorsal; and with a double working edge (1 specimen), on which the retouch along one edge is directed from dorsal to ventral and on another, from ventral to dorsal. The length of the inset blades is 0.7 to 3.1 cm, the width 0.4 to 0.9 cm.

Ten burins were made on flint blades, three on microblades. They were assigned to the angle type of burins, on which the working edges were formed by the plane of the break of the blades and by the removal of burin spalls directed at a right or an acute angle to them (Pl. 67:4, 9). One tool was made on a blade with a beveled edge. The burin spall scar on it was directed not toward the retouched edge of the blade, but toward its opposite end (Pl. 67:6). The length of the burins is 1.5 to 2.5 cm, the width 0.4 to 0.8 cm, the length of the burin spall scars 0.6 to 1.0 cm, their width 0.02 to 0.05 cm.

The scrapers were made on flint knifelike blades (10 specimens), a microblade (1 specimen), and flint flakes (5 specimens). The scrapers on blades and microblade are end scrapers. The form of the working edges is ovally convex on five tools, beveled on two, and straight on three. The working edges were worked by edge pressure retouch directed from dorsal to ventral. Two scrapers made on large broad blades had both the base and the working edges of the lateral sides worked by edge retouch directed from ventral to dorsal. The length of the scrapers is 1.8 to 5.4 cm, the width of the working edge 0.2 to 1.5 cm (Pl. 67:10, 12, 14, 19).

The scrapers on flakes are represented by one rounded tool, three end scrapers, and one side scraper. The working edge of the rounded scraper runs the whole circumference of the tool. It was worked by pressure retouch directed from ventral to dorsal, which has long and narrow facets converging in the center of the back. The longitudinal section of the scraper is triangular. Its diameter is 2.1 cm (Pl. 67:20).

The end scrapers were made on lamellar flakes (2 specimens) and a subtriangular primary flake (1 specimen). The working edges of all these scrapers are convexly arced. An “ear” can be seen at the edges of each working edge. The scrapers on lamellar flakes were worked along the working edge and one lateral

edge by retouch of narrow parallel facets directed from ventral to dorsal (Pl. 67:11, 17). The working edge of the scraper on a primary flake was formed by small edge retouch directed from ventral to dorsal (Pl. 67:18). The length of the scrapers is 2.1 to 3.2 cm, the width of the working edges 1.1 to 1.9 cm.

The side scraper was made on a primary lamellar flake. Its working edge has a convexly arced form and is on the longitudinal edge of the tool. Only the working edge of the tool was worked, by edge retouch directed from ventral to dorsal. The length of the scraper is 6.0 cm, the width 2.5 cm (Pl. 67:22).

The knives are represented by tools on large flint blades (2 specimens) and lamellar flint flakes (2 specimens). The knives on blades were poorly worked by retouch. Partial edge retouch is encountered only on their working edges. A knife on a subtriangular lamellar flake deserves special attention. Its whole back is covered with cobble cortex and the long convexly arced working edge was carefully worked by edge retouch directed from ventral to dorsal. The length of the knife is 8.0 cm, the width of the base 2.8 cm (Pl. 67:25). Traces of use-wear in the form of heavy grinding and polish of the edge can be clearly observed on the working edge and on the base of the knife.

The punch was made on a knifelike blade 4.3 cm long and 0.7 cm wide. The tip of the tool is broken. The tip of the punch and its long lateral sides were worked by small edge retouch directed from dorsal to ventral (Pl. 67:8).

The blades with a groove are tools having a groove 0.3 to 0.4 cm long and 0.2 cm deep made on the long side by retouch directed from dorsal to ventral. The length of the tools is 1.1 to 1.5 cm, the width 0.5 to 0.7 cm (Pl. 67:1).

The chisel-like tools were made on a flint blade (1 specimen) and flint flakes (2 specimens). The tool on a blade had only the working edge, which is located in the lower transverse plane of the break of the blade, formed by retouch, directed from dorsal to ventral. The length of the tool is 5.6 cm, the width of the working edge 0.5 cm. The tools on flakes have a subdiscoid form and wedge-shaped longitudinal profile. Both broad surfaces of the tools were worked by flat retouch. The tools are noticeably flattened toward the working edge. The edges of the working edges were trimmed by secondary bifacial retouch. The diameter of the tools is 4.0 to 4.5 cm (Pl. 67:27).

The skreblos were made from a primary diabase flake (1 specimen) and a longitudinally split diabase cobble (1 specimen). The skreblo on a flake has an oval form and a segmentlike cross section. The ovally convex lateral working edge of the skreblo was formed by steep retouch directed from ventral to dorsal. The length of the skreblo is 10.6 cm, the width 6.5 cm (Pl. 63:1). The cobble skreblo has an almond-shaped form and a segmentlike cross section. The skreblo has one lateral working edge carefully worked by flat retouch and trimmed by unifacial edge retouch, and the second lateral working edge was subjected to partial work. The working edges meet at an angle in the upper part of the tool, forming a point that could have been used as a knife. The length of the skreblo is 11.5 cm, the width 4.0 cm (Pl. 63:2).

The adzes were made from diabase cobbles. Their form is subrectangular, the cross sections trapezoidal, the butts straight, the working edges ovally convex. The middle part of the dorsal surface of the tools is covered with cobble cortex. The longitudinal edges of the tools were worked by flat retouch, directed on one adze from ventral to dorsal and on the other, from dorsal to ventral. The length of one tool is 9.4 cm, the width of the working edge 3.5 cm, width of the butt 3.3 cm (Pl. 63:4). The length of the other tool is 16.5 cm, the width of the working edge 5.2 cm, the width of the butt 4.7 cm (Pl. 63:5).

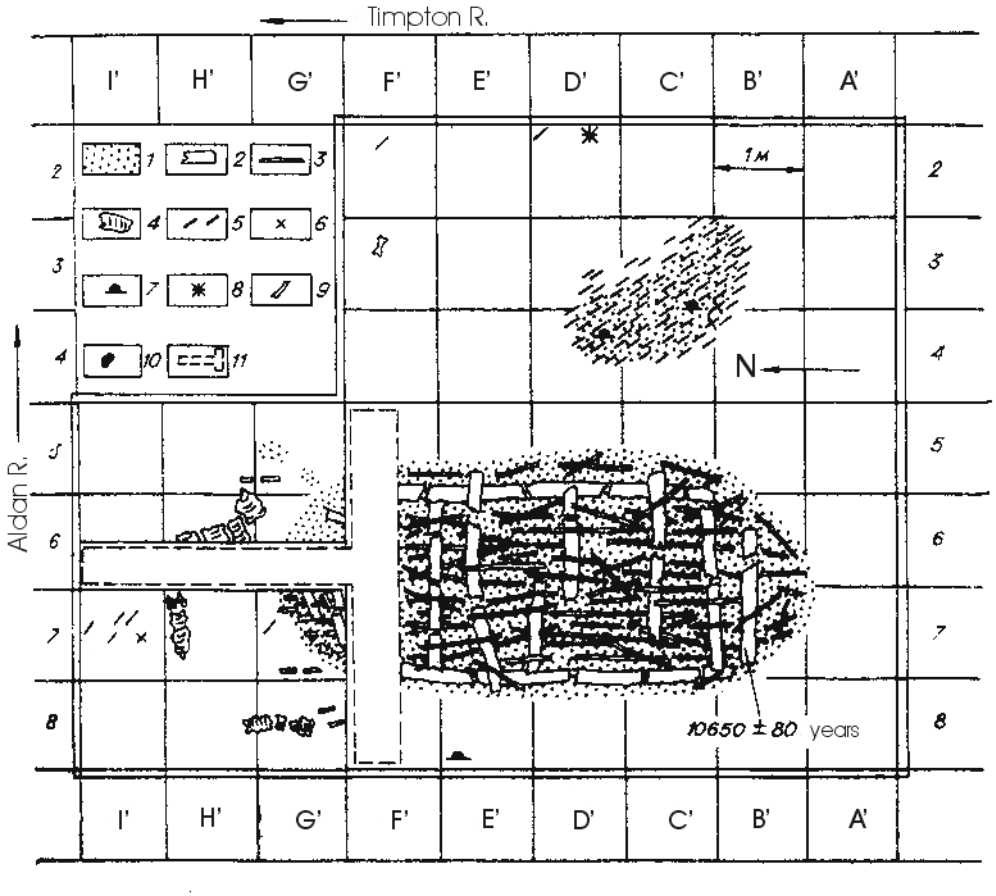

Figure 33. Plan of house in cultural Layer VI of the Ust' Timpton site. 1) carbonaceous ash fill within house; 2) log remains; 3) remains of branches; 4) remains of roots; 5) flakes; 6) blades; 7) scraper; 8) graphite; 9) animal bones; 10) hearth stone; 11) control balk.

Cultural Layer VI

Cultural Layer VI was opened over an area of 468 m^2. In a large part of the excavation it was confined to the upper beige loamy interlayer of buried Terrace I (?) above the floodplain. As a rule, the thickness of this interlayer was 1 to 2 cm. Toward the Aldan, approximately from Line G, the beige loam dropped at an angle of 4 to 6º and was displaced by two or three interlayers of bluish loam 0.5 to 1.0 cm thick. Toward the point at the mouth of the creek, each of the interlayers was made up in places of the two thinnest (0.2 to 0.3 cm) loams. Finds from the upper bluish interlayer were assigned to Horizon VIa, and from the lower, to Horizon VIb. A radiocarbon date of 10,340 ± 140 BP (LE-862) was obtained on charcoal from Horizon VIa. The upper interlayer of Horizon VIb was dated to 10,130 ± 100 BP (LE-897), and the lower, 10,650 ± 80 BP (LE-898). Considering these dates, as well as those for Horizon Vb (10,740 ± 100 BP) and the carbonaceous interlayer of sand separating Layers V and VI (10,300 ± 50 BP), we determine the age of Layer VI as approximately 10,500 ± 100 BP.

The few cultural remains in Layer VI, confined to the beige interlayer, lay separately in Quadrants $H_{10–16}$–$S_{10–16}$, not forming a separate cluster. Horizon VIa also contained very few finds.

The primary cultural remains were connected with Horizon VIb. Quadrants $B'_{5–7}$–$G'_{5–7}$ contained the remains of a house structure represented by burned beams and poles (Fig. 33). The house plan was rectangular and stretched from south to north along the Aldan. Along the long sides of the house, at a distance of 1.9 to 2.0 m, lay (on each side) a burned cracked beam (trunks of larch or pine?) 15 to 17 cm wide and 7 to 9 cm thick. The lower part the beams was flattened. They were most probably rotted through before they were burned. Transverse to these beams lay seven more of the same kind of beams. Under these beams and on top of them in two or three rows were arranged severely burned pieces of poles 3 to 5 cm in diameter. The length of some of them reached 2 m. Pieces of the same kind of poles were also found near the north part of the house in Quadrants $G'_{4–5}$, $G'_{7–8}$. Here, in the same place, were found burned pieces of larch or pine (?) bark, which were probably the remains of the house roof. In the house itself were almost no cultural remains. Among the beams and poles were a single burnt granite cobble and eight small diabase flakes.

The majority of the finds in Horizon VIb was confined to the hearth located approximately 1 m east of the south part of the house. The hearth was oval. Its dimensions were 0.9 x 2.0 m. Within the 1- to 2-cm-thick hearth fill and beside the hearth were 404 diabase flakes, 271 diabase flakelets, 5 flint flakes, 2 flint knifelike blades, and 2 flint end scrapers. At a distance of 1.5 to 2.0 m from the hearth in the direction of the point of the river bank were 2 more diabase flakes, 1 small piece of graphite, and an exfoliating moose tooth.

Near the burned remains of bark at the north part of the house were 4 diabase flakes and 1 flint blade. In Quadrant E'_8, at a distance of 80 cm from the house, was a flint scraper.

After removal of the beams and poles in the area of the house, an oval burnt spot 5.8 m long and 2.5 to 2.65 m wide appeared. No cultural remains were found during excavation of this spot.

In cultural Layer VI, counting the finds in the beige loam and two interlayers of bluish loam, was a total of 783 stone items, represented by flint cores (4 specimens), flint flakes (11 specimens), flint flakelets (2 specimens), diabase flakes (475 specimens), diabase flakelets (271 specimens), flint knifelike blades (6 specimens), and various flint tools (14 specimens).

The cores are divided into four types. To the first belong wedge-shaped cores (Pl. 68:11) with two retouched lateral sides converging at an acute angle at the bottom and the back (opposite the flaking end). An arc-shaped rib was additionally worked on one side by edge retouch. The pressure platform was formed by the removal of a small longitudinal spall. The end of the core from which blades were removed is located at a right angle to the pressure platform. The maximal length of the core is 3.1 cm, the height of the working end 2.5 cm.

The second type is represented by an end core (Pl. 68:8), made from a piece of lamellar flint. Its pressure platform was formed by the removal of a small longitudinal spall. The end of the core from which blades were removed is situated at a right angle to the pressure platform. In distinction from wedge-shaped cores, the unretouched lateral sides of this core are located parallel to each other, and do not converge on the rib. The maximal length of the core is 2 cm, the height of the working end 1.8 cm.

A piece of a prismatic core was assigned to the third type, and to the fourth, a small subdiscoid core (Pl. 68:12). Irregular short blades were removed from the last, in a radial direction. One edge of the core has a characteristic starlike impact point. After it was exhausted the core was evidently used as a retoucher. The dimensions of the core are 3.6 x 3.7 cm.

Of the flint flakes, two are large and nine are small. The diabase flakes are divided into large (118 specimens), medium (282 specimens), and small (75 specimens).

Of the six knifelike blades, only two are whole. Their length is 3.0 and 4.3 cm, their width 0.7 and 0.8 cm (Pl. 68:4, 6). The width of the broken blades is 0.7 to 1.2 cm (Pl. 68:3).

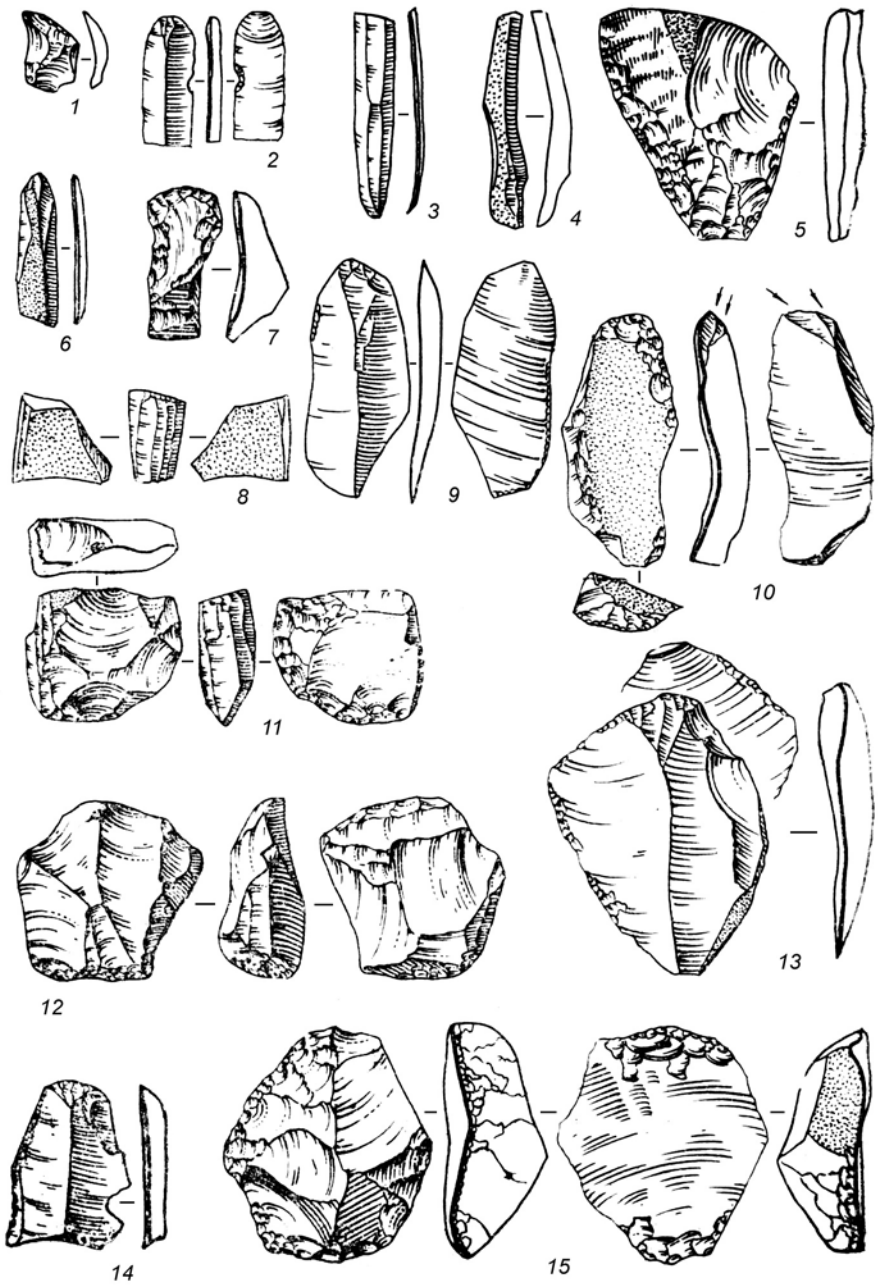

Plate 68. Ust' Timpton site. Stone assemblage from Layer VI.

The stone tools are represented by inset blades (3 specimens), scrapers (5 specimens), a burin (1 specimen), knives (3 specimens), a blade with a notch (1 specimen), and an axe (1 specimen).

The inset blades are midsections of microblades (2 specimens) and a blade (1 specimen). The tools were not worked by retouch, but have traces of use-wear along the edges in the form of the finest serration. The length of the inset blades is 0.7 to 1.5 cm, the width 0.3 to 0.6 cm.

The scrapers were made on a knifelike blade (1 specimen) and flakes (4 specimens). The scraper on a blade has a convexly arced working edge, which was worked by edge retouch directed from ventral to dorsal. One lateral side of the scraper also was trimmed by edge retouch. The length of the tool is 3.1 cm, the width of the working edge 1.2 cm, the width of the base 2.3 cm (Pl. 68:14). Three of the scrapers on flakes are end scrapers; one is a combination tool with an end working edge and a lateral working edge. One of the end scrapers does not have a formal shape. Its beveled working edge was formed by edge retouch directed from ventral to dorsal (Pl. 68:1). On the ends of the working edge on one of the scrapers were elaborated small "ears" with the aid of edge unifacial retouch (Pl. 68:7). Subtriangular scrapers with a convexly arced end working edge and a scraper of oval form with end and lateral working edges, made from black flint, were covered by a rich greenish-gray patina. Their convexly arced working edges were heavily used. The working edges and lateral sides of the tools were worked by unifacial edge retouch directed from dorsal to ventral (Pls. 67:28; 68:15). The length of the scrapers on flakes fluctuates from 1.6 to 5.6 cm, the width of the working edge from 1 to 4 cm.

The burin is assigned to the transverse type (Pl. 68:10). It was made on a primary lamellar flake, on which the upper and lower parts were worked by retouch directed from ventral to dorsal. The upper retouched end of the flake was evidently used as a knife, the lower end, as a scraper. The burin working edge was formed by two diagonal spall scars running along the ventral side and one edge of the dorsal side. The length of the tool is 5.1 cm. The length of the burin spall scars is 0.7 and 1.5 cm, the width 0.4 cm.

The knives are represented by one tool made on a blade and two on flakes. The knife on a blade (Pl. 68:9) has a length of 4.7 cm, a width of 2.0 cm. Its working edge was formed by the finest edge retouch directed from dorsal to ventral.

One knife on a flake has a subtriangular form (Pl. 68:5). Both of its straight working edges were worked from ventral to dorsal by pressure retouch. The other knife on a flake has an irregular form (Pl. 68:13). Its subtriangularly projecting working edge was worked by edge retouch, partially from ventral to dorsal and partially the opposite. The length of the knives is 4.8 and 5.7 cm, the width 4.0 and 4.2 cm.

The blade with a notch (Pl. 68:2) has a length of 2.6 cm and a width of 1.0 cm. The notch is located on the right longitudinal edge of the blade. It was formed by steep pressure retouch directed from dorsal to ventral. The length of the notch is 0.5 cm, the depth 0.2 cm.

The axe has an oval form and almond-shaped longitudinal and transverse sections. The working edge of the tool is ovally convex, the butt straight and pointed. Both broad surfaces of the axe were worked by flat retouch. The edges were trimmed by unifacial secondary retouch. The length of the axe is 7.8 cm, the width of the working edge 3.8 cm, the width of the butt 3.5 cm (Pl. 69). Since the axe was worked on all sides by retouch we cannot precisely determine the form of its original blank. A flint nodule, cobble, or large flake could have been used as a blank for it.

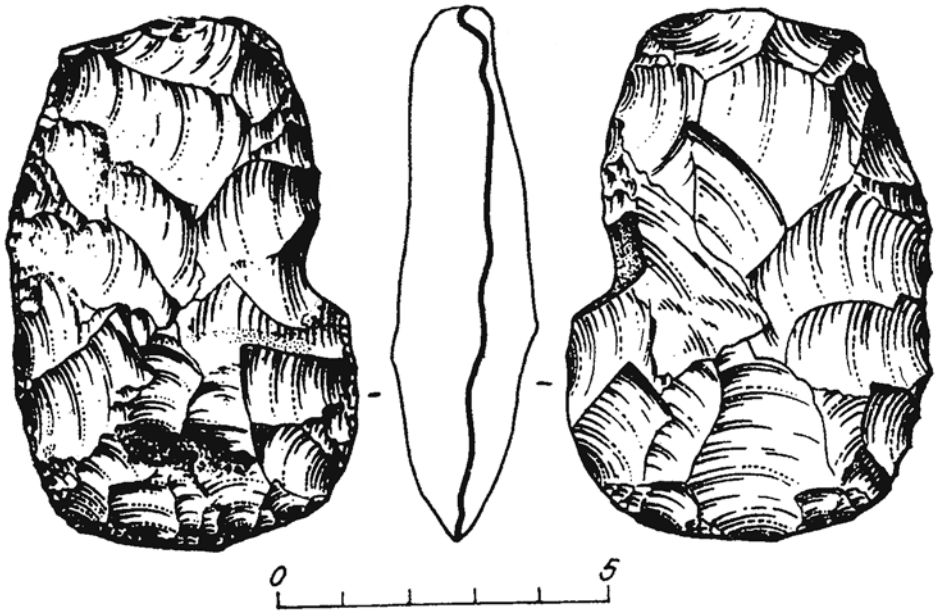

Plate 69. Ust' Timpton site. Stone tool from Layer VI.

* *
*

Analysis of the materials from Layers IVa, IV, IVb, and Va indicates that they belong to the Sumnagin culture. They all are characterized by identical types of tools and technique of making them, as well as the monotypic pencil-shaped cores. Based on the primary technical-typological features, the stone assemblage from Layers IVa to Va is identical to the assemblage from Layers XX to VIII at the Bel'kachi I site (Table 2). Most of the tools at both sites were made on knifelike blades (Tables 2 and 3). Also, the percentage of tools on knifelike microblades is very large in their assemblage (Tables 2 and 3). Of course, in Layers IVa and IVb at the Ust' Timpton site were diabase adzes with ears, which were not noted in Layers XX to VIII at the Bel'kachi I site. But in general almost no adzes or axes are found in the latter. The diabase adze with ears found in the tow path at the Bel'kachi I site possibly can be assigned to the Sumnagin culture. Earlier, it was tentatively assigned to the Bel'kachi culture (Mochanov 1969a:Plate 34). At present, adzes and axes with ears have been found in clear stratigraphic contexts, besides in the Ust' Timpton site, in the Sumnagin layers at the Sumnagin I (Pl. 71) and Ust' Chirkuo (Pl. 78).

The radiocarbon dates and stratigraphic position of the finds allow dating Layer IVa to an age of 8,500 to 6,500 years; Layer IVb approximately 9,500 to 8,500 years; and Layer Va approximately 10,500 to 9,500 years. Although Layer IVb is 1,000 years earlier and Layer Va approximately 2,000 years earlier than Layer XX at the Bel'kachi I site, based on the appearance of the cultural remains they are almost identical.

Table 3. Multicomponent Ust'-Timpton site. Stone tools (distribution by layer).

Tool Type	VI	Vb	V	Va	IVb	IV	IVa	Total
1	2	3	4	5	6	7	8	9
Retouched insets – B*	–	–	12 14.46	16 34.04	7 2.42	28 4.6	1 1.05	64 5.56
Retouched insets – MB**	–	–	2 2.41	–	16 5.54	40 6.5	11 11.58	69 5.99
Unretouched insets – B	2 14.29	1 12.5	24 28.92	13 27.66	99 34.26	177 28.8	30 31.58	346 30.06
Unretouched insets – MB	1 7.14	–	2 2.41	–	49 16.95	111 18.05	16 16.84	179 15.56
Knives – B	1 7.14	–	2 2.41	2 4.25	5 1.73	4 0.65	–	14 1.22
Knives – F***	2 14.29	–	2 2.41	–	2 0.69	1 0.16	–	7 0.61
Blades with beveled edge	–	–	–	1 2.13	9 3.11	20 3.25	5 5.27	35 3.04
Microblades with beveled edge	–	–	–	–	3 1.04	2 0.33	1 1.05	6 0.52
Blades with groove	1 7.14	–	2 2.41	2 4.25	8 2.77	2 0.33	–	15 1.3
End scrapers – B	1 7.14	2 25	10 12.05	3 6.39	18 6.23	55 8.94	9 9.48	98 8.51
End scrapers – MB	–	–	1 1.2	–	–	4 0.65	–	5 0.43
End scrapers – F	4 28.58	3 37.5	3 3.62	5 10.64	4 1.38	7 1.12	2 2.11	28 2.43
Side scrapers – B	–	–	–	1 2.13	–	–	–	1 0.69
Side scrapers – F	–	–	1 1.2	–	2 0.69	–	–	3 0.26
Rounded scrapers – F	–	–	1 1.2	–	–	–	–	1 0.69
Angle burins – B	–	–	10 12.05	2 4.25	35 12.11	97 15.77	11 11.58	155 13.47
Angle burins – MB	–	–	3 3.62	–	4 1.38	17 2.77	–	24 2.09
Angle burins – F	–	1 12.5	–	1 2.13	1 0.35	–	–	3 0.26
Lateral burins – B	–	–	–	–	2 0.69	7 1.12	1 1.05	10 0.87
Lateral burins – MB	–	–	–	–	–	–	1 1.05	1 0.69
Dihedral burins – B	–	–	–	–	–	2 0.33	–	2 0.17
Transverse burins – F	1 7.14	–	–	–	–	–	–	1 0.69
Multi-faceted burins	–	–	–	–	1 0.35	1 0.16	–	2 0.17
Gravers – B	–	–	–	–	3 1.04	5 0.81	–	8 0.7
Gravers – MB	–	–	–	–	–	2 0.33	1 1.05	3 0.26
Punches – B	–	1 12.5	1 1.2	–	–	7 1.12	1 1.05	10 0.87
Punches – MB	–	–	–	–	1 0.35	4 0.65	–	5 0.43

Tool Type	**VI**	**Vb**	**V**	**Va**	**IVb**	**IV**	**IVa**	**Total**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Perforators – B	–	–	–	–	–	2 0.33	–	2 0.17
Chisel-like tools – B	–	–	1 1.2	–	2 0.69	2 0.33	1 1.05	6 0.52
Chisel-like tools – MB	–	–	–	–	2 0.69	–	–	2 0.17
Chisel-like tools – F	–	–	2 2.41	–	1 0.35	1 0.46	–	4 0.35
Skreblos	–	–	2 2.41	1 2.13	4 1.38	7 1.12	1 1.05	15 1.3
Adzes	–	–	2 2.41	–	6 2.08	8 1.3	1 1.05	17 1.48
Axes	1 7.14	–	–	–	3 1.04	1 0.16	2 2.11	7 0.61
Hammerstones	–	–	–	–	–	1 0.16	–	1 0.09
Abraders	–	–	–	–	2 0.69	–	–	2 0.17
Total tools Percent	14 100	8 100	83 100	47 100	289 100	615 100	95 100	1151 100
Total tools on blades Percent of all	42.85	50	83.13	85.1	91	95.28	93.68	–
Percent of tools on blades vs. percent on microbles	66.66 33.34	100 0	86.95 13.05	100 0	71.48 28.52	69.11 30.89	67.41 32.59	–
Total tools on flakes Percent of all	57.14	50	13.25	14.89	6.22	3.08	3.15	–
Total “cobble” tools Percent of all	–	–	3.61	–	2.07	1.46	3.15	–

Note: The numerator indicates the number of tools; the denominator – the percent. * = blades; ** = microblades; *** = flakes.

The materials from Layers Vb and VI differ by their substantial diversity in comparison with materials from IVa–Va. Characteristic for them are wedge-shaped cores with retouched lateral sides. Such cores have never been encountered on the Aldan in layers of the Sumnagin and later cultures. Based on the data available here, they are characteristic of the Dyuktai culture. The wedge-shaped core from Layer IV (Pl. 68:11) almost is an exact copy of one of the wedge-shaped cores (Pl. 22:3) from the lower layer of the Tumulur site, the materials of which are assigned to the late stage of the Dyuktai culture. Burins with diagonal burin spall scars (Pls. 66:11; 68:10) and corelike artifacts of discoid form (Pl. 68:12) also have analogies in the stone assemblage of this culture. Based on the form and technique of preparation, the biface from Layer VI of the Ust’ Timpton site is very close to the Dyuktai oval bifaces (Pl. 69). In distinction from the Sumnagin layers, in which the quantity of tools on blades amounts to 85 to 95%, in Layer Vb and VI tools on flakes (12 specimens) predominate over tools on blades (10 specimens). All of these observations, together with the stratigraphic data and radiocarbon dates, suggest that the materials from Layers Vb and VI belong to the terminal stage of the Dyuktai culture, which can be dated to approximately 11,000 to 10,500 years ago.

Figure 34. General view of the Sumnagin I and Sumnagin II sites.

Apparently, part of the materials from Layer V also belong to the Dyuktai culture. Layer V contains mixed artifacts of both Sumnagin (e.g., pencil-shaped cores) (Pl. 67:3, 16) and Dyuktai cultures (e.g., a wedge-shaped core and a corelike disk) (Pls. 67:26; 67:27).

Because of the absence in several areas of a sterile interlayer between Layers Va and Vb, very probably in the first of them (the upper layer) can be found artifacts of the Dyuktai culture (e.g., skreblos) (Pl. 64:11, 12) and in the second (lower layer), artifacts of the Sumnagin culture (e.g., end scrapers on lamellar flakes) (Pl. 66:6, 7). This circumstance requires very great care in the investigation of the contact Layers Va and Vb, since these layers can provide the most valuable materials for clarification of the historic events that occurred in Northeast Asia at the Pleistocene-Holocene boundary.

The Multicomponent Sumnagin I Site

The multicomponent Sumnagin I site was discovered in July 1964 by the Anadyr' Expedition (of the Institute of Language, Literature, and History) on the left bank of the Aldan, 1,524 km from its mouth. It is situated on a point on the left bank of the Aldan and the left bank of its tributary, Sumnagin Creek, a small mountain stream (Fig. 34).

The point on which the Sumnagin I site is located is a segment of the high Aldan floodplain, which in this place rises 13.5 to 15.7 m above the mean river level. At its back end, the high floodplain is connected with a terrace rising 25 m above the floodplain, on which the Sumnagin II site is located. The middle floodplain, which is 9.5 to 10 m high, is connected to the outer point of the high floodplain.

Figure 35. Sumnagin I site during excavation.

The area of excavation at the Sumnagin I site amounted to 280 m^2 (Fig. 35). The greatest depth of successful penetration into the permafrost was 6 m (Fig. 36). Investigation of the Sumnagin I site established it as a multicomponent archaeological site consisting of several diachronic occupations. The cultural layers corresponding to the individual occupations were confined to the deposits of the alluvial floodplain facies in the high floodplain of the Aldan. The latter is represented by evenly intercalated brownish-purple silty humic aleurites and inequigranular well washed grayish-yellowish sands (Fig. 37). The thickness of the aleurite interlayers fluctuates from 0.5 to 6.0 cm and the sandy interlayers from 1 to 50 cm. The humic nature of the interlayers of aleurite is due to the substantial richness of its plant detritus, small compacted branches, leaves, needles, rotted roots, and some charcoal. The last often give the aleurites a purple tint. The humic aleurites are thin rudimentary buried sods.

Owing to the periodic alternation of the humic aleurites and the washed quick sands (in the dry state), the opened parcel of the floodplain alluvium is characterized by a clear horizontally undulating lamination. However, because the floodplain alluvium is in a permafrost state at a depth of 0.5 to 0.6 m from the present ground surface, the clear lamination in some parts is damaged by small frost cracks beginning at various levels.

The opened stratum of the floodplain alluvium at the Sumnagin I site counts 48 well defined humic interlayers separated from each other by sterile sands. The humic interlayers are monolithic, 0.5 to 6.0 cm thick, and united, consisting of several lenses of humic aleurites that join each other. The thickness of the joined humic interlayers sometimes reached 15 to 20 cm.

In many of the humic interlayers were traces of the life of early peoples. The upper cultural layer is associated with the fourth buried humic interlayer from the top. The depth of its deposition from the present ground surface is 0.4 to 0.65 m. The lowest cultural remains were found meanwhile in the 42nd humic interlayer from the top, lying at a depth of 5.2 to 5.3 m below the present ground surface.

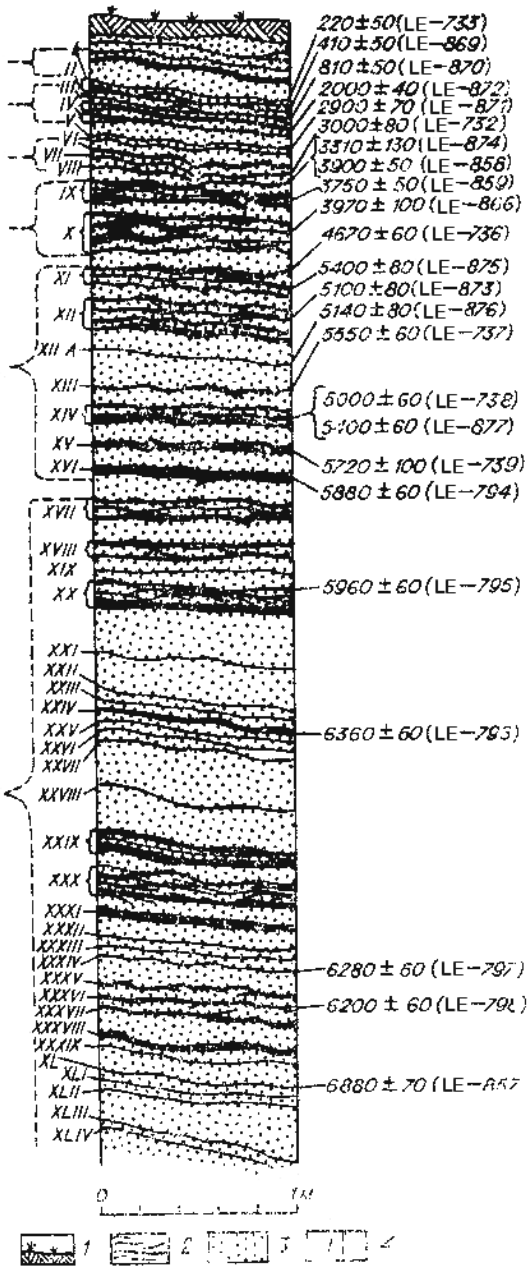

Figure 36. Stratigraphic profile of deposits at the multi-component Sumnagin I site. 1) sod; 2) silts with humus and woody material; 3) sand; 4) number and boundary of cultural layer. A) cultural complexes of the early Iron Age; B) Ust' Mil' culture (Bronze Age); C) Ymyyakhtakh culture (Late Neolithic); D) Bel'kachi culture (Neolithic); E) Syalakh culture (Neolithic); F) Sumnagin culture (final stage of the Upper Paleolithic).

A wood sample from the 44th humic interlayer, lying 15 to 18 cm below the 42nd, provided a radiocarbon date of 6880 ± 70 BP (LE-857). Based on the age, this interlayer is synchronic with cultural Layer X of the Bel'kachi I site. Considering that the obtained date and the fact that the underlying 42nd humic interlayer of the deposit belongs, like that above, to the floodplain facies of alluvium, the whole cultural stratum probably was not excavated through at the Sumnagin I site. With continuation of work in the depths of the permafrost cultural remains of the age 7,000 to 9,500 years may be found.

Such conclusion is suggested by comparing the Sumnagin profile with the Bel'kachi. Though they are separated from each other by 430 km, in geological regard both profiles are very similar. This is not surprising. The cultural layers of both sites are confined to deposits of the floodplain facies of alluvium of the accumulative high floodplain of the Aldan. Of course, each of the profiles also have some differences.

In the region of Bel'kachi, the floodplain facies of alluvium of the high floodplain is characterized by the uniform alternation of rudimentary buried sods and sterile alluvial sands. The large number of humic interlayers attests to the relatively long periods of drying of the surface of the forming floodplain. In the region of Sumnagin, periods of drying were very brief. About 70% of the opened stratum at Sumnagin I is represented by alluvial sterile sands. In the Bel'kachi sites that share amounts to only 45 to 50%. The unification of such deposit is evidently concealed in the peculiarity of the hydrologic regime of some parts of the Aldan basin.

Thick sterile interlayers of sand separate the stratigraphy of the Sumnagin I site even more clearly than the stratigraphy of the Bel'kachi I site, while the great subdivision of the cultural layers permits tracing in more detail the evolution of the individual cultures.

At the Sumnagin I site, 38 cultural layers are preliminarily distinguished, separated by sterile interlayers. However, indisputable traces of human activity are noted in only 24 layers. In Layers 17 to 19, 21 to 23, 26 to 28, 30 to 34, and 37 were found only isolated split moose bones and small pieces of wood charcoal, most proba-

bly the remains of eroded hearths in the other layers. Due to this find, and keeping in mind the "deserted" layers in the profile, in time artifacts of early people also likely will be found in them. Therefore, "in advance" they are conferred the numerical order of the cultural layers, and by this they are reserved places in the stratigraphic column.

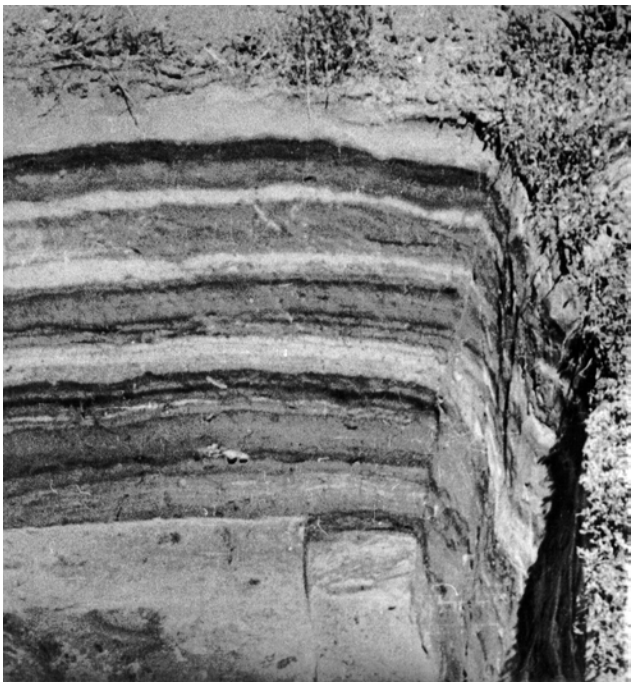

Figure 37. Character of lamination of Layers XXVIII–XXXIX of the Sumnagin I site.

The study of the materials from the Sumnagin I site indicates that, as at the Bel'kachi I site, they represent six cultural-chronological stages sequentially superceding one another (Fig. 36). To the first belong the remains of the Sumnagin Paleolithic culture. They are noted in Layers 38, 36, 35, 29, 25, 24, and 20. The second stage is represented by finds of the Syalakh Neolithic culture in Layers 16, 15, 14, 13, 12a, 12, and 11. The third stage is characterized by artifacts of the Bel'kachi Neolithic culture in Layers 10 and 9. The fourth stage is represented by the remains of the Ymyyakhtakh culture in Layers 8, 7, and 6. To the fifth stage belong the remains of the Ust' Mil' culture of the Bronze Age in Layers 5, 4, and 3. The sixth and final stage is distinguished by finds in Layers 2 and 1 that belong to the Iron Age of Yakutia.

Only materials of the Sumnagin culture are examined in the present work. Unfortunately, they are presently very few in number. Because of frequent floods, people earlier than 5,000 years ago could settle only episodically at the Sumnagin I site. Further, because of the very difficult conditions of excavating the permafrost layers, only an area of approximately 50 m^2 was uncovered below Layer 16.

In Layer 20 was found one broken knifelike blade of grayish-white banded flint. The blade is regular in form. Its top and bottom are broken. The cross section of the back on the upper part of the blade is three-faceted, on the lower part, two-faceted. The length of the blade is 3.1 cm, the width 0.7 cm (Pl. 70:7).

In Layer 24 were two flint artifacts—a knifelike blade and a combination tool on a blade. The knifelike blade was made from red flint. It has a regular edge, a two-faceted back, and small dents along both sharp edges—traces of work. It was evidently used as a cutting instrument. Although the bottom of the blade is broken, it is rather large: its length is 4.6 cm, its width 0.6 cm (Pl. 70:10). The combination tool was used as an end scraper and a lateral burin. It was made on a large red flint blade with a three-faceted back. The scraper has a steep working edge beveled to the right, worked by pressure retouch directed from ventral to dorsal. The width of the working edge of the scraper is 2 cm. The working edge of the burin was formed by the retouched plane of the working edge of the scraper and a burin spall scar 4.3 cm long and 0.4 cm wide, directed toward it at an almost right angle. On the working edges of the scraper and burin were preserved traces of intense use, having the form of the finest indentations and polish. The length of the tool is 4.3 cm, the width in the middle part 2.3 cm (Pl. 70:12).

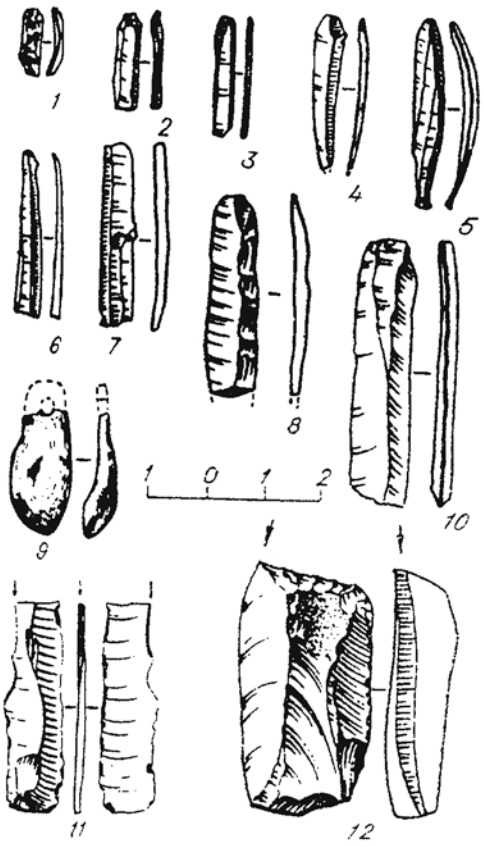

Plate 70. Sumnagin I site. Stone and bone assemblage (7 from Layer XX; 10, 12 from Layer XXIV; 11 from Layer XXIX; 6, 8 from Layer XXXV; 1–5, 9 from Layer XXXVI).

In Layer 25 was a total of one small flat flake of yellow flint. In Layer 29 was an angle burin on a white flint knifelike blade, which has the top and bottom broken. The working edge of the burin was formed by the transverse plane of the break of the blade and a burin spall scar 1.4 cm long and 0.1 cm wide, directed toward it at a right angle. On both sharp long edges of the blade there are the finest dents, reminiscent of edge retouch. The blade was evidently used not only as a burin but also as a knife. The length of the blade is 3.7 cm, the width 1.3 cm (Pl. 70:11).

In Layer 35 were two flint flakes, one flint knifelike blade, and one flint end scraper. The flakes are very small and flat. The knifelike blade has a two-faceted back and a broken bottom. The length of the blade is 3.5 cm, the width 0.5 cm (Pl. 70:8). The end scraper was made on a regular knifelike blade. The working edge of the scraper, 0.2 cm wide, is on the bottom transverse edge of the blade. It was worked by the smallest retouch directed from ventral to dorsal. The form of the working edge is convexly arced. The length of the blade is 2.8 cm, the greatest width 0.5 cm (Pl. 70:6).

In Layer 36 were found eight blades and a bone pendant. All the blades were made on red flint. They have a two-faceted back (2 specimens), three-faceted (4 specimens), and four-faceted (1 specimen). Two blades are whole. Their lengths are 2.7 and 3.2 cm, their widths 0.5 cm. The remaining blades are broken. Two of them have microdimensions, that is, a width no greater than 0.4 cm. The pendant was made from the tooth of a Siberian stag. It is slightly ground and has the remains of a penetrating hole for suspension on the lower end. The length of the pendant is 2.2 cm, the width in the middle part 1.5 cm (Pl. 70:9). This pendant is the only ornament that has been found in sites of the Sumnagin culture.

In Layer 38 were 16 diabase flakes and an axe (Pl. 71). The axe was made on a flat diabase cobble. It was worked on all sides by the removal of crude spalls. The flakes found in the layer possibly are waste material from making just this axe. The axe has small projecting ears on the butt. The length of the axe is 12 cm, the width at the butt 8 cm, the width of the working edge 4 cm.

Seven radiocarbon dates were obtained for the floodplain deposits in which the remains of the Sumnagin culture lie: for Layer 40, 6880 ± 70 BP (LE-857); for Layer 36, 6200 ± 60 BP (LE-798) and 6100 ± 50 BP (GIN-296); for Layer 33, 6280 ± 60 BP (LE-797); for Layer 24, 6360 ± 60 BP (LE-796); for Layer 20, 5960 ± 60 BP (LE-795) and 6900 ± 50 BP (GIN-295). The last radiocarbon date is clearly too early. The distortion of the age of the sample GIN-295 occurred, according to N. V. Kind's report, because of perturbation in the calculation. On the whole, the radiocarbon dates of the lower part of the stratigraphic column

from Layer 40 to Layer 20 correspond well among themselves. The individual inversions observed, with the exception of sample GIN-295, do not exceed the limits of two standard deviations.

It is very important that the date 5960 ± 60 BP (LE-795), obtained for Layer 20, corresponds well with the date of 5880 ± 60 BP (LE-794), which determines the lower chronological boundary of the Early Neolithic Syalakh culture. These dates, together with the dates of 5900 ± 70 BP (LE-678) and 5970 ± 70 BP (LE-676) for Layers 8 and 7 of the Bel'kachi I site, set the upper chronological boundary of the Sumnagin culture on the Aldan at approximately 6000 ± 100 BP.

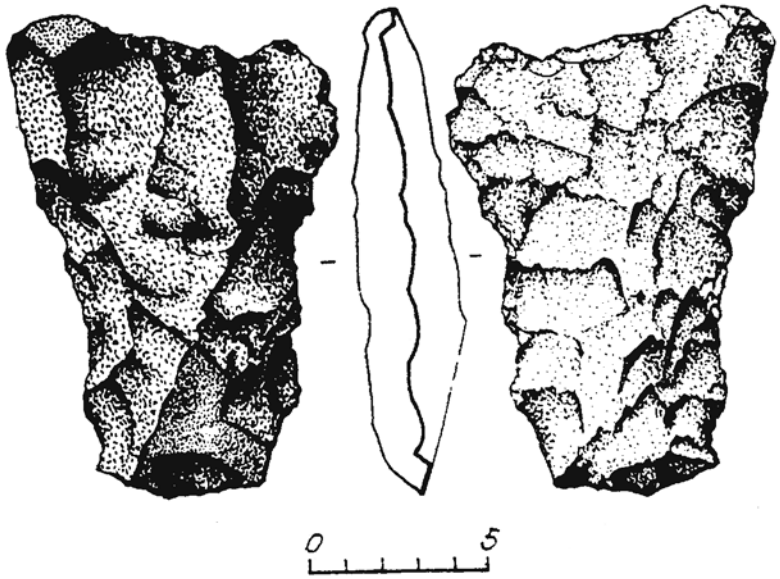

Plate 71. Sumnagin I site. Stone tool from Layer XXXVIII.

The radiocarbon dates confirm that Layers 17 to 38 can be considered synchronic with Layers 8 to 10 of the Bel'kachi I site and the upper part of Layer IVa of the Ust' Timpton site. The archaeological and geological data do not contradict this.

In spite of the small quantity of materials, the Sumnagin I site is important for studying the problem of the initial stages of human settlement of Northeast Asia. The remains of a new archaeological culture were found for the first time in clear stratigraphic context under the Neolithic layers. They have an age of about 6,000 years and have been given the name "Sumnagin."

Other Early Holocene Sites in the Aldan Valley

Besides the Bel'kachi I, Ust' Timpton, and Sumnagin I sites, the remains of the Sumnagin culture have been found in the Aldan valley in the sites of Sumnagin II, Tumulur, Alysardakh, Dyuktai Cave, Bilir, Ust' Mil', Verkhne Troitskaya, and El'dikan (Fig. 18).

The *Sumnagin II* site was discovered in 1965 during work by the PAE. The site is located on a 25-meter bedrock terrace, to which the high floodplain with the Sumnagin I site is connected (Kashin 1970; Mochanov 1969a). The remains of the Sumnagin culture in the form of pecked adzes made from longitudinally-split diabase cobbles lay in orangish-brown sandy loam at a depth of 10 to 50 cm below the ground surface. These adzes have clear analogies in Layer IV of the Ust' Timpton site. Stratigraphically they are not distinguishable from the bulk of finds belonging to the different periods from Early Neolithic to Iron Age, inclusively. Besides the mentioned adzes, pencil-shaped microcores may be assigned to the Sumnagin culture, as well as some tools from blades (punches, burins) and end scrapers on lamellar flakes.

The *Tumulur* site is located on a 13-meter terrace above the floodplain on the left bank of the Aldan, approximately 70 km below the Sumnagin I site (Mochanov 1969a). The remains of the Sumnagin culture are represented by pencil-shaped cores, inset blades, punches, pointed tools, blades with a beveled

edge, and a diabase adze. They lay in yellowish-brown sandy loam, covering a reddish loam, which contained the remains of the Dyuktai culture.

The *Alysardakh* site was discovered in 1964 during work of the Aldan Expedition. It is located on the right bank of the Aldan approximately 20 km above the mouth of the Uchur River (Mochanov 1969a). Artifacts of the Sumnagin culture in the form of small prismatic cores and various tools from blades were noted, together with the remains of later cultures in orangish-brown sandy loam directly under the sod on a terrace 14 m above the floodplain.

Dyuktai Cave. The remains of the Sumnagin culture, represented by a small number of prismatic cores and tools from blades (Pl. 72), lay in the apron of the cave in grayish loam directly above the latest finds of the Dyuktai culture.

The *Bilir* site was discovered in 1964 during work of the Aldan Expedition. It is located 60 km below the Bel'kachi I site and 17 km below Dyuktai Cave on the left bank of the Aldan (Mochanov 1969a). The cultural layers of this multicomponent site were found in diluvial sandy loam, which covers the alluvial sand of a terrace 12 m above the floodplain. Cultural Layer V, which contains the finds of the Sumnagin culture, is confined to the lower horizon of sandy loam. The loam lies in contact with the sand and is covered by a layer with the remains of the Syalakh culture. The artifacts of the Sumnagin culture are represented by flint blades, flakes, pointed instruments, and scrapers, as well as diabase flakes, knives, and skreblos.

The *Ust' Mil' I* site was discovered in 1964 during work by the Aldan Expedition. It is located on the left bank of the Aldan, 55 km below the Bilir site. The remains of the Sumnagin culture were noted here in cultural Layer III. It is a grayish-brown loam lying at a depth of about 1.5 m below the present ground surface on a 12-meter high floodplain. In the layer, covered by deposits with the remains of the Syalakh culture, were found flint blades, flakes, punches, pointed instruments, end scrapers, and blades with a beveled edge, as well as diabase artifacts, of which the most interesting is a pecked adze of the Timpton type.

The *Verkhne Troitskaya* site is located on the right bank of the Aldan 10 km above the mouth of the Maya River. The remains of the Sumnagin culture lay here in the sod horizon of the second terrace above the floodplain. Also assigned to the Sumnagin culture is a small quantity of surface material represented by chopping tools made from diabase cobbles.

The *El'dikan* site was discovered in 1964 during work by the Aldan Expedition. It is located on the right bank of the Aldan 80 km below the Verkhne Troitskaya site. Here under the precipice of a 12-meter high floodplain was an adze blank of the Timpton type, made on a split cobble of siliceous slate.

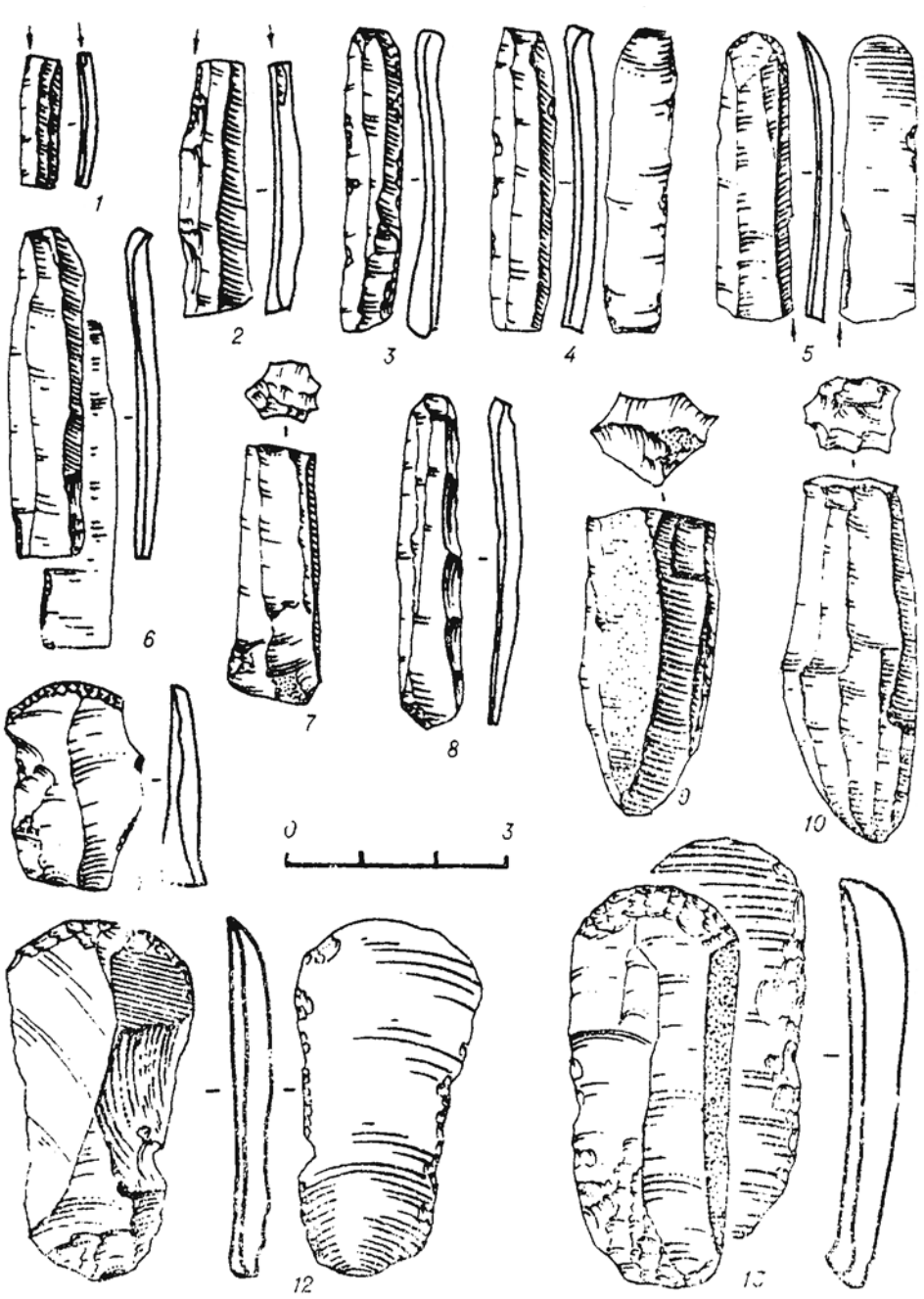

Plate 72. Dyuktai Cave. Stone assemblage from Layer V.

The Buyaga Site on the Amga River

The site is located on the right bank of the Amga, 30 km above the village of Buyaga. Early Holocene cultural remains—flint flakes and blades—were found here in 1965 by the Aldan detachment of the PAE. The remains lay in the middle part of the deposits of the 10-meter high floodplain. A flint prismatic microcore found on the left bank of the Amga, opposite the Buyaga site, can be dated to early Holocene times.

The Yakimdzha II Site on the Maya River

The Yakimdzha II site was discovered in 1967 during work by the Aldan detachment of the PAE. It is located on the right bank of the Maya approximately 682 km from the entrance of the Maya into the Aldan. Early Holocene cultural remains in the form of flint lamellar inset blades, end scrapers on flint blades, burins on flint blades and flakes, and some other artifacts lay directly under the sod in an interlayer of grayish-yellow sandy loam on a 12-meter terrace above the floodplain. S. A. Fedoseeva (1975:62), studying the archaeological complexes of the Maya, concluded:

> Materials from the Yakimdzha II site, based on most of the types, are identical with the Sumnagin complex of Northeast Asia, dated to the ninth to fifth millennium B.C. But the fragment of a bifacially retouched arrow point found here falls outside the complex and attests to mixing of the site's cultural layer and the presence of Neolithic age remains in it, possibly Bel'kachi culture.

Traces of the Sumnagin culture noted on the Maya are important due to the fact that they are located only 150 km from the Okhotsk Sea coast, suggesting that the Sumnagin people also could have taken part in the historic fate of peoples of the northern part of the North Pacific basin. Work carried out by the PAE in 1974 on the Ul'ya River showed that this was actually so.

The Amka Site on the Ul'ya River

The Ul'ya River flows from southwest to northeast between the Dzhugdzhur Range and the Primorskii Range, entering the Sea of Okhotsk at approximately 59° north latitude. The Dzhugdzhur mountains separate the Ul'ya from the Maya valley. The distance between them is only about 100 km, and the tributaries of these rivers, coming initially from the Dzhugdzhur mountains, are almost joined. Also important to note is that the Ul'ya flows its whole course along the Sea of Okhotsk, which is separated from it by only 25 to 30 km.

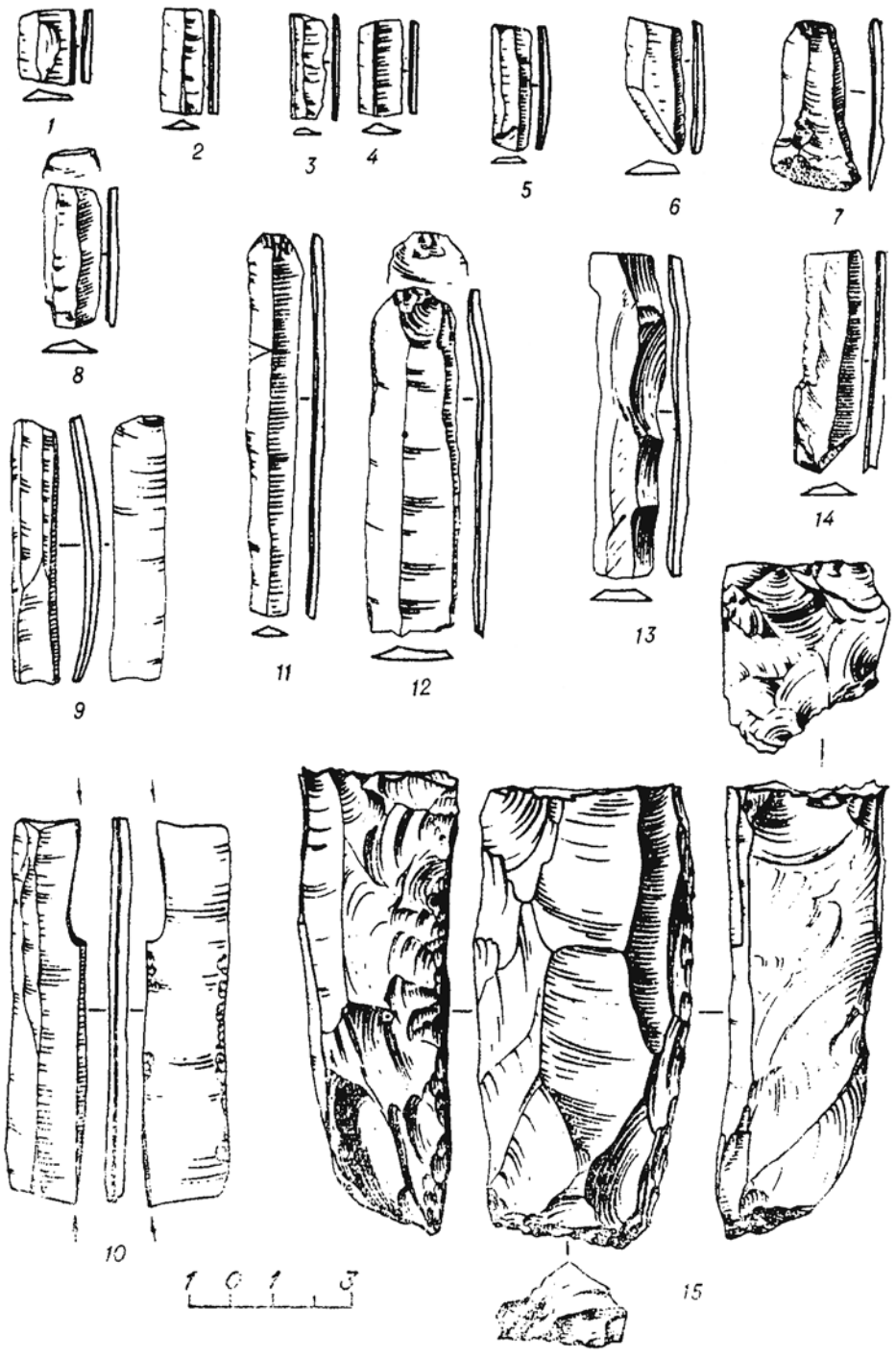

Plate 73. Amka site. Stone assemblage.

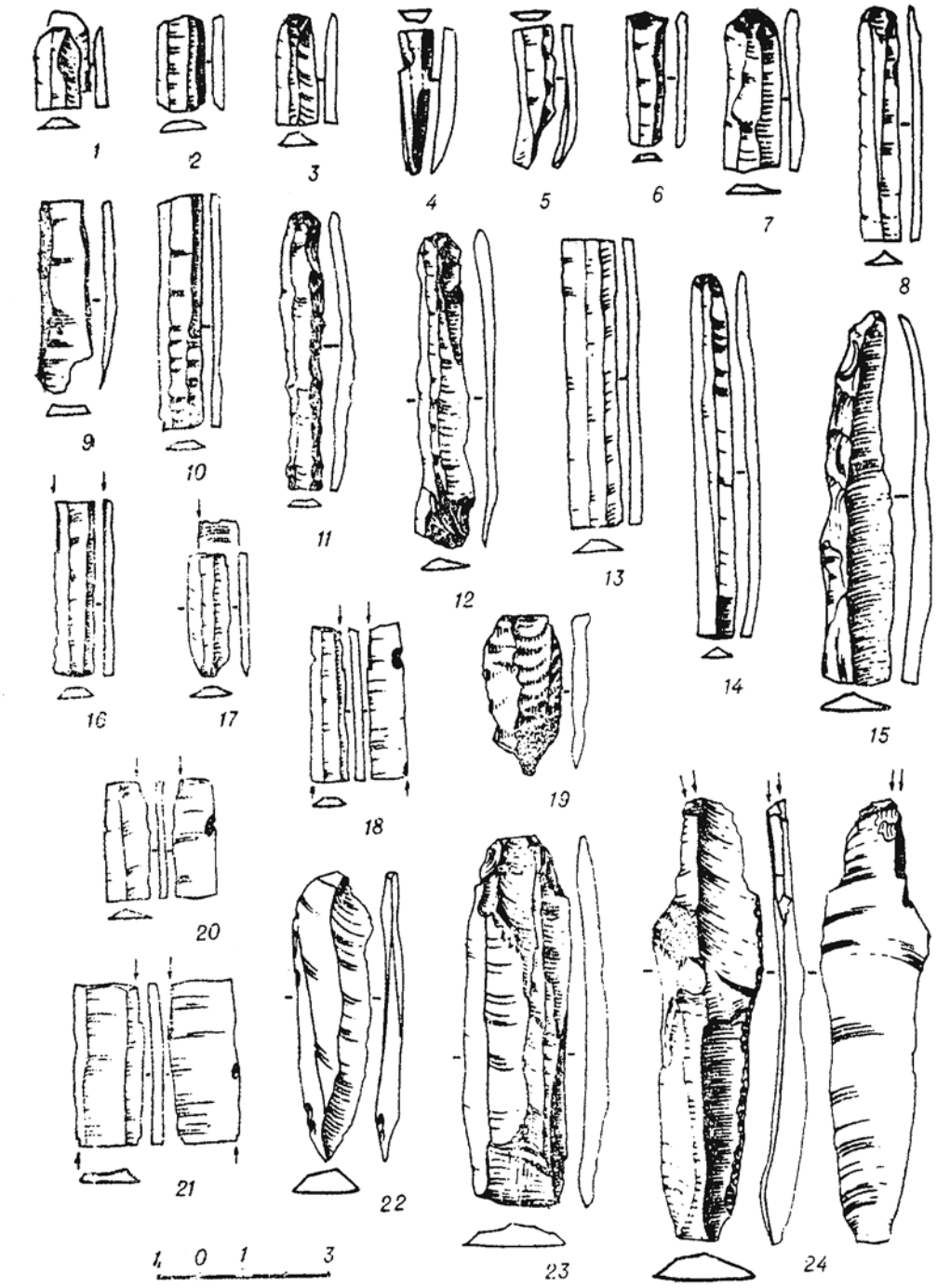

Plate 74. Amka site. Stone assemblage.

The Amka site was found by the Priokhotsk detachment of the PAE on 20 September 1974 on the left bank of the Ul'ya River, 60 km from its mouth. The layer containing the early Holocene cultural remains is represented by a yellowish-brown loam lying on channel gravels of the 8-meter bedrock terrace of the Ul'ya. In it were found a flint prismatic core (Pl. 73:15), 29 flint knifelike blades, and 9 angle burins made on flint knifelike blades (Pls. 73:10; 74:16–18, 20, 21, 24). Above these finds in a light-brown sandy loam

lay the remains of the Bel'kachi (?) Neolithic culture, and under the sod the remains of the Iron Age. Early Holocene artifacts from the Amka site, based on their technical-typological indexes, have their closest analogies in the Sumnagin sites of the Aldan. The Amka site is located almost on the coast of the Sea of Okhotsk. Seals swim along the Ul'ya in the vicinity of the site, attesting to the fact that the occupants of the site could have combined hunting taiga animals with hunting sea mammals; however, faunal remains are necessary to corroborate this theory. With the exception of several small unidentifiable burned bones, sea mammals have not been found at the site. Further study of the Amka site may provide valuable clues about the relationships of continental and maritime cultures.

Sites on the Kolyma

Early Holocene sites were discovered on the lower reaches of the Kolyma in 1970 during work by the Severo-Vostochnyi detachment of the PAE. These sites are located in the vicinity of Cherskii village, on a 20-meter terrace of the right bank near the mouth of the Panteleikha River. The latter enters the Kolyma on the right, 90 km from its mouth. Found here were 14 diachronic sites, which have the names Zelenyi Mys, Pirs, Panteleikha I–IX, and Komarok I–III. In 1946, A. P. Okladnikov discovered a site in the vicinity of Cherskii village, which he called Nizhnie Kresty, or Kresty Kolymskie. The researcher dated it to the Late Neolithic—second millennium B.C. (Okladnikov 1947b; 1955). The precise location of this site is not noted; therefore, it remains unclear whether it corresponds to one of the sites examined in 1970 or is located somewhere else.

Meanwhile, early Holocene remains are noted only in the sites of Panteleikha I–VIII and Pirs. They lie, together with the remains of the Neolithic period and early Iron Age, directly under the sod, in brownish sandy loam mixed with small rubble. The maximal depth of the deposit of the archaeological finds below the present ground surface was 15 to 20 cm.

Among the clearest indexes in the sites of the presence of Sumnagin culture remains are end scrapers on large blades and lamellar flakes of siliceous stone, worked by edge pressure retouch directed from ventral to dorsal. The tools have an ovally convex working edge and high back. The retouch most often covers only the working edge, but sometimes also runs to the lateral sides of the scrapers. The length of the scrapers fluctuates from 4.2 to 5.2 cm, the width of the working edges 2.1 to 3.2 cm. The largest number of these scrapers (7 specimens) was found in the Panteleikha III site (Pl. 75:11, 12, 17, 18). The edge of the working edge of one scraper from this site was formed in a way characteristic for Sumnagin scrapers with "ears" (Pl. 75:14). A scraper with a pointed "ear" on the end of the ovally convex working edge was also found in the Panteleikha IV site (Pl. 75:15). Scrapers on large blades were noted at the Panteleikha VIII site (Pl. 75:16, 22).

All these scrapers are analogous both in form and in technique of preparation to scrapers from the Sumnagin layers of the Bel'kachi I and Ust' Timpton sites.

Besides scrapers, present here and characteristic for the Sumnagin complex are small prismatic cores and their blanks (Pl. 75:5–7, 10, 19, 20, 23), knifelike blades, end scrapers on thin blades (Pl. 75:3), knives on blades (Pl. 75:4), and inset blades on sections of knifelike blades (Pl. 75:2, 8). However, these artifacts continued to exist in Neolithic cultures and therefore are not such a clear Sumnagin indicator as end scrapers on large blades.

In spite of the small number and stratification of the early Holocene finds on the lower reaches of the Kolyma, they are significant since at present they record the northernmost traces of the Sumnagin culture.

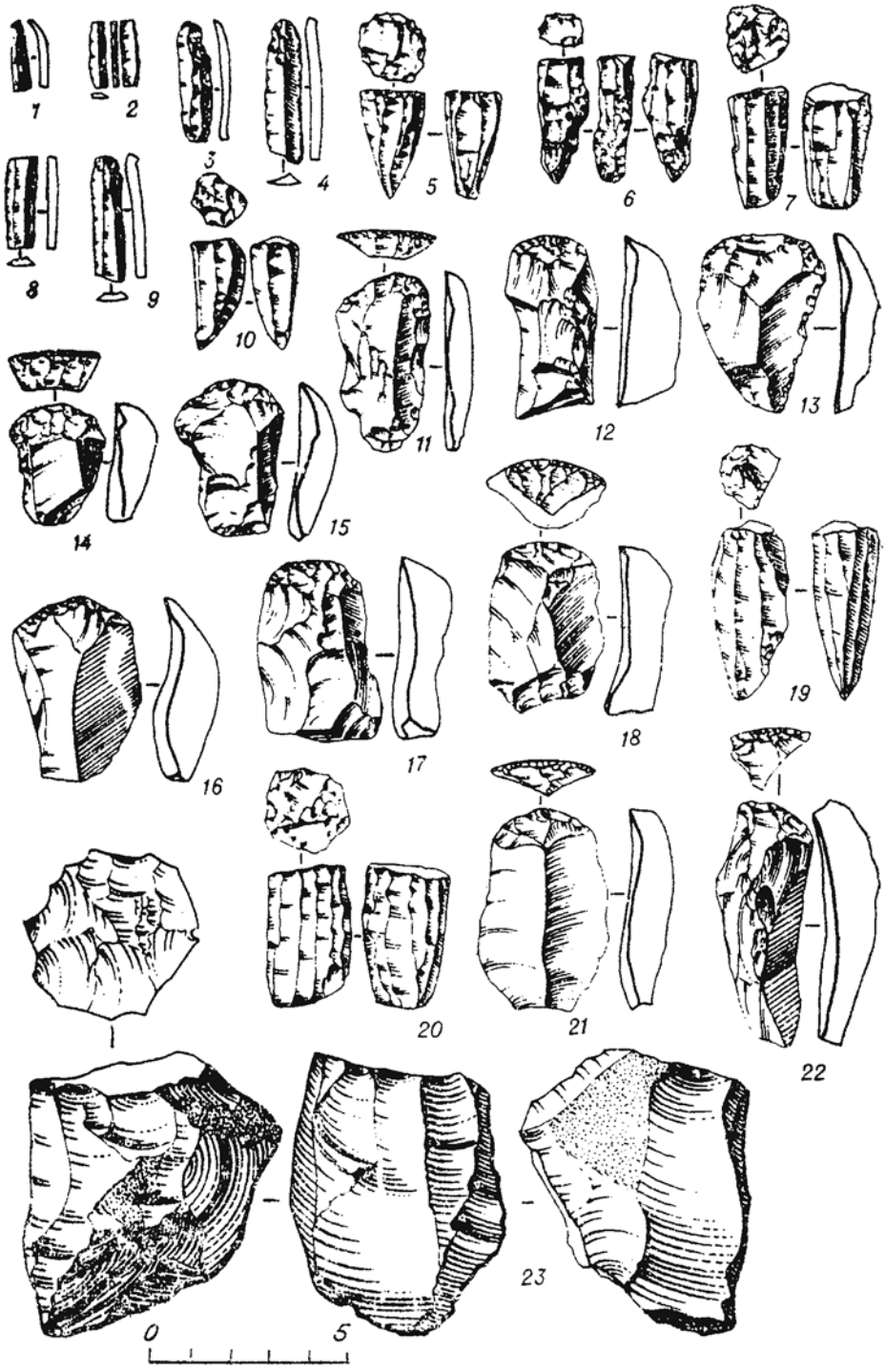

Plate 75. Early Holocene sites on the Kolyma. Stone assemblage (3, 4, 6, 7, 20 from Panteleikha I; 19, 21 from Panteleikha II; 11, 12, 14, 17, 18 from Panteleikha III; 10, 15 from Panteleikha IV; 1, 8, 9 from Panteleikha V; 5 from Panteleikha VI; 2 from Panteleikha VII; 16, 22, 23 from Panteleikha VIII; 13 from Pirs).

Sites on the Lena

Investigations by the PAE in recent years have indicated that traces of the Sumnagin culture can be found in several Lena sites discovered and described in detail by A. P. Okladnikov (1953). The sites of Shishkino, Solyanka, Nyuya, Gatamaiskaya, Tochil'naya, At-Daban, Balagannakh, and Markhachan can evidently be tentatively assigned to the Sumnagin culture. All of these sites contained various artifacts made from blades and diabase cobbles, which have analogies among materials of the Sumnagin layers of the Bel'kachi I and Ust' Timpton sites. The first radiocarbon date for the Shishkino site, located on the upper reaches of the Lena, was obtained only recently—8000 ± 700 BP (GIN-303) (Kind et al. 1972). This date, along with analysis of the archaeological material, enables us to assign the Shishkino site to one of the beginning stages of the Sumnagin culture.

The Bol'shaya Severnaya Site on the Vitim

The Bol'shaya Severnaya site is located on the right bank of the Vitim River 50 km below the city of Bogdaibo. It is confined to the outer point of the 15-meter first (?) terrace above the floodplain. The site was discovered by S. A. Fedoseeva during work by the Vitim detachment of the PAE in July 1973. The first cultural remains in the form of flint flakes, flakelets, and knifelike blades were collected on the sand-gravel towpath of the Vitim and on the ditched surface of the high floodplain.

The cultural layer, clarified during the process of excavation, was located at a depth of 15 to 18 cm below the present ground surface of the first (?) terrace. It was covered by a reddish-brown layer of sandy loam 12 to 15 cm thick and sod. The layer was confined to an upper horizon of yellowish-brown sandy loam 15 to 17 cm thick. Under it lay fine-grained gray sand.

The cultural remains were concentrated around a hearth, bordered by diabase and quartzite cobbles, many of which were cracked through fire activity. Inside the hearth and the areas adjacent to it were 3 flint flakes, 1 diabase flake, 9 flint flakelets, 3 small prismatic cores of flint and chalcedony, 1 double-end scraper on a flint flake, 117 flint knifelike blades, 13 microblades, and 52 various tools on flint blades and microblades. A total of 199 stone objects was found here in an area of 6 m^2.

The cores are represented by a cylindrical single-platform specimen, from which thin regular blades were removed around the whole circumference (Pl. 76:21); a cylindrical double-platform specimen, from which blades were removed around the whole circumference (Pl. 76:20); and a prismatic single-platform unifacial specimen (Pl. 76:31). The length of the cores is 2.2 to 2.4 cm, the diameter of the platform 0.5 to 0.8 cm.

The knifelike blades have a regular edge. There are 16 whole blades, whose length fluctuates between 1.5 and 5.1 cm. One whole microblade has a length of 1.8 cm. The width of the microblades is 0.2 to 0.4 cm (Pl. 76:4). The width of 63 knifelike blades is 0.5 to 0.7 cm (Pl. 76:15, 25, 26, 33), of 49 blades, 0.71 to 1.0 cm (Pl. 76:8, 32, 34), and of 5 blades, 1.1 to 1.5 cm.

Almost all the tools found in the layer were made on flint knifelike blades (42 specimens) and microblades (10 specimens). The tools on blades include 4 end scrapers (Pl. 76:5, 18, 19); 5 angle burins (Pl. 76:6, 10, 11, 29); 1 double angle burin (Pl. 76:12); 3 single-working edge retouched inset blades on blades (Pl. 76:7, 22); 2 single-working edge retouched inset blades on microblades (Pl. 76:1, 9); 25 unretouched inset blades on midsections of blades (Pl. 76:2, 3, 13); 8 unretouched inset blades on midsections of microblades (Pl. 76:4); 1 blade with a beveled edge (Pl. 76:14); 2 gravers (Pl. 76:16); and 1 combination tool, combining the working edges of a graver and a chisel (Pl. 76:17).

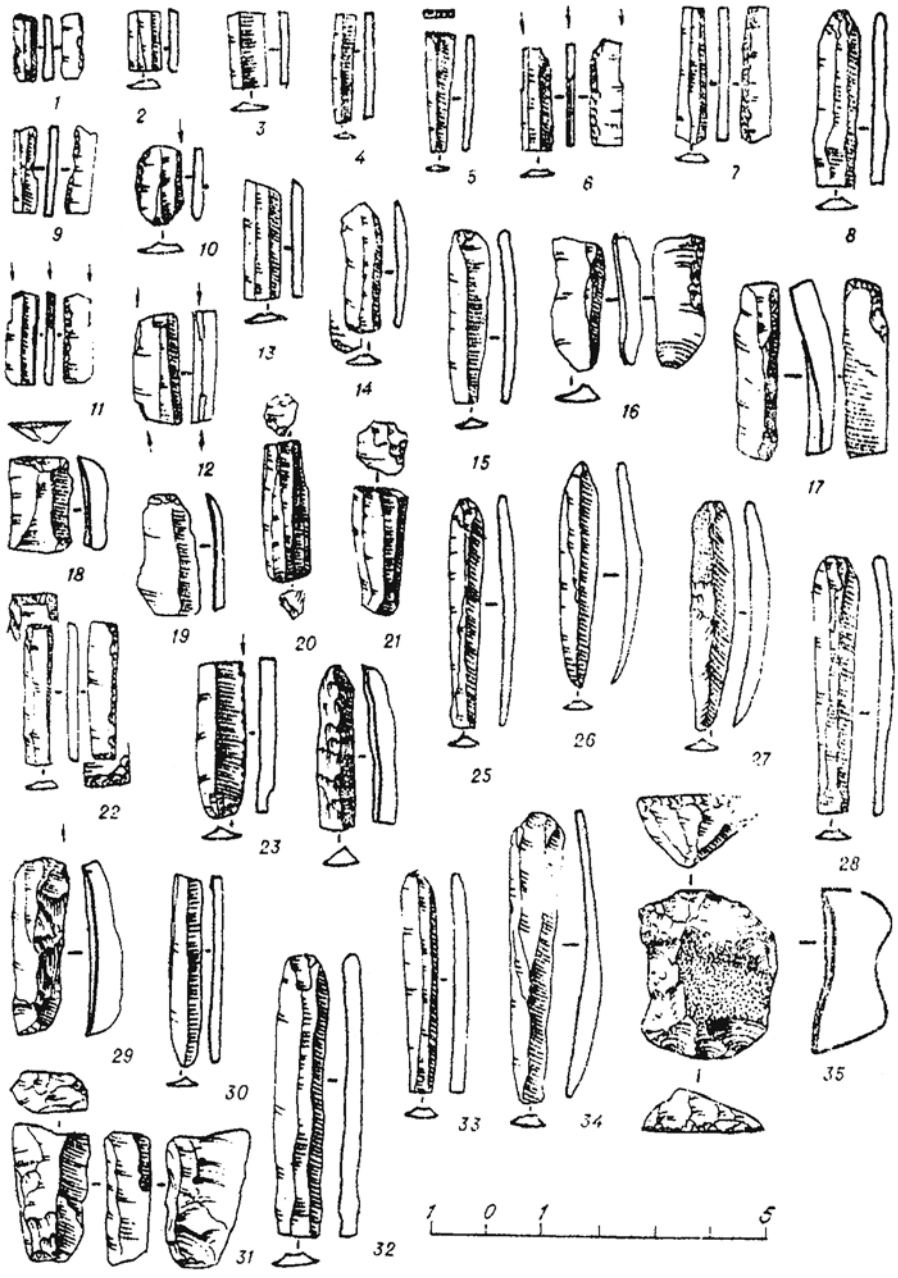

Plate 76. Bol'shaya Severnaya site. Stone assemblage.

The double-end scraper on a primary flint flake has an oval form. Both working edges of the scraper were formed by edge retouch directed from ventral to dorsal, and a pointed "ear" was made on one of them (Pl. 76:35).

Based on all the primary technical-typological indexes of the stone assemblage, the Bol'shaya Severnaya I site is a typical site for the Sumnagin culture. The materials from the site have clear analogies in Layers IX–XX of the Bel'kachi I site and in Layer IV of the Ust' Timpton site, suggesting that the age of the site is within the interval 9,000 to 6,000 years ago. More precise dating can be obtained only after additional investigations.

The Teryut I Site on the Olekma

The Teryut I site was discovered during work by the PAE in August 1975. It is located on the left bank of the Olekma River 8 km above its mouth. At the location of the site, the 20-meter Olekma terrace is cut by a small unnamed creek, which forms a deep gully. Archaeological remains in the form of stone artifacts were noted on both points at the mouth of the creek. The richest finds were made on the left point of the mouth, to which the Teryut I site is confined.

The cultural layer of the Teryut I site lies at a depth of 5 to 6 cm below the present ground surface, under the sod in yellowish-brown sandy loam 20 to 25 cm thick. The layer contained 34 stone items, including 15 cores and their blanks, 3 flakes, and 16 knifelike blades. The materials for making the cores and knifelike blades were nodules of yellowish-gray and red flint.

Both the core blanks and the finished artifacts are assigned to one type of single-platform prismatic core. The blanks have the form of three-sided or cylindrical bars, a large part of the surface of which was cleared of nodule cortex with the aid of retouch. The pressure platforms are characterized by subtriangular, oval, or trapezoidal forms. They are beveled toward the long axis of the blanks. The length of the blanks is 4.5 to 8.5 cm, the dimensions of the smallest pressure platform 2.3 x 1.2 cm, of the largest 5.3 x 3.3 cm.

Besides the primary blanks, the site contained two almost completely formed cores, from which knifelike blades of not quite regular form were removed. These are single-platform conical cores with blades removed around the whole circumference. The pressure platforms have an oval form. They are directed at a right angle to the long axis and were worked by flat pressure retouch. One core has the lateral rib partially removed, the second one has it completely removed. The length of the cores is 5.5 to 5.9 cm, the dimensions of the pressure platforms 2.5 x 1.8 cm and 3.1 x 2.3 cm.

The blades are large to very large, and have not quite regular edges. Six of them are ribbed blades and five are primary blades, on the facets of which nodule cortex is preserved. There are 15 whole blades and 1 broken one. The length of the whole blades fluctuates from 4.9 to 8.6 cm, their width from 1.1 to 2.4 cm. One of the blades has a width of 3.2 cm. On the long sides of five blades can be seen traces of use-wear in the form of small dents. Not one tool is found among the blades.

The flakes are represented by small specimens not exceeding a length of 2 cm or a width of 1 cm.

The artifacts found are typologically closest to materials from Layer IV of the Ust' Timpton site. Therefore, the Teryut I site can be tentatively dated to the eighth to fifth millennium B.C. A more precise date for it is not available.

The Ust' Chirkuo Site on the Vilyui

The Ust' Chirkuo site was discovered in 1962 by S. A. Fedoseeva on the upper reaches of the Vilyui (Fedoseeva 1968). As investigations conducted by the Severo-Zapadnyi detachment of the PAE (Fedoseeva 1972) indicated, the early Holocene cultural remains in the site were confined to the lower part of the deposits of the floodplain facies of alluvium on the high floodplain of the Vilyui, for which a radiocarbon date of 7600 ± 80 BP (LE-996) was obtained. Here were found pencil-shaped cores, scrapers, burins, and inset blades on blades (Pl. 77), as well as axes and adzes with ears (Pl. 78). Fedoseeva (1972:260) believes that these finds "based on appearance are close to materials of the Sumnagin culture, widespread in the Aldan River basin between the ninth and fifth millennium B.C." The work of the Vilyui detachment of the PAE in 1975 showed that the early Holocene cultural remains from the Ust' Chirkuo site have the clearest analogies in materials in Layer IV of the Ust' Timpton site.

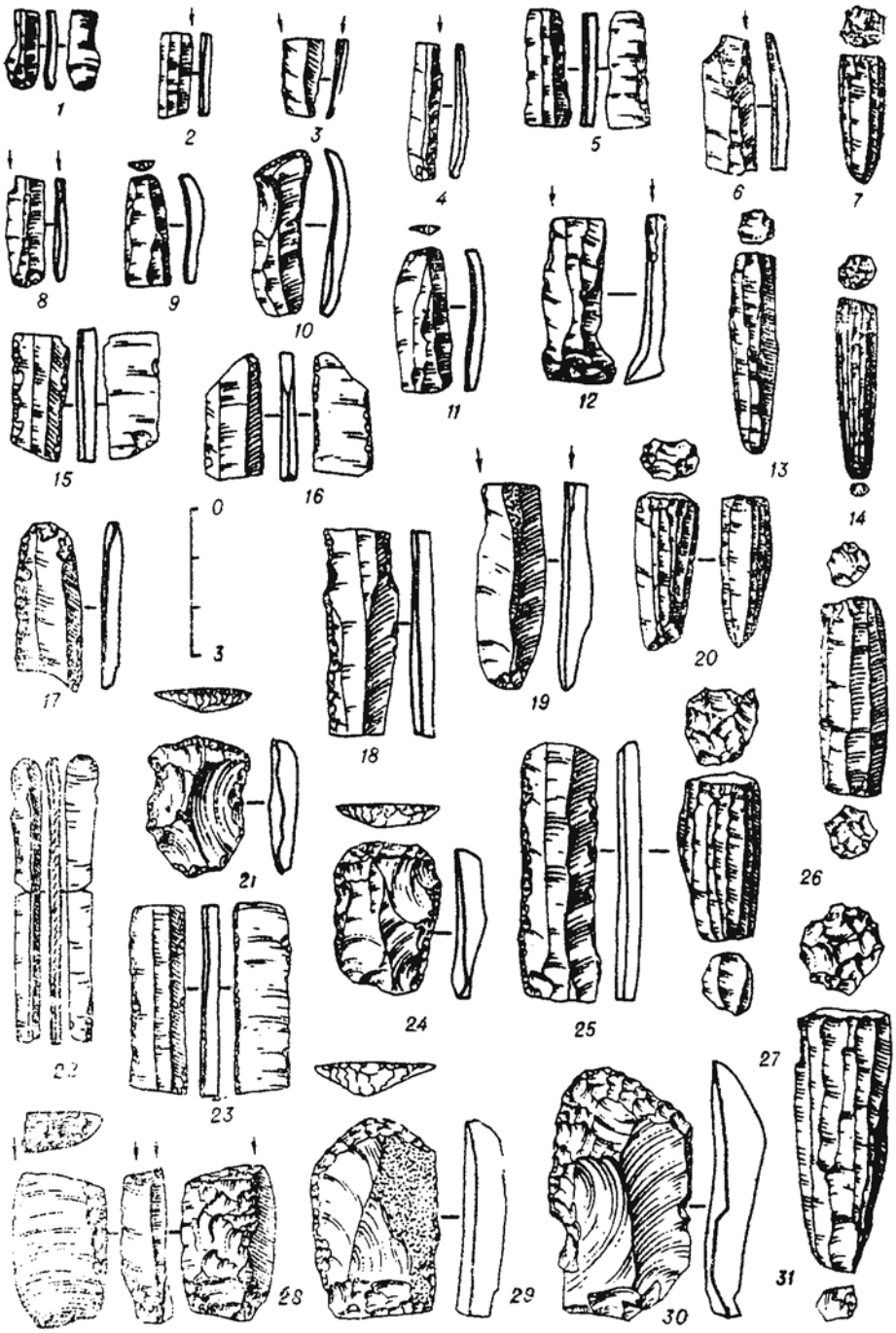

Plate 77. Ust' Chirkuo site. Stone assemblage from Layer III.

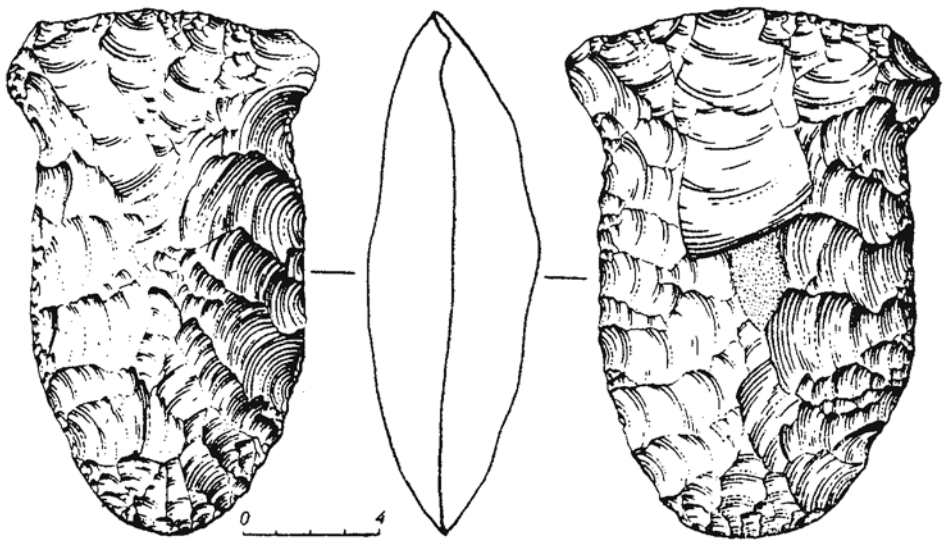

Plate 78. Ust' Chirkuo site. Stone tool from Layer III.

The sharp stratigraphy of the Ust' Chirkuo site and the wealth of archaeological material confirm that it may be a type site of the Sumnagin culture in the western part of its area.

Sites on the Taimyr

In recent years early Holocene cultural remains have been found by L. P. Khlobystin (1973a, 1973b) on the Taimyr Peninsula. They were noted in the sites of Tagenar VI and Pyasina I. Part of the assemblages from the sites of Pyasina III, Pyasina IV, Lantoshka II, and Malaya Korennaya III also may belong to the early Holocene.

The Tagenar IV site is located on the left bank of the Tagenar River 5 km from its entrance into the Volochanku River—a left-bank tributary of the Khety River. The cultural layer is located at a depth of 1.3 m from the surface of a sand dune covering the first terrace above the floodplain of the Tagenar River. Here were prismatic cores and various tools from blades, including inset blades, scrapers, and angle burins. A date of 6030 ± 100 BP (LE-884) was obtained for these artifacts. As the investigators note (Levkovskaya et al. 1972), "closest to materials from the Tagenar VI site is the assemblage from sites of the preceramic Sumnagin culture of Yakutia, in particular artifacts from Layers X to VIII of the Bel'kachi I site on the Aldan." In our view, this conclusion is correct.

The Pyasina I site is located on a 9-meter terrace on the left bank of the Pyasina River. Various artifacts on knifelike blades (inset blades, angle burins, punches, scrapers) that lay in the lower layer of the site at a depth of 10 to 24 cm below the present ground surface can be assigned to the Sumnagin culture. Today the Pyasina I site is the northwesternmost site of the Sumnagin culture.

Chapter III

STRATIGRAPHY, PERIODIZATION, AND ABSOLUTE CHRONOLOGY OF THE ARCHAEOLOGICAL SITES OF THE LATE PLEISTOCENE AND EARLY HOLOCENE OF NORTHEAST ASIA

The historical interpretation of the archaeological material of any region is possible only with a clearly founded periodization and absolute chronology of the sites of the earliest past of humanity.

Of special value for working out the periodization and absolute chronology of the early stages of the history of Northeast Asia at present are the archaeological sites of the Aldan River valley. Many of these sites lie in clear stratigraphic conditions in the alluvia of diachronic stream terraces, for the various levels of which numerous radiocarbon dates have been obtained and the faunal and floral complexes determined.

Typological analysis of materials from the archaeological sites, spread to the east of the Yenisei basin and to the north of the Amur basin, indicates that most of them have clear analogies with one or another stratigraphically distinguished cultural complex on the Aldan. The periodization and absolute chronology of the early cultures elaborated in the materials of the multicomponent sites of the Aldan can serve as a reliable standard for correlation and synchronization of the archaeological sites of a substantial area of Northeast Asia.

The Aldan River valley reveals a series of terraces, separated by clear benches: the 55–60 m terrace, 40 m terrace, 23–25 m terrace, 16–18 m terrace, 12–14 m high floodplain, 8–10 m middle floodplain, and 4–5 m low floodplain.

Archaeological work connected with excavations of large areas of the high floodplain established that at the base of the latter in several cases lay two buried terraces—the 12–13 m and the 9–10 m. These terraces were not considered in the geological literature since Quaternary geologists sometimes study terraces only with the aid of the profiles of their outer edges (Markov 1973; Rusanov 1968). This method makes it difficult to establish the true character of the deposits of the terrace in its entirety.

Work on the 12–13 m and 9–10 m terraces revealed that they had great significance for clarifying the history of development of human society, as well as flora and fauna in the final stage of the Pleistocene and early Holocene.

Considering two terraces buried under the Holocene alluvium, we tentatively propose the following order of numeration of the terraces above the floodplain of the Aldan: I: 9–10 m; II: 12–13 m; III: 16–18 m; IV: 23–25 m; V: 30 m; VI: 40 m; VII: 55–60 m. It must be conceded that with more detailed work in terraces IV–VII new buried terraces may be found.

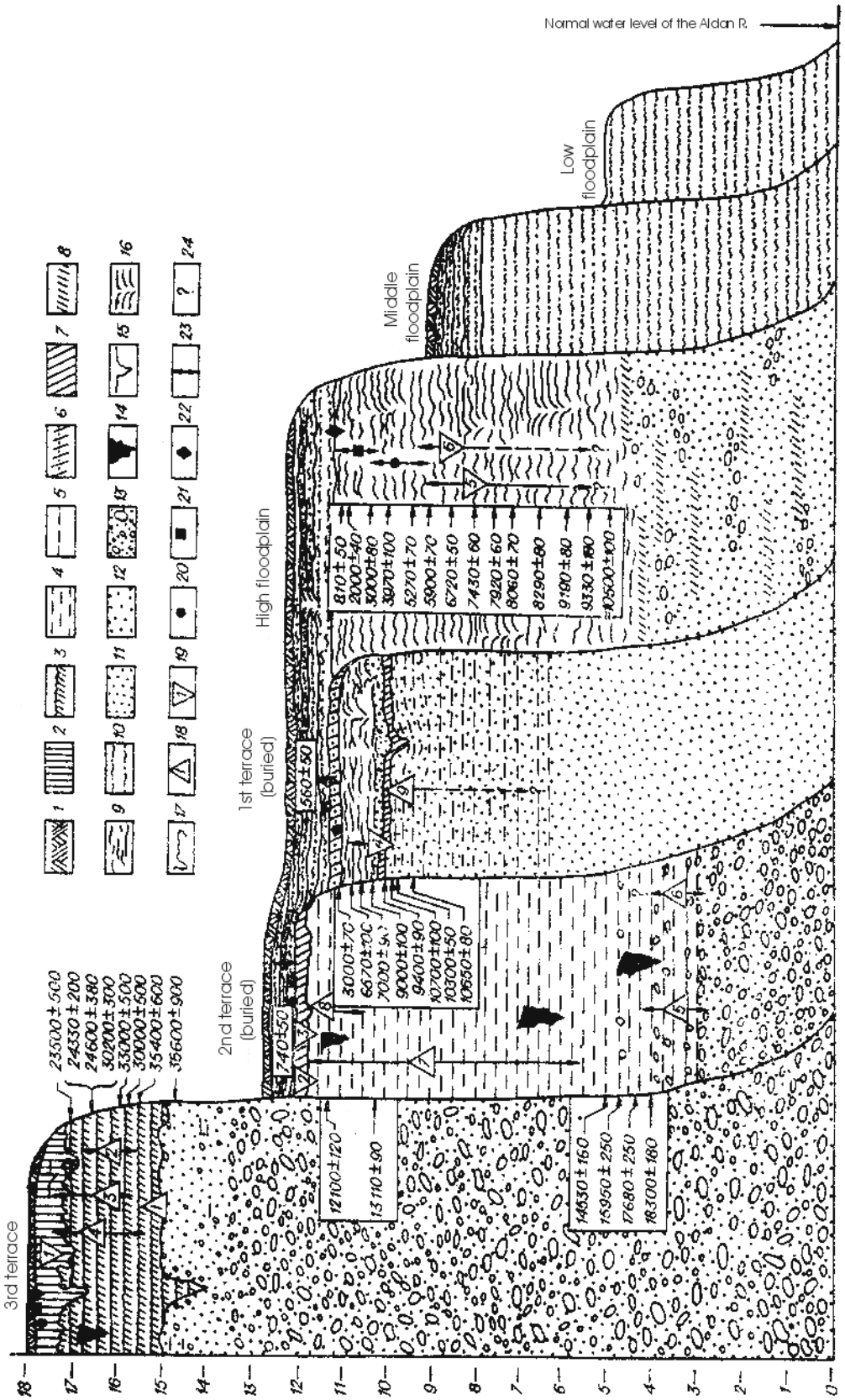
Normal water level of the Aldan R.
Low floodplain
Middle floodplain
High floodplain
1st terrace (buried)
2nd terrace (buried)
3rd terrace
23500±500
24330±200
24600±380
30200±300
33000±500
36000±500
35400±600
35600±900
12100±120
13110±90
14630±160
15950±250
17680±250
18300±180
3000±70
6670±70
7000±90
9000±100
9400±90
10700±100
10300±50
10650±80
7440±50
7560±50
810±50
2000±40
3000±80
3970±100
5270±70
5900±70
6720±50
7430±60
7920±60
8060±70
8290±80
9190±80
9330±80
10500±100

Figure 38.

At present, cultural remains have been encountered in the floodplain facies of alluvium of the high floodplain, Terraces I, II, and III, as well as the covering deposits of the terraces above the floodplain.[8]

Sites containing the remains of mammoth fauna are confined to various levels of the floodplain alluvium of Terraces II and III and the covering deposits of Terraces III to V. The sites on the Aldan, where the remains of mammoth fauna are absent, are confined to the floodplain facies of alluvium of Terrace I and the high floodplain, as well as to the covering deposits of Terraces I to VI.

Based on the first stratigraphic observations, the sites confined to the floodplain facies of alluvium of the higher terraces must have been earlier sites than those lying in the floodplain alluvium of the lower terraces.

The earliest archaeological sites today are confined to the floodplain alluvium of Terrace III, which is well defined on the Aldan. Its elevation fluctuates from 15 to 20 m above river level. As a rule, the thickness of the floodplain alluvium of this terrace, represented by horizontally laminated yellowish-gray loam or argillaceous sandy loam, is very thin. It does not exceed 2 to 2.5 m. The sites of Ezhantsy, Ust' Mil' II, Ikhine I, and Ikhine II are confined to these deposits (Fig. 38). Profiles of these sites reveal that above the floodplain alluvium lie rather thick covering deposits represented by reddish-brown loam or sandy loam.

Palynological analysis of the deposits of the Ezhantsy, Ust' Mil', and Ikhine I sites permitted A. I. Tomskaya and G. M. Savvinova to conclude that the three studied profiles contain basically the same spore-pollen spectra. The low content of pollen of woody and shrubby plants and the domination of spores in the spectra of the studied profiles attest, in the opinion of Tomskaya and Savvinova (1975), to a cold climate during their formation. However, during the glacial periods the freezing was no greater than it is now. The climate of the glacial epochs was evidently less continental than today: the summer periods were not as warm and dry, and the winter periods not as cold but with a large amount of atmospheric moisture.

The sites confined to the deposits of Terrace III of the Aldan are also very similar in the faunal assemblages collected from them, revealing not only the bones of mammoth, bison, and horse, but also woolly rhinoceros (Table 4).

Notable in the archaeological material from these sites is the combination in a single complex of large cobble subprismatic cores, small wedge-shaped cores, and bifacial artifacts.

Figure 38. Schema of the structure of the lower terraces in the Aldan River valley and the stratigraphic position of the archaeological type sites. 1) sod; 2) covering loam; 3) horizontally laminated alluvial loam; 4) horizontally laminated alluvial sandy loam; 5) thin interlayers of loam; 6) humic sandy loam (buried soil); 7) humic loam (buried soil); 8) lenses of loam; 9) horizontally laminated silty sands and sandy loam with woody material; 10) horizontally laminated sands and sandy loam with woody material; 11) inequigranular sands; 12) large-grained sands; 13) pebbles and gravels with sand; 14) ice veins; 15) soil veins of fill; 16) soil veins of diffraction; 17) traces of solifluction; 18) upper Pleistocene Paleolithic sites [1) Ezhantsy; 2) Ust' Mil' I, II; 3) Ikhine I; 4) Ikhine II; 5) Verkhne Troitskaya (Layers Vb, VI); 6) Nizhne Troitskaya; 7) Dyuktai Cave; 8) Tumulur; 9) Ust' Timpton (Layers Vb, VI)]; 19) early Holocene Paleolithic sites [1) Ust' Mil' I, II; 2) Verkhne Troitskaya; 3) Dyuktai Cave; 4) Ust' Timpton (Layers IV–V); 5) Bel'kachi I; 6) Sumnagin I]; 20) Neolithic sites; 21) Bronze Age sites; 22) early Iron Age sites; 23) vertically distribution of cultural remains; 24) presumed levels of distribution of cultural remains.

[8] As a rule, all the archaeological sites on the Aldan, as well as those in the remaining part of Yakutia and Chukotka, which have cultural layers situated at a depth of 1 m (and sometimes only 0.3 to 0.5 m) below the present ground surface, are found in permafrost deposits, often including ice veins. Excavations of these sites require substantial work and material means, which must be taken into account when planning archaeological work in Northeast Asia.

Table 4. Species composition of bone remains of animals in the Paleolithic sites of Northeast Asia.

Animal species	**Dyuktai Cave**					**Ust'-Mil' II**			**Ikhine I**		
	VIIa	**VIIb**	**VIIc**	**VIII**	**IX**	**"A"**	**"B"**	**"C"**	**I**	**II**	**III**
Woolly rhinoceros	–	–	–	–	–	–	3	1	–	1	–
Mammoth	24	4	7	621	132	4	7	2	1	3	1
Bison	2	1	3	3	6	3	–	5	3	8	3
Horse	1	4	9	–	2	9	–	7	1	4	2
Muskox	–	–	–	1	–	1?	–	–	–	–	–
Reindeer	32	1	2	3	4	3	–	–	2	5	–
Moose	33	3	–	5	–	–	–	–	–	–	1
Red deer	–	–	–	–	–	–	–	–	–	–	–
Snow sheep	4	6(?)	–	3	–	–	–	–	–	–	–
Cave lion or tiger	–	3	–	6	–	–	–	–	–	–	–
Wolf	4	–	–	4	–	–	–	–	–	–	–
Fox	9	5	–	3	1	–	–	–	–	–	–
Arctic fox or fox	–	–	–	14	–	–	–	–	–	–	–
Arctic fox	12	12	1	16	6	–	–	–	–	–	–
Hare	38	11	20	61	66	–	–	–	–	–	–
Collared lemming	–	–	17	1	–	–	–	–	–	–	–
Brown lemming	–	–	7	3	1	–	–	–	–	–	–
Various rodents	39	32	191	38	21	–	–	–	–	–	–
Various birds	2	–	4	24	23	–	–	–	–	–	–
Various fish	2	–	–	7	3	–	–	–	–	–	–
Unid. split bone	1429	545	2309	2958	1081	7	4	8	1	9	3
Total bone	1631	627	2570	3771	1346	27	14	23	8	30	10

Animal species	Ikhine II					Ezhantsy	Verkhne Troitskaya	Berelekh
	I	IIa	IIb	IIc	IId			
Woolly rhinoceros	–	4	5	2	1	9	3	7
Mammoth	–	7	4	–	9	8	8	78
Bison	6	50	58	14	29	8	23	3?
Horse	5	71	50	14	43	20	9	–
Muskox	–	–	–	–	–	–	–	–
Reindeer	–	16	6	2	10	10	2	1
Moose	–	1	–	–	–	–	–	–
Red deer	–	–	–	–	1?	–	–	–
Snow sheep	–	–	–	–	–	–	–	–
Cave lion or tiger	–	–	–	–	–	–	–	–
Wolf	–	–	–	–	1	–	1	–
Fox	–	–	1	–	–	–	–	–
Arctic fox or fox	–	–	–	–	–	–	–	–
Arctic fox	–	–	1	–	–	–	–	–
Hare	–	–	–	–	–	–	–	827
Collared lemming	–	–	–	–	–	–	–	–
Brown lemming	–	–	–	–	–	–	–	–
Various rodents	–	–	–	–	–	–	–	–
Various birds	–	–	–	–	–	–	–	92
Various fish	–	–	–	–	–	–	–	2
Unid. split bone	–	105	75	32	–	360	3	10
Total bone	11	254	202	64	94	415	49	1003

The most numerous and diagnostic Paleolithic remains were confined to the deposits of Terrace II. In most of the archaeologically investigated areas of the Aldan, the terrace is buried under alluvial Holocene deposits (Fig. 38). The thickness of the floodplain facies of Terrace II fluctuates in the various denuded areas from 2 to 6 m. The alluvium is represented by a grayish-brown sandy loam with horizontal layers of sand and interlayers of humic sandy loam. The alluvial deposits often have traces of frost deformations. In some profiles the ends of ice veins can be observed.

The uppermost floodplain facies of alluvium is not laminated and differs from the humus above. This horizon is evidently connected with the end of the accumulation of Terrace II. However, the covering deposits in Terrace II, with the exception of the Tumulur site, were very poorly preserved. These deposits probably were eroded by high flood waters, which, judging by the Sumnagin finds lying on the eroded surface, took place at the beginning of the Holocene. The thickness of the early Holocene alluvium on Terrace II is insignificant—0.1 to 0.3 m.

About 1,000 years ago the level of the flood waters of the Aldan sharply increased. As a result, a rather thick layer (0.7 to 1.1 m) of recent alluvium was deposited on Terrace II and on all the lower terraces, in the bottom of which lay finds of the early Iron Age. This late Holocene alluvium sometimes also lies on parts of Terrace III (Fig. 10:2).

The sites of Verkhne-Troitskaya, Nizhne-Troitskaya, Dyuktai Cave, Tumulur, and Ust' Mil' II (Horizon A) are confined to the floodplain facies of alluvium of Terrace II on the Aldan.

By comparing materials from these sites with the materials from the sites confined to the deposits of Terrace II of the Aldan, we note that the bones of woolly rhinoceros were recorded only in the Verkhne-Troitskaya and Nizhne-Troitskaya sites, that is, only in the bottom of the floodplain alluvium. The bones of mammoth were encountered in the lower and middle parts of the alluvium. In its uppermost part (Dyuktai Cave apron, Horizon A) no bones of mammoth were found, with the exception of a piece of tusk. The bones of bison and horse were noted throughout the whole thickness of the alluvium.

Bifacially worked stone spear points and knives were encountered in all the sites confined to the alluvium of Terrace II. A laurel-leaf biface spear or dart point occurred in the top of the alluvium. One small willow-leaf biface, reminiscent in size and form of a Neolithic arrowhead, was found in Layer VIIa at Dyuktai Cave.

Terrace I of the Aldan, similar to Terrace II, is in a buried state. Its deposits have been studied only at the Ust' Timpton site. A horizontally laminated parcel of alternating bluish or beigish loams and beigish-grayish sands (approximately 10 m thick) was discovered there, which probably represented the alluvium of the facies of a fluvial shoal. In the top of this parcel (Layer VI) lay the remains of the terminal stage of the Dyuktai culture. These remains also were encountered in the lower horizon (Layer Vb) of eroded soil of Terrace I. Unfortunately, no faunal remains have been recorded, with the exception of several small fragments of moose bone, together with the Dyuktai stone artifacts in the deposits of Terrace I. Because of this, the precise boundary of disappearance of the mammoth, bison, and horse remains unclear.

The accumulated high floodplain is very widespread on the Aldan. Its floodplain alluvium is represented by a horizontally laminated parcel of alternating dark-brown humic loams or sandy loams and yellowish-grayish sands. The thickness of this parcel reaches 7 m. At its bottom lie the remains of the Paleolithic Sumnagin culture, and above them, in turn, the remains of the Neolithic Syalakh, Bel'kachi, and Ymyyakhtakh cultures, the Ust' Mil' Bronze Age culture, and the cultural complexes of the early Iron Age. No mammoth, bison, or horse bones were encountered in any Aldan profile in the floodplain alluvium of the high floodplain. The fauna was primarily represented by the bones of moose and reindeer, which also are encountered in the deposits of Terraces I to III, as well as roe deer, the bones of which are absent from sites of the Dyuktai culture.

On the basis of the stratigraphic data we propose the following periodization for the sites of the late Pleistocene and early Holocene of the Aldan (Fig. 38):

1. Ezhantsy, Ikhine I (Layer III).

2. Ust' Mil' II (Horizon C), Ikhine II (Layer IId).

3. Ust' Mil' II (Horizon B), Ikhine I (Layer II), Ikhine II (Layers IIc and IIb).

4. Ikhine II (Layer IIa).

5. Verkhne-Troitskaya, Nizhne-Troitskaya (?).

6. Dyuktai Cave (Horizon C).

7. Dyuktai Cave (Horizon B).

8. Dyuktai Cave (Horizon A), Ust' Mil' II (Horizon A).

9. Ust' Timpton (Layers VI and Vb).

10. Ust' Timpton (Layer Va).

11. Ust' Timpton (Layer IVb).

12. Ust' Timpton (Layer IVa), Bel'kachi (Layers XX–XI).

13. Bel'kachi I (Layers X–VIII), Sumnagin I (Layers XXXVIII–XVII).

Of the archaeological sites of Northeast Asia of late Pleistocene and early Holocene age found outside the Aldan valley, the clearest stratigraphy is presently found in the sites of Berelekh: alluvium of Terrace II of the Berelekh River; Avdeikha: alluvium of the 22-meter terrace of the Vitim River; Kukhtui III: alluvium (?) of the 25-meter terrace of the Kukhtui River; Makarovo II (Layers III, IV): alluvium of Terrace II of the Lena River (Aksenov 1972); Makarovo III: alluvium of Terrace III of the Lena River (Aksenov 1972); Chastinskaya: alluvium of the 10-meter Terrace (II–?) of the Lena River (Okladnikov 1953); Ushki: alluvium of the 4-meter Terrace (I–?) of the Kamchatka River (Dikov 1969a; Shilo et al. 1967); Ust' Chirkuo (Layer VI): lower part of the alluvium of the high floodplain of the Vilyui River (Fedoseeva 1968, 1972); Amka: alluvium of the 8-meter terrace of the Ul'ya River.

The remaining sites, judging by the preliminary data, are confined to covering deposits of various floodplain terraces or are represented by surface finds on a towpath.

In examining the absolute date of late Pleistocene and early Holocene archaeological sites of Northeast Asia, the stratigraphic data can help to determine the relative chronology of archaeological sites and corresponding historical stages only of local regions. To correlate and synchronize archaeological sites of regions distant from each other, a detailed elaboration of the absolute chronology, based on criteria independent of local conditions, is necessary.

Establishing the absolute chronology of the Paleolithic period is especially complicated. In the first report on the Paleolithic of Northeast Asia, one of the founders of Siberian Paleolithic studies, G. P. Sosnovskii (1934), wrote: "Only a multifaceted interdisciplinary study of the Paleolithic sites of Siberia (data on the geology, fauna, flora, and tool industries) can serve as a basis for dating them."

This position remains indisputably true even today. Researchers studying an archaeological site try to maximally use all the data. Besides recording and collecting artifacts of people, soil samples to determine lithology are taken and spore-pollen analysis carried out, any geological manifestation in the profile is recorded, and faunal remains are collected. But even the most scrupulous analysis of all these data yields only the approximate age of a site. Even more difficult is a comparison between the sites of distant

regions. The succession of tool industries, fauna, and flora, as well as terrace, soil, and forest formation, and permafrost manifestations in various regions can differ in substantial degree.

The way out of this impasse was found only in recent years, when the data of absolute geochronology, and especially radiocarbon dates, enabled the dating of archaeological sites.

The PAE turned special attention to the collection of samples for radiocarbon dating in the first years of its work. As a result, more than 100 radiocarbon dates, including about 70 for late Pleistocene and early Holocene sites, have now been obtained for the various archaeological sites of Northeast Asia.

Radiocarbon dates as a rule have corresponded well with stratigraphic dating (Fig. 38). The earliest dates were obtained for sites confined to the deposits of the floodplain facies of alluvium in Terrace III of the Aldan. They indicate that the accumulation of the floodplain alluvium of Terrace III began approximately 35,000 BP (evidently at the end of the Malokhetsk stage of the Karginsk Interglacial) and ended 23,000 to 22,000 BP (at the end of the Lipovsk-Novoselovsk stage of the Karginsk Interglacial).

The accumulation of deposits of the floodplain facies of alluvium in Terrace II of the Aldan occurred most probably from 23,000 to 22,000 BP (at the end of the Lipovsk-Novoselovsk stage of the Karginsk Interglacial) to 13,000 to 12,000 BP (Kokorevsk Interstadial of the Sartan Glaciation). The beginning of accumulation of the floodplain alluvium of Terrace I of the Aldan was probably confined to this interstadial, the buildup of which concluded 10,500 BP (at the Pleistocene-Holocene boundary). At this time a new cut of the Aldan evidently occurred and the accumulation of the floodplain facies of alluvium of the modern high floodplain began.

The last substantial cut of the Aldan, judging by data from the profile at the Ust' Timpton site, took place approximately 4,000 BP. A "dampening" of the accumulation of alluvium in the high floodplain occurred at this time and deposits of the floodplain facies of alluvium of the modern middle floodplain began to be formed.

About 1,000 BP, everywhere from the upper reaches of the Aldan to the mouth, a substantial increase in the level of flood waters occurred. In some areas they presently reach 14 to 15 m above mean water level. As a result, on the high floodplain, as well as on Terraces I and II, a rather thick (to 1 m) parcel of superimposed late Holocene alluvium was deposited, most often represented by humic sandy loams and very eroded inequigranular sands. Sometimes late Holocene superimposed alluvium also lies on the slopes of Terrace III.

The radiocarbon dates that do not differ from the geological and archaeological chronological criteria suggest that the sites of Ezhantsy and Ikhine I (Layer III) have an age of approximately 35,000 years; Ust' Mil' II (Horizon C) and Ikhine II (Layer IId), 35,000 to 31,500 years; Ust' Mil' II (Horizon B), Ikhine I (Layer II), and Ikhine II (Layers IIc and IIb), 31,500 to 25,000 years; Ihine II (Layer IIa), 25,000 to 23,000 or 22,000 years; Verkhne-Troitskaya, 23,000 or 22,000 to 18,000 years; Dyuktai Cave (Horizon C), 16,000 to 15,000 years; Dyuktai Cave (Horizon B), 15,000 to 13,000 years; Dyuktai Cave (Horizon A), Ust' Mil' II (Horizon A), and Tumulur, 13,000 to 12,000 years; Ust' Timpton (Layers VI–Vb), 11,000 to 10,500 years; Ust' Timpton (Layer Va), 10,000 to 9,500 years; Ust' Timpton (Layer IVb), 9,500 to 8,500 years; Ust' Timpton (Layer IVa) and Bel'kachi I (Layers XX–XI), 8,500 to 6,500 years; Bel'kachi I (Layers X–VIII) and Sumnagin I (Layers XXXVIII–XVII), 6,500 to 6,000 years.

The absolute chronology of the archaeological sites of the Aldan was based on radiocarbon dates calculated on a half-life of C^{14} equal to 5568 ± 30 years. A half-life for C^{14} equal to 5730 ± 40 years is now considered more precise. For correction of all the available dates we can increase them by the coefficient 1.03 (Serebryannyi 1965). Based on this correction, the chronological boundary between the Dyuktai culture and the Sumnagin should be determined at 10,800 ± 100 years, and the boundary between the Sumnagin and the subsequent Neolithic Syalakh culture, at 6,200 ± 100 years.

With this estimate of the absolute age of the archaeological cultures, the radiocarbon dates, calculated on the basis of W. F. Libby's position of the constancy of concentration of C^{14} in the earth's atmosphere, are rather young for a significant segment of the Holocene, as indicated in the works of many researchers (Suess 1969). Comparison of these dates with the "Suess curve," plotted using the annual rings of the bristlecone pine for the last 7,000 years, permits a corresponding correction, thereby bringing the age of the radiocarbon dates close to the calendric (true) age. If we use the "Suess correction," the age of the Sumnagin culture will be approximately 10,800 to 7,000 BP.

Until the "Suess scale" is accepted as the international standard for conversion of all radiocarbon dates available in the world, the reexamination of local dates is premature. Meanwhile, it is necessary to use the Suess as a working (corrective) scale, especially when comparing the radiocarbon chronological column with chronological columns constructed on the basis of dendrochronology and the written data.

To establish the absolute chronology several radiocarbon dates were obtained for some late Pleistocene and early Holocene archaeological sites of Northeast Asia located outside the Aldan valley. For the Berelekh site the radiocarbon dates fall within the interval 13,000 to 12,000 years. The date 10,600 ± 90 BP (LE-998) is evidently too young since, with a repeat measurement of this sample radiocarbon dates of 12,930 ± 80 BP (GIN-1021) and 13,420 ± 200 BP (IM-152) were obtained, which correspond well with the age of the samples LU-147 and LU-149 (Fig. 15).

Cultural Layers III and IV of the Makarovo II site on the upper Lena yield the following dates: 11,400 ± 500 BP (GIN-480b); 11,860 ± 200 BP (GIN-480a); 11,950 ± 50 BP (GIN-481); and for the Shishkino site, 8,000 ± 700 BP (GIN-303).

The dates 12,900 ± 300 BP (GIN-1022) and 15,200 ± 300 BP (IM-236), obtained on charcoal taken from the top of Horizon S of the Avdeikha site, confirm that the upper parcel of the floodplain alluvium of the 22-meter terrace of the Vitim River accumulated during the second half of the Sartan Glaciation.

For the Paleolithic horizons of the Ushki sites, which are presumably connected with the alluvium of (buried?) Terrace I above the floodplain of the Kamchatka River, dates of 14,300 ± 200 BP (GIN-?); 13,600 ± 250 BP (GIN-167); 21,000 ± 900 BP (GIN-186); and 10,360 ± 350 BP (MO-345) were obtained. The stratigraphy of this site is poorly understood. Pending additional control work, we suggest that the Paleolithic layers of the site, given the appearance of the stone industry and the radiocarbon dates, are connected with the alluvium of the eroded and buried terrace of the Kamchatka River, which, based on the time of formation, most probably corresponded to Terrace I of the Aldan River. From our point of view, the most probable age of the Paleolithic layers of the Ushki site fall within the interval 12,000 to 10,000 BP.

Unfortunately, the absolute age of the Chastinskaya site remains unclear. As noted above, the very few finds in the Paleolithic layer of this site are connected with the upper stratum of alluvium on the 9- to 10-meter Terrace (II-?) of the Lena. The Chastinskaya site can most probably be assigned to the second half of the Sartan Glaciation.

The radiocarbon dates of sites with the cultural layers confined to deposits of the floodplain facies of alluvium on river Terrace II of such regions distant from each other as the upper Lena, the Aldan, and the Berelekh suggest a synchroneity of stages of formation, at least of the lower terraces in the substantial territory of Northeast Asia.

This suggestion is supported by examination of radiocarbon dates of some sites of the Yenisei and Angara. Radiocarbon dates within the interval 15,000 to 12,000 BP were obtained for sites on the Yenisei that were located in the middle and upper parcels of floodplain alluvium on Terrace II. A date of 20,900 ± 300 BP (GIN-117) was determined for the site of Afontova Gora II (lower horizon), the

deposits of which are considered synchronic with the final stage of accumulation of the fluvial gravels of Terrace II of the Yenisei.

The dates 9800 ± 500 BP (GIN-483) and 8960 ± 60 BP (GIN-96) were obtained for the Ust' Belaya site, confined to the upper stratum of the floodplain alluvium on Terrace I of the Angara. The date 10,900 ± 50 BP (GIN-30d) was obtained for the Oshurkovo site, the cultural layers of which are connected with Terrace I of the Selengi River.

A radiocarbon date of 7600 ± 80 BP (LE-996) was obtained for the lower part of the floodplain deposits of the high floodplain of the Vilyui. All these dates correspond well to the radiocarbon dates of the Aldan.

The recorded facts attesting to the synchroneity of the stages of terrace formation in regions quite far from each other suggest that in the nearest future, relying on the data of the stratigraphy, radiocarbon dates, and "pure" cultural complexes, we will be able to build a reliable periodization and absolute chronology of earliest history of Northeast Asia and, on this basis, proceed to a historical interpretation of the archaeological material.

We already can propose the first working schema of periodization for the earliest stages of Northeast Asia (Table 5). The schema offers some observations of great significance for correlation and synchronization of the late Pleistocene and early Holocene archaeological sites of the different regions of Northeast Asia.

(1) No remains of mammoth, bison, horse, and muskox are encountered on the Aldan in sites with an age younger than 12,000 years, nor any remains of woolly rhinoceros in sites younger than 18,000 (Table 4). Beginning approximately 10,500 years ago, the primary animal that people hunted on the Aldan was the moose, and to a lesser degree reindeer, red deer, roe deer, and brown bear (Table 1). Fishing did not play an essential role in the life of the population of the Aldan either in the Pleistocene or the early Holocene.

(2) Bifacially worked tools appeared on the Aldan, based on available data, about 35,000 BP. At least 23,000 or 22,000 to 18,000 BP bifacially worked knives and spear points already existed on the Aldan. The same tools, based on the technique of manufacture, were used on the Aldan until the end of the Pleistocene. They were also encountered at the sites of Ushki, Kukhtui III, and Berelekh. Berelekh has the same cultural material as on the Aldan, but is accompanied by mammoth fauna. In the concluding stage of the Dyuktai culture (the top of Horizon A of Dyuktai Cave and the Ushki sites) small willow-leaf bifaces appeared (Pls. 2:1; 30:1, 2, 7, 8, 14), which, judging by the size, form, and technique of preparation, could have been used as arrowheads (?).

(3) No site on the Aldan, confined to the Holocene deposits of the age 10,500 to 6,000 years and characterized by clear stratigraphy, has presently produced even one bifacially worked knife or point of a spear, dart, or arrow.

(4) Wedge-shaped cores appeared on the Aldan about 35,000 years ago and existed to the end of the Pleistocene. They have not been recorded in any Holocene site with clear stratigraphy. Wedge-shaped cores in several sites are accompanied by large subprismatic cores, which were often made from cobbles.

(5) The earliest pencil-shaped cores are presently recorded on the Aldan in deposits dating to 10,500 to 9500 BP. They have not been encountered in any Pleistocene sites.

(6) "Cobble" tools such as biface and uniface choppers are not characteristic either for the Pleistocene or for the early Holocene sites of the Aldan.

(7) Approximately 10,500 to 9500 BP typologically diagnostic flaked stone axes and adzes come into use on the Aldan for the first time. They were most often made from whole or split cobbles. These finds indicate that at least 9,500 to 8,500 years ago axes and adzes with ears were known on the Aldan. They are also encountered in the early Holocene deposits of the Ust' Chirkuo site on the Vilyui. Until the work of the PAE archaeologists believed that such artifacts appeared in Siberia no earlier than 5,000 years ago.

(8) The first serial types of ground stone tools and ceramics appear on the Aldan about 6,000 years ago; bronze artifacts about 3,000 years ago; and iron artifacts about 2,000 years ago.

Table 5. Schema of periodization and correlation of Paleolithic sites of Northern Eurasia and North America

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Climate-Stratigraphic Subdivisions (after Kind 1974); in thousands of years				Archaeological periodization for Northeast Asia			Archaeological type sites of Northeast Asia	Radiocarbon dates (half-life of C^{14} 5568±30 years; age of samples relative to 1950; in thousands of years
				Epoch	Stage	Culture		
Holocene	Upper			Early Iron Age				2.1 ± 0.1 – 0.7 ± 0.1
				Bronze Age				3.1 ± 0.1 – 2.1 ± 0.1
				Neolithic				6.0 ± 0.1 – 3.1 ± 0.1
	Lower			Upper Paleolithic	Latest	Sumnagin	Sumnagin I (38 – 17) Bel'kachi I (20 – 8) Ust' Timpton (5a – 4a)	10.5 ± 0.2 – 6.0 ± 0.1
Upper Pleistocene	Sartan Glaciation	Late Phase	Noril'skaya stage 10.3±0.1 – 11.4±0.2		Late	Dyuktai	Ushki (6 – 5) Ust' Timpton (6 – 5b) Ushki (7 - ! - ?)	10,360 ± 350 (MO-345) 10,740 ± 100 (LE-861) 13,600 ± 250 (GIN-167) 14,300 ± 200 (GIN-?)
			Taimyrskoe warming ~11.8 - 11.4				Kukhtui III (! - ?) Berelekh (¡ - ?)	12,930 ± 80 (GIN-1021) 11,830 ± 110 (LU-147) 10,600 ± 90 (LE-998) 12,240 ± 160 (LU-149) 13,420 ± 200 (IM-152)
			Cooling (?)				Avdeikha (B)	
			Kokorevskoe warming 13 - 12.2				Ust' Mil' II (A) Dyuktai Cave (A) Tumulur (! - ?)	12,200 ± 170 (LE-953) 12,100 ± 120 (LE-907) 13,200 ± 250 (GIN-405)
		Early Phase	N'yapanskaya stage ~15 - 13				Avdeikha (C - ¡ - ?) Dyuktai Cave (B)	13,070 ± 90 (LE-784) 14,000 ± 100 (GIN-404) 12,690 ± 120 (LE-860) 13,110 ± 90 (LE-908)
			Interstadial ~16 – 15				Dyuktai Cave (C - ¡ - ?) Maiorych (! - ?) Ust' Dyktai I (! - ?)	
			Gydanskaya stage ~22 - 16		Middle		Nizhne Troitskaya (! - ?) Verkhne Troitskaya	17,680 ± 250 (LE-906) 18,300 ± 180 (LE-905)
	Karginsk Interglacial		Lipovsko-Novoselovsk warming ~30 - 22		Early		Ust' Mil' II (B) Ikhine II (2 – a, b, c) Ikhine (2)	23,500 ± 500 (LE-999) 24,600 ± 380 (IM-153) 30,200 ± 300 (GIN-1019) 31,290 ± 500 (GIN-1020)
			Konoshel'sk cooling ~33 - 30				Ust' Mil' II (C) Ikhine II (2 – d)	33,000 ± 500 (LE-1000) 30,000 ± 500 (LE-1001) 35,400 ± 600 (LE-954)
			Malokhetsk warming (optimum) ~43 - 33				Ezhantsy, Ikhine I (3)	
			Early cooling ~45					
			Early warming >50 - 45					
	Zyryansk Glaciation ~80 - >50							
	Kazantsev Interglacial ~200/150-80							

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Geological-Geomorphological Conditions of the Bedding of the Archaeological Sites of North-east Asia	Fauna (the primary objects of the hunt)										Vegetation (modern taiga zone
						+	+	+	+	+	Larch-pine forest with fir and birch (modern zonation)
Covering deposits of flood plain terrace Upper part of RTA of the high flood plain						+ +	+ +	+ +	+ +	+ +	
Covering deposits of flood plain terrace Lower part of RTA of the high flood plain						+	+	+	+	+	
Upper part of RTA (?) 1st (?) buried (?) Kamchatka terrace								+			Forest-tundra
Upper part of RTA (?) 1st (?) buried Aldan terrace Lower part of RTA (?) 1st (?) buried (?) Kamchatka terrace											
Lower part of RTA of the 25-meter Kukhtui terrace Middle part of RTA of the 2nd Berelekh terrace	+ +		+? +			+ +					
Upper part of RTA 22-meter Vitim terrace					+						
Superposed alluvium on the slope of the 3rd Aldan terrace Top of the RTA of the 2nd Aldan terrace Top of the RTA of the 2nd (?) Aldan terrace	+ +		+ +	+?	+ +	+ +		+ +			
Middle part of the RTA of the 22-meter Vitim terrace Upper part of the RTA of the 2nd Aldan terrace	+ +		+ +	+ +	+ +	+ +		+ +			
Middle part of the RTA of the 2nd Aldan terrace Exposed top of the FA of the 14-meter Kolyma terrace Colluvium on the 4th Aldan terrace	+		+		+	+					
Lower part of the RTA of the 2nd Aldan terrace Lower part of the RTA of the 2nd Aldan terrace	+ +	+ +	+ +		+ +	+ +					
Upper part of the RTA of the 3rd Aldan terrace Upper middle part of the RTA of the 3rd Aldan terrace Upper middle part of the RTA of the 3rd Aldan terrace	+ + +	+ + +	+ +		+ +	+ +		+ +			
Middle part of the RTA of the 3rd Aldan terrace Lower part of the RTA of the 3rd Aldan terrace	+ +	+ +	+ +		+ +	+ +	+?				
Contact of the RTA and FA of the 3rd Aldan terrace	+	+	+		+	+		+			Larch-pine forest with fir and birch
Abbreviations: RTA – river terrace alluvium; FA – fluvial alluvium. Territory of Central and South America.	*Mammuthus primigenius*	*Coelodonta antiquitatis*	*Bison priscus*	*Ovibos moschatus*	*Equus caballus*	*Rangifer tarandus*	*Cervus elaphus*	*Alces alces*	*Capreolus capreolus*	*Ursus arctos*	Forest-tundra Birch-pine-larch forest

Table 5 (cont.).

SIBERIA		NORTH AMERICA			EUROPE	
Some Paleolithic type sites of southern Siberia, Kazakhstan, Mongolia, and northern China	Radiocarbon dates; thousands of years	Climatic-stratigraphic subdivisions	Archaeological sites	Radiocarbon dates; thousands of years	Climatic-stratigraphic subdivisions	Some lines of development in the Paleolithic
Early Iron Age		Holocene			Holocene	
Bronze Age						
Neolithic			Anangula	8.4 ± 0.3		
Ust' Belaya (4 – 3)	8.9 ± 0.1		Galagher Flint (! -?)	10.5 ± 0.1		
Ust' Belaya (13)	9.8 ± 0.5					
Ust' Belaya (16 – 15)	10.9 ± 0.1; 24	Valders	Akmak (! - ?)	9.8 ± 0.2	Upper Dryas	Azil
Sosnovyi Bor (3)			Denali (! - ?)	10.2 ± 0.3		
Oshurkovo			Dent	11.2 ± 0.5		
Sosnovyi Bor (6 – 4 ! - ?)	11.9 ± 0.2; 11.4 ± 0.5	Two Creeks	Murray Springs	11.2 ± 0.3	Allered	Svider
Makarovo 2 (3)			Lener	11.2 ± 0.3		
Makarovo 2 (4)	11.9 ± 0.1		Fells Cave*	11.3 ± 0.2		
Tashtyk I (upper)	12.2 ± 0.1	Interstadial	Ventana Cave	11.3 ± 1		
Verkholenskaya Gora (3 - ! - ?)	12.6 ± 0.2		Clovis	11.3 ± 0.2		
			Lucy Cave (! - ?)		Middle Dryas	
			Sandia Cave (! - ?)			
			Tuli Springs		Belling	
				13.9±0.2; 12.4±0.2		
Golubaya I (3)	13.0 ± 0.1	Late Woodford	Fort Rock Cave	13.2 ± 0.7	Lower Dryas	
Zabochka (2)	13.3 ± 0.1; 12.9 ± 0.3	Cary interstadial	Pikimachay Cave*	14 ± 0.2	Raunis	
Zabochka (3)	14.4 ± 0.1	Middle Woodford	Wilson Butte Cave	14.5 ± 0.5	Pomerantsevsk	
Kipernyi Log (upper)	14.3 ± 0.3					
Kipernyi Log (lower)	15.5 ± 0.3	Eri interstadial			Lasko interstadial	
Telezhnyi Log (! - ?)	13.3 ± 0.1; 12.7 ± 0.1	Early Woodford	Valsequillo* (??)	21 ± 0.8	Primary stage of the late Wurm (Brandenburg, Borovsk)	Magdelene Solutre
Afontova Gora II (lower)	20.9 ± 0.3					
Mal'ta (! - ?)	23 ± 5; 14.7 ± 0.1					
Ottson Maint (! - ?)		Plum Point (Farmdale) interstadial	Tlapacoya* (?)	23 ± 1	Paudorf interstadial (Bryansk)	
Shuidungou (A – B - ! - ?)			Old Crow (??)	27 +3/-2		
Makarovo 3 (! - ?)						
Krasnyi Yar (7 – 6)						
		Southwold			Brendon (mid-dle Valday)	Aurignac Perigore
Ust' Kanskaya Cave		Port Tolbot 2 interstadial			Khengelod ("Grazhdansk pr.)	Selet
						Blatsintsen
		Daunuich			Fledberi	
		Port Tolbot 1 interstadial			Moerskhovd interstadial (Tatishchevsk)	
		Early Wisconsin (Alton)			Early Wurm (Kalininsk) glacial	Mousterian
Tarkhai (! - ?)		Sangamon interglacial			Eyemsko-Mikulinsk interglacial (Riss-Wurm)	Pre-Mousterian
Dzagandir; Yarkh (! - ?)						
Dintsun'; Zhaman Aibat 4 – 5 (! - ?); Sary Ark (! - ?); Man-gyshlak (! - ?); Mysovaya (! - ?)						Upper Acheu-lean

Chapter IV

THE DYUKTAI CULTURE (35,000–10,500 YEARS AGO) AND THE INITIAL STAGES OF SETTLEMENT BY PEOPLE OF NORTHEAST ASIA

The originality of the discoveries in the Pleistocene deposits of archaeological sites of Yakutia permitted archaeologists even from the very beginning of the investigations to isolate a distinct Paleolithic culture of Northeast Asia, which was called "Dyuktai" (Mochanov 1969b, 1969c).

This culture has received wide recognition among specialists, both in Russia (Okladnikov 1970a; Khlobystin 1973c; Abramova 1975) and abroad (Powers 1973; Smith 1974). However, study of the Dyuktai culture is far from complete. The Dyuktai culture is perhaps the most recent discovery among Paleolithic cultures of the world. Excavations of sites of the Dyuktai culture, as a rule lying at a great depth in the permafrost layer, require significant expense in time and energy. In addition, the surveys that the PAE conducts in various regions of Northeast Asia (Fig. 1) result almost every year in discoveries that sometimes bring essential amendments to the idea of the earliest past of this large region, located at the juncture of the Old and the New Worlds. Hence we can offer only the most general preliminary characteristics of the Dyuktai culture, many aspects of which will undoubtedly need subsequent revision.

The earliest Upper Paleolithic sites that can be preliminarily related to the Dyuktai culture are the Ezhantsy and Ust' Mil' II sites on the Aldan. The age of these sites is 35 to 30 thousand years. In them have been found the earliest bifacially worked flint artifacts (bifaces) in Northeast Asia together with the bones of mammoth, woolly rhinoceros, bison, and horse (Pls. 9:7; 15:20). The biface from the Ezhantsy site is exceptionally important in that it is almost indistinguishable in form and technique of manufacture from the bifacially-worked oval stone knives found in the Upper Paleolithic horizon of Dyuktai Cave.

Characteristic for early sites of the Dyuktai culture is the combination in a single cultural complex of large subprismatic cobble cores (Pl. 18:7, 8), which in the primary stage of manufacture are reminiscent of uniface choppers, and small wedge-shaped cores (Pl. 15:6, 12). The latter sometimes are almost indistinguishable in form, dimension, and technique of manufacture from multifaceted middle and lateral burins. In one complex isolated cobble skreblos (Pl. 16:26) and small scrapers on flakes (Pl. 16:12) also can be found. The Ezhantsy site contained a typical tortoise-shaped Levallois core (Pl. 17:6); similar artifacts have not been found in later Paleolithic sites of Northeast Asia.

In the stone assemblage of the Ezhantsy site a variety of burins, which make up more than half the tools, are notable. They are represented by the corner type on flakes and blades, as well as end, transverse, and dihedral types on flakes. The last are often finished by taking off a few burin spalls. Such a wealth and variety of burins have not been noted in other Paleolithic sites of Siberia.

The sites of Ikhine I and Ikhine II on the Aldan are dated to an age of 35,000 to 30,000 years. In view of the small amount of material preserved in them, the question of cultural association of these sites

remains open. However, the presence in the Ikhine I site of an elongate wedge-shaped core of the "Gobi" type with two retouched lateral faces suggests that this site and the Ikhine II site, with the same age, could be related to the Dyuktai culture. A core analogous to the Ukhine one was found in the Dyuktai complex at the Verkhne Troitskaya site.

At present the Dyuktai culture is characterized most fully by the complexes with an age of 20,000 to 11,000 years. Judging by the materials from the Verkhne Troitskaya site, at least 20,000 to 18,000 years ago the Dyuktai people began to make distinct bifacially-worked spear points (Pl. 20:7). They are most completely represented by specimens that belong to the terminal stage of the Dyuktai culture at the Tumulur site (Pl. 22:5, 6) and Dyuktai Cave (Pl. 3:1; 7:7) on the Aldan.

A comparison of Upper Pleistocene archaeological sites on the Aldan with sites of the same age found in other regions of Northeast Asia indicates that the northernmost Paleolithic site in the world, Berelekh, on the lower reaches of the Indigirka, now can be assigned to the Dyuktai culture (Pls. 24–27), as can the sites of Avdeikha on the Vitim, Leten Novyi on the Olekma (Pl. 23), and Kukhtui III on the northwestern coast of the Sea of Okhotsk (Pl. 28). The bifaces from these sites are close in form and technique of manufacture to specimens of the Dyuktai sites on the Aldan.

Some artifacts from Levels V and VI of the Ushki I, II, and IV sites in Kamchatka also can be related to the Dyuktai culture (Pl. 30). Examining these artifacts, the investigator of the Ushki sites, N. N. Dikov, notes that "a particular Late Paleolithic culture, the Dyuktai, was discovered on the Aldan. We evidently discovered its continuation in Kamchatka" (Dikov 1971b:191).

However, the question of the cultural and chronological association of the materials of Level VII of the Ushki site remains. Dikov (1969b) thinks they represent one of the earliest Paleolithic cultures in Siberia, which was preserved in relict form only in Kamchatka, where it has an age of 14,000 years. Unfortunately, the stratigraphy of the Ushki sites is by no means reliable. No attention was given to permafrost deformation of the deposits during the process of excavation, nor to the presence of Neolithic pithouses and storage pits that cut through the Paleolothic level. Therefore, manifestly Paleolithic artifacts (for example, wedge-shaped cores) are found here in the latest Neolithic levels. At the same time, typically Neolithic artifacts can be found among materials of the Paleolithic complexes isolated by Dikov. Stemmed arrow points, which, according to Dikov, are characteristic for the "early Upper Paleolithic culture of Kamchatka," could fall into (Paleolithic) Level VII of the Ushki I site from (Neolithic) Level III of this site. Perhaps for this reason Dikov cannot find analogies to the mentioned arrow points in any of the Paleolithic sites of Siberia and the Far East. These discrepancies urge caution in the use of the Ushki Paleolithic materials for different ethnocultural construction.

The stratigraphic position of the Paleolithic sites, radiocarbon dates, spore-pollen spectra, and faunal remains confirm that the Dyuktai people lived in the region of Northeast Asia 35,000 to 10,500 years ago under conditions of periglacial forest-steppe and forest-tundra landscapes and were typical hunters of mammoths, woolly rhinoceros, bison, horse, reindeer, and some other animals.

Paleogeographic data and the geographic location of Paleolithic sites (especially such as the Avdeikha, Berelekh, Kukhtui III, and Ushki sites) confirm that the mountain valley glaciers in the Upper Pleistocene were not insurmountable barriers for the wide settlement of human populations throughout the territory of Northeast Asia.

As a rule, sites of the Dyuktai culture found in Northeast Asia are located on the banks of rivers and are confined to points of land at the mouths of streams. The cultural remains in these areas are represented primarily by the tool-making assemblage and kitchen refuse, which is concentrated in a thin accumulation around small cooking areas. No artificial pits connected with the construction of dwellings were found in the sites. Evidently, the Dyuktai people lived in surface dwellings, using trunks and branches of trees to construct them. Some observations at the Berelekh site suggest that they might have used the bones of mammoths for this same purpose, but this suggestion needs serious examination.

The stone assemblage, represented primarily by artifacts of flint, hornfels, quartzite, and some other types of stone, dominates the cultural remains of the Dyuktai people.

Most often various types of cores are found in the sites. These are represented by large subprismatic cobble specimens with oval cross section (Pls. 18:7; 21a:10); flattened unifacial subprismatic specimens made from thin slabs of flint (Pls. 8:10; 10:10; 21a:3), subdiskoid specimens (Pls. 4:11; 23:6), and a variety of wedge-shaped specimens (Pls. 2:4; 4:8; 11:8; 15:18).

Tools include bifacially worked oval and semilunar knives (Pls. 3:2; 20:8), leaf-shaped and subtriangular points of spears and darts (Pls. 3:1; 22:4, 9; 23:9, 10; 24:29); scrapers (Pls. 11:5; 16:12); skreblos (Pl. 6:14); corner, lateral, transverse, and dihedral types of burins (Pls. 5:1–3; 9:4; 10:4; 16:17–25; 21b:2, 3); and inset blades on lamellar blades (Pls. 13:3; 19:2). Single finds are represented by a punch (Pl. 16:1); chisel-like tools (Pls. 11:4; 19:7); and points of spears made from large blades with an asymmetrically beveled base (Pl. 8:6). A variety of forms and sizes of flakes and blades, as well as flat slabs of siliceous stone, served as blanks for making the tools.

Among the bone tools in the sites are found points of spears or darts from flakes of mammoth tusk (Pls. 5:9; 24:38), skreblos from flakes of mammoth tusk (Pls. 25:6; 26:4), polishers of mammoth rib (Pl. 25:8), billets ("mallets") of reindeer antler (Pl. 5:15), and awls and needles of split bone of various animals (Pl. 19:1). To date the richest site in bone artifacts is Berelekh.

Ornaments make up a special group in the assemblage. These are represented by perforated pebbles, some having notches along the edges (Pl. 24:7–9). Ribs and fragments of mammoth tusks with traces of notches and grooves were found in small quantity. Especially interesting are fragments of mammoth tusks with clear traces of geometric patterns (Pl. 25:7). Its technique for applying these geometric patterns is quite close to the engraving of the unique representation of a mammoth (Pl. 27) on a fragment of mammoth tusk found in the vicinity of the Berelekh site (Bader 1972). Very likely the representation of a mammoth published by O. N. Bader is related to the cultural complex of the Berelekh site. This find brings hope that with continued work in the Dyuktai sites a variety of works of art will be discovered that will help elucidate the spiritual life of the Paleolithic population of Northeast Asia.

Comparing Dyuktai sites with Paleolithic sites of adjoining regions is most significant for determining the place of the Dyuktai culture in the Stone Age and resolving problems of the initial stages of human settlement of Northeast Asia.

Analysis of cultural complexes from Upper Paleolithic sites of Northeast Asia reveals that the largest quantity and often the only remains of human activity—stone tools—are represented in the complexes by a variety of objects prepared from blanks of various forms (flakes, blades, and individual rounded and not rounded pieces of stone) by various technical methods. As a result, the tools of some sites are characterized by work either only along the edge or additionally along some parts of the flat surfaces adjacent to them. At other sites artifacts are completely worked by flattening percussion and pressure retouch on all sides. The most significant of them are bifacially worked points of spears and knives (bifaces) of various forms. The presence or lack of these bifaces sharply distinguishes the stone assemblage of the different sites from each other and suggests that they are related to two distinct Paleolithic cultural traditions or, as they are sometimes called, lines of development.

These two traditions highlight cultural commonalities of the first order for the Paleolithic of Siberia. In turn, each of them, by the sum of the basic technical-typological indexes of the stone assemblage from the sites that are related to them, is subdivided into several local cultures (commonality of the second order),[9] represented, most probably through recruitment of distinct tool types, by certain cultural variants (commonality of the third order).[10]

[9] The distinctiveness of some cultures is certainly not determined just by the appearance of the stone tools. However, at present for the Paleolithic of Northern Asia, with the exception of Mal'ta, Buret, and some other sites, we have practically no other in-

Sites of the tradition for which bifaces are not characteristic are presently the most investigated. The local Mal'tan, Afontova, Kokorev, Srostkin,[11] Oshurkov, and Sannomys cultures can be assigned to this tradition. Obviously, in due course their number will increase.

For all the distinctiveness of each of these cultures, similarity can be traced between them as well. Thus, Z. A. Abramova (1966:55) notes the similarity of the Oshurkov culture with the Kokorev "both in technique of working stone and in types of cores and tools," as well as with the Afontova (Abramova 1970:16). At the same time Abramova (1972:257) sees similarity between the Afontova culture and the "upper complex" at Krasnyi Yar, relating it to the Mal'ta culture. The similarity of the features of the Mal'ta culture and the Afontova are pointed out by A. P. Okladnikov (1968:71) and S. N. Astakhov (1966a:65). Astakhov (1966a:67) also writes about the similarity between the Kokorev culture and the Srostkin.

Z. A. Abramova recently came out against the assignment of the Mal'ta and "Yenisei cultures" (that is, Afontova and Kokoreva) to one tradition (1975). She considers the basic difference between these cultures to be that in the Mal'ta culture wedge-shaped cores are unknown, and in the "Yenisei cultures" they are widely represented. However, Abramova notes that, by the early stages of the Mal'ta culture "the concept of such a technique (the flaking of microblades from wedge-shaped cores—*Yu. A. M.*) can be clearly traced (Abramova 1973:25); further, in a later stage of this culture, represented by the upper complex at the Krasnyi Yar site, there is "a very high percent of wedge-shaped cores" (Abramova 1972a:256). About 35 years ago A. P. Okladnikov (1940) convincingly demonstrated the presence of a wedge-shaped core at the Buret' site, which, in his opinion, was an analog of the Mal'ta site, at which wedge-shaped cores were found by M. M. Gerasimov in 1932. Unfortunately, these findings were left unpublished (Museum of Anthropology and Ethnography, Academy of Sciences, USSR; Collections 5406–180, 5406–320).

The degree of similarity and difference of the cultures of the first tradition cannot be indisputably substantiated at the standard level since the materials from their type sites have not been published completely. But at present we can firmly establish that in not one of the sites of this tradition was a single bifacially-worked stone knife or spear point encountered.

The clearest sites of the first tradition today are the sites of Mal'ta and Afontova Gora, known throughout the world. Therefore, acknowledging the differences between them, we call the first tradition "Mal'ta-Afontova." The name itself can give a preliminary idea of the diverse character and distinctive appearance of this tradition.

The second cultural tradition of the Paleolithic of Northern Asia was identified very recently. This event is connected primarily with the discovery in Northeast Asia of new archaeological sites assigned to the Dyuktai culture. Therefore, we have proposed the name "Dyuktai" for this tradition.

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dices (bone and wooden tools, ornaments, the remains of dwellings, burials, dress, etc.) that would permit one to reconstruct long gone epochs.

[10] The division of some cultural variants should be carried out on the basis of a reliable scale of absolute chronology; otherwise, only one of the chronological stages of the culture can be taken for the variant. Unfortunately, the absolute age of the majority of sites still remains unclear, which makes elaboration of the problem of localizing the Paleolithic of Northeast Asia difficult.

[11] Upon more extensive analysis of the materials related to them, the Kokorev and Srostkin local cultures will be found to be just local variants of the Afontova culture. Also, it is probable that materials from the Achinskaya site represents one of the local variants of the Mal'tan culture.

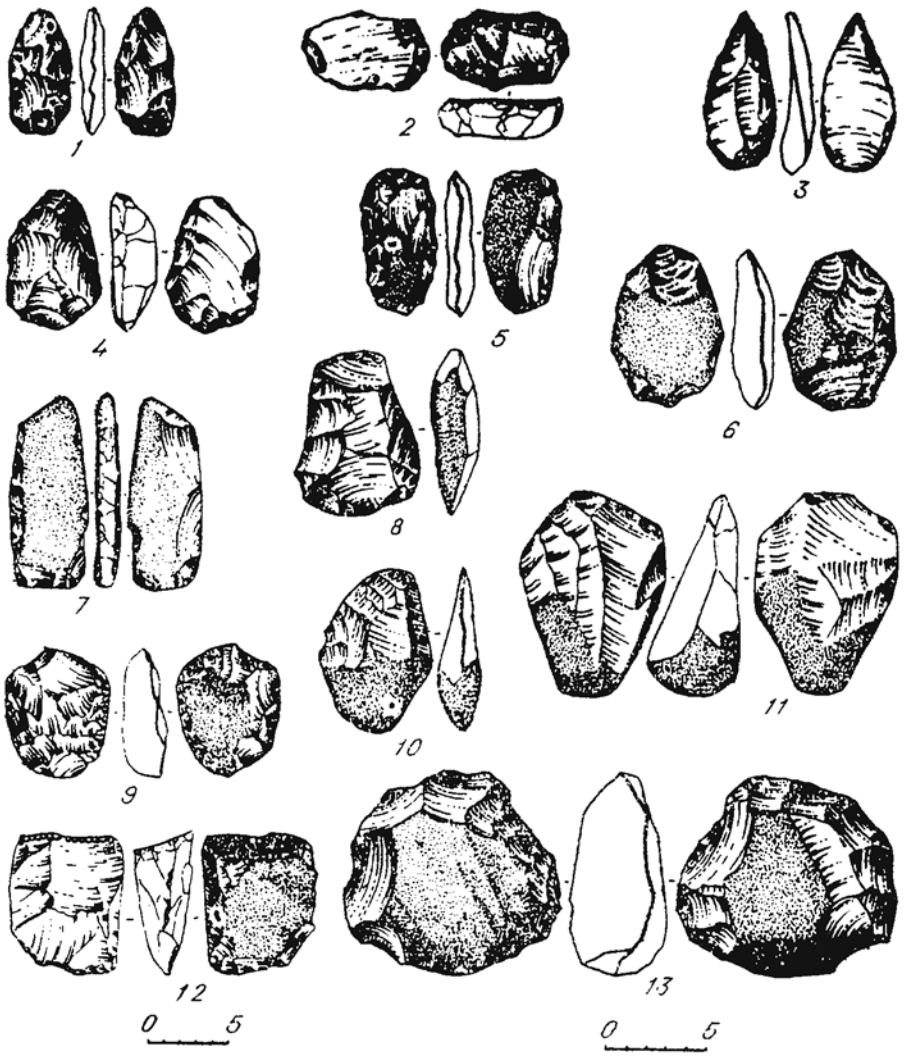
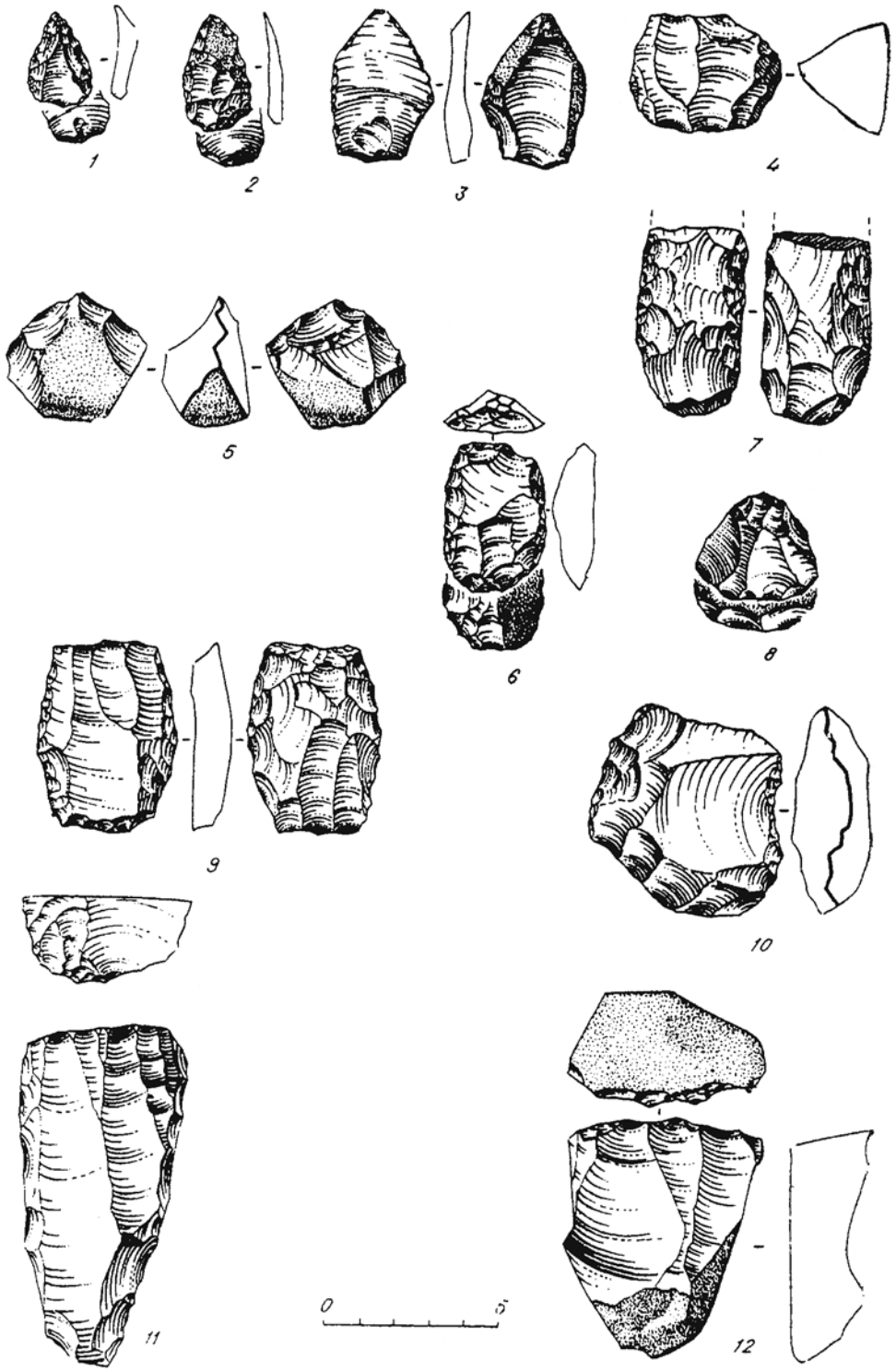


Plate 79. Stone assemblage of the Mysovaya site in the southern Urals (based on O. N. Bader and G. N. Matyushin). Scale at right is for nos. 8, 10, 11, 13.

In addition to the basins of the Lena, Indigirka, Kukhtui, and Kamchatka, Paleolithic sites containing bifacially worked knives and spear points also have been discovered in Northeast Asia in Pribaikal'e (Voennyi Gospital'; Ust' Belaya, Layer XVI; Verkholenskaya Gora; Ushkanka; and others), in Zabaikal'e (Nyan'gi, Batoiskaya Yama, Sokhatino IV, and others), on the Amur River (Kumary III, Osipovka, and others), and in Primor'e (Ustinovka). Each of these sites is characterized by a different degree of similarity and difference from the Dyuktai sites of the Aldan. They seem to represent separate local "Dyuktai" cultures or variants of cultures. However, the disparate studies of the sites and the lack of absolute dates for most of them does not yet permit definitively separating these cultures and giving them characteristics.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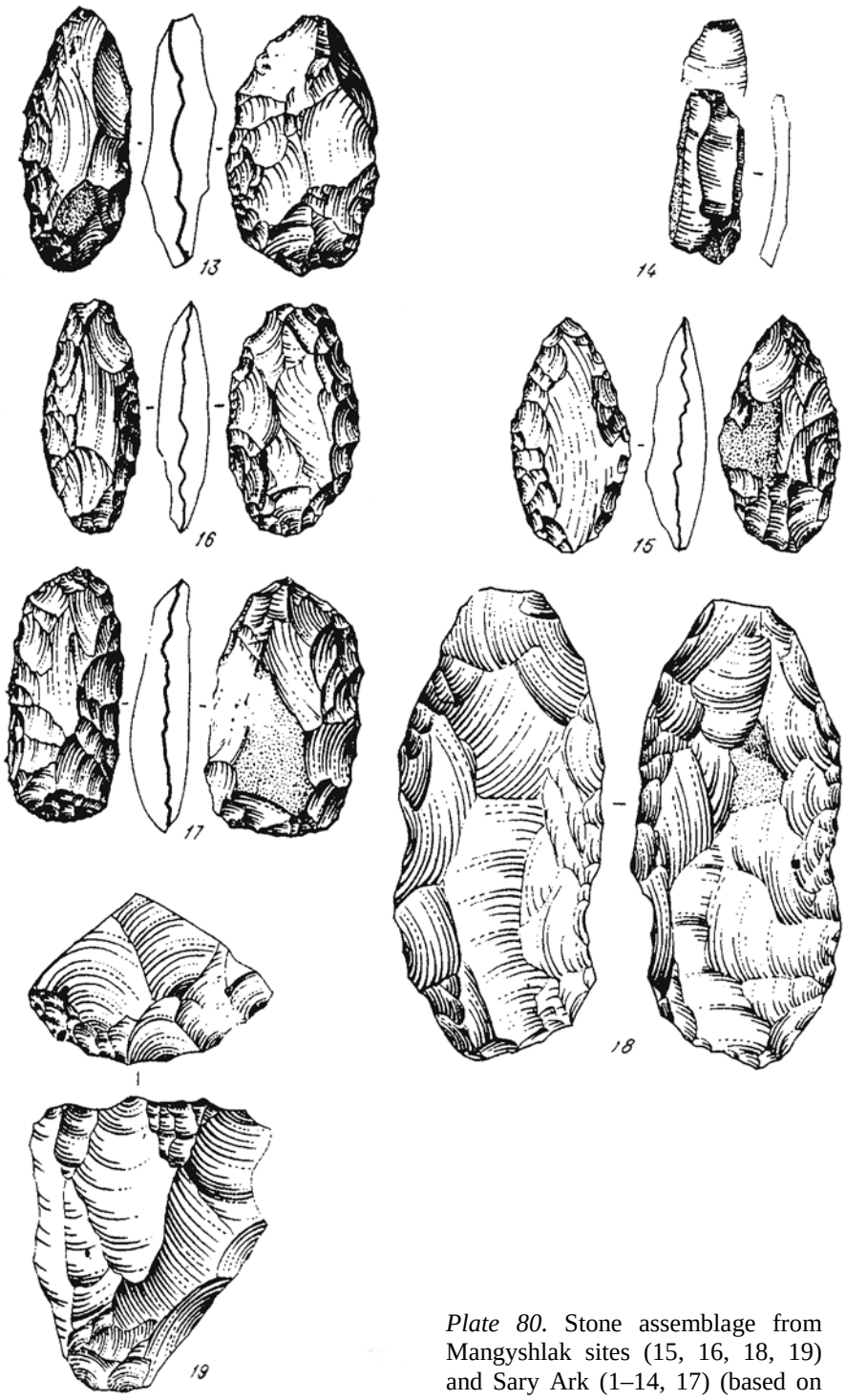


Plate 80. Stone assemblage from Mangyshlak sites (15, 16, 18, 19) and Sary Ark (1–14, 17) (based on A. G. Medoev).

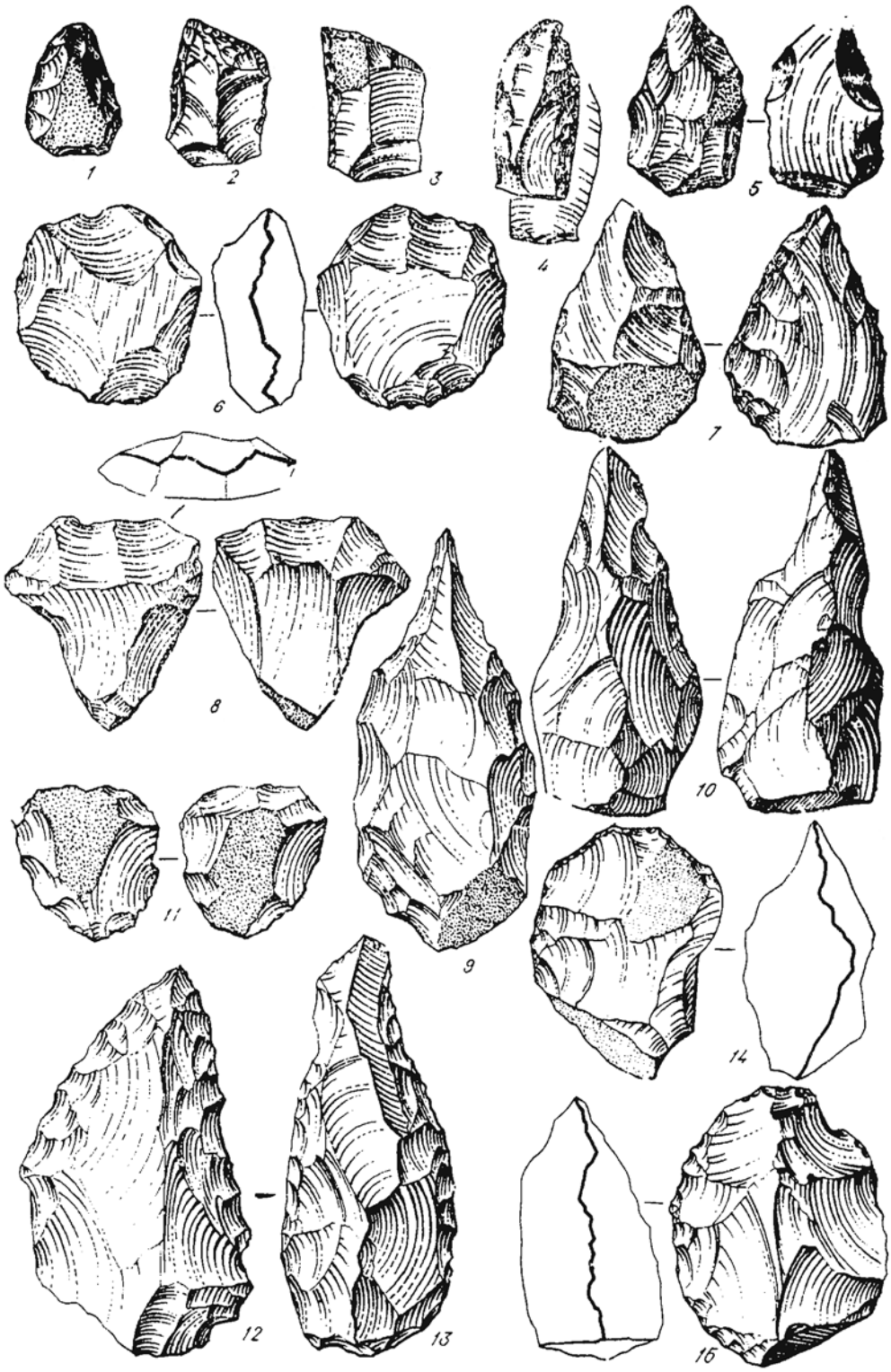
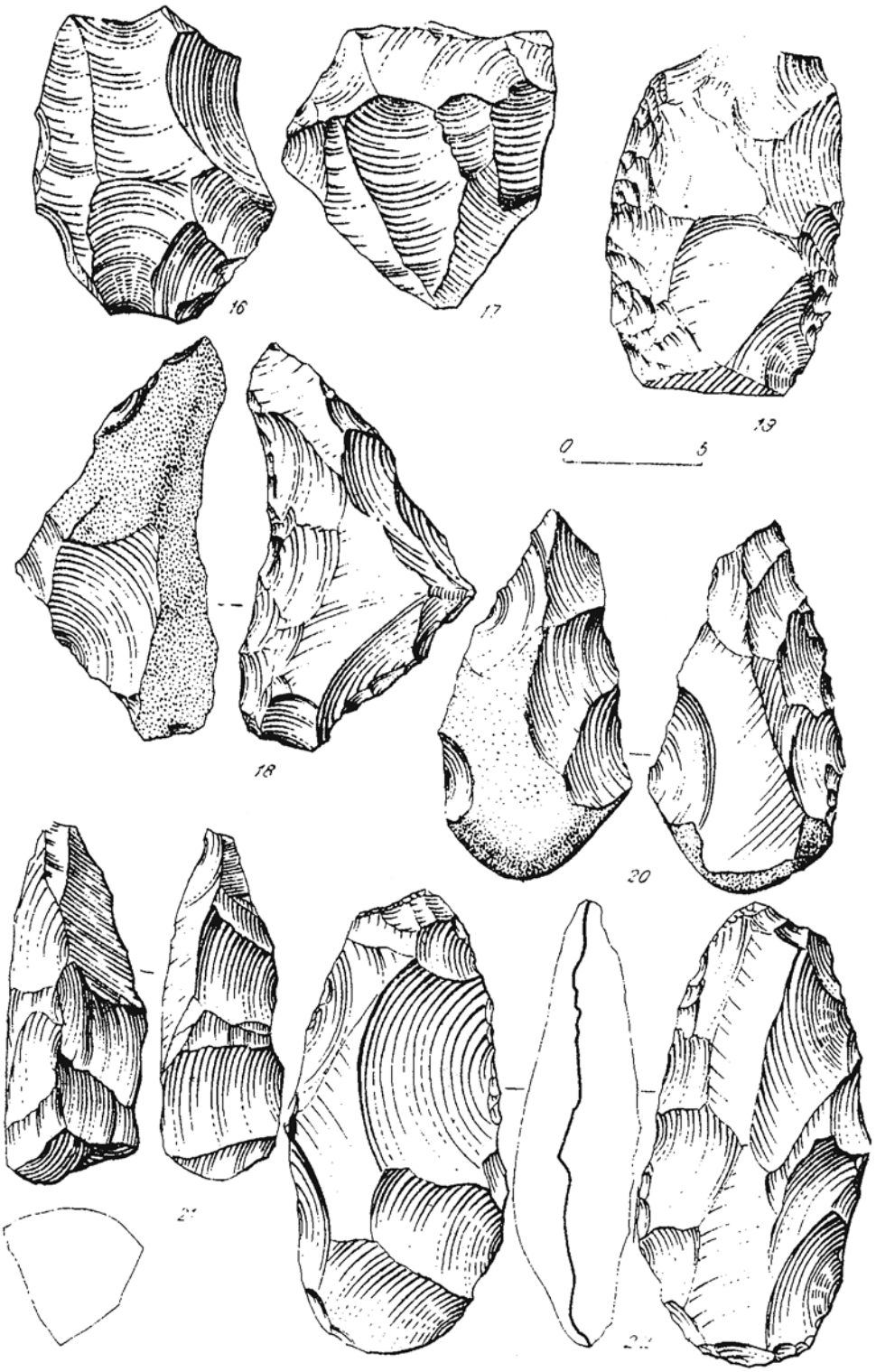


Plate 81. Stone assemblage from Dintsun sites (1, 2, 4–19, 22), Dzagandir (3, 21), Lantyan (20) (based on J. Aigner, J. Kozlowski, and V. E. Larichev).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Nevertheless, in determining the place in the Paleolithic of Northeast Asia of sites containing bifacially worked knives and spear points, some researchers are beginning to compare them with the Dyuktai culture. Thus, for example, I. I. Kirillov and M. V. Konstantinov (1975:76) write that "the most complete analogies to Sokhatino IV material are found in sites of the Dyuktai culture." The American archaeologist J. W. Smith (1974) is inclined to assign to one "Dyuktai subtradition" generally all the Pleistocene and early Holocene sites of Yakutia, Pribaikal'e, Zabaikal'e, Priamur'e, Mongolia, and northern China, in which are encountered cores specially prepared for the removal of microblades. However, his criteria, which do not include bifaces—a very important Dyuktai indicator—do not seem useful for distinguishing a special tradition different from the "Mal'ta-Afontova."

One primary aspect of studying the Upper Paleolithic cultures of the "Mal'ta-Afontova" and "Dyuktai" traditions is the problem of their origin. At present the most important means of resolving this problem is examination of Middle Paleolithic sites of northern Eurasia and adjacent southern regions.

A substantial number of Lower Paleolithic sites (diminishing to the east because of poor study) is known in Europe, Kazakstan, Mongolia, and northern China, in which various types of bifaces have been recorded. At the end of the Riss-Würm (Kazantsevo) time, about 80,000 years ago, the Middle Paleolithic complexes being examined gradually grew, probably on a base of various Lower Paleolithic bifacial industries in those regions. A common indicator for them is the presence of bifacially worked knifes, which often vary significantly in their technical-typological characteristics, evidently showing their origin from the various Lower Paleolithic prototypes.

One well defined Middle Paleolithic site in Western Europe with bifaces is the Fonmor site; in Central Europe, "Blattspitzen" points; in Eastern Europe, the sites of Stinka I, Ak-Kaya, Khotylevo, Staro-sel'e, Antonovka II, Il'skaya, Volgogradskaya, and perhaps some sites in Kama and Pechora. The Mysovaya site in the southern Urals, investigated by O. N. Bader and G. N. Matyushin (1973), evidently belongs to this same circle of sites (Pl. 79).

In Kazakstan, "Levallois-Mousterian" complexes with an "Acheulean" ("bifacial") tradition were recorded by A. G. Medoev (1972) on the Mangyshlak Peninsula (Pl. 80:15, 16, 18, 19) and in northern Pribalkhash'e (Pl. 80:1–14, 17). They are unknown farther to the east. However, taking note of the presence of Lower Paleolithic bifaces that date to the Kazantsevo and earlier times in northeastern China, in the sites of Lan'tyan' (Pl. 81:20), Kekhe, and Dintsun' (Pl. 81), and in Mongolia at the sites of Yarkh and Dzagandir (Pl. 81:3, 21), traces of a Middle Paleolithic "bifacial" tradition will be found as well. They already may represented here partly in surface materials from Yarkh and Dintsun', but proving this would be very difficult because of the lack of a well elaborated typology of the cultural complexes of these sites.

Middle Paleolithic sites with bifaces in several regions of Eurasia—for example in the Loire, Dnestr, the Azov area, and in the Caucasus—are near Middle Paleolithic sites without bifaces. In Eastern Europe Middle Paleolithic sites with bifaces occupy a more northern position than sites without bifaces. About 35,000 years ago in Western Europe, in the Near East, and in the Caucasus, Middle Paleolithic "bifacial" cultures were replaced by Upper Paleolithic cultures without bifaces. In Central and Eastern Europe, Middle Paleolithic "bifacial" cultures are continued in Upper Paleolithic "bifacial" cultures such as Szelet, Kostenki-Sungir, and others.

Such regularity can also be traced east of the Caspian Sea. In Kazakstan bifaces are an unfailing element of Middle Paleolithic complexes, while in numerous Middle Paleolithic sites of Central Asia practically none are found.

Comparison of the "bifacial" complexes of Kazakstan and northeastern China, which precede the Upper Paleolithic, with the "Levallois-Mousterian" complexes of Central Asia and Mongolia suggest (Mochanov 1969) that in Kazakstan, Central Asia, Mongolia, northern China, and evidently southern Siberia there existed two Middle Paleolithic cultural traditions (or lines of development) that were different from each other in the technical-typological features of the stone assemblage—a "Levallois-Mousterian

bifacial" one with bifaces and a "Levallois-Mousterian" one without bifaces. On the foundation of the first of them were developed the "bifacial" Upper Paleolithic cultures of Siberia, and on that of the second, the Upper Paleolithic cultures without bifaces.

Z. A. Abramova (1973) has been critical of this position, considering the existence of a Middle Paleolithic "bifacial" tradition in the region from Kazakstan to northeastern China "in highest degree doubtful." However, new finds by A. P. Okladnikov in Mongolia have recently confirmed that a "bifacial" tradition is, in fact, a historical reality. Okladnikov (1973a) reported that in 1970, in a "Lower Paleolithic workshop" on Yarkh Mountain, he found "consistent samples of tools of the Acheulean type, entirely different by their typology and technique of manufacture from cobble tools." On the basis of this discovery Okladnikov (1973b) concluded that "the tradition of bifaces emerges in Central Asia early, at least in late Acheulean times. It also continues later, in the end of the Paleolithic."

The distribution of Lower Paleolithic and Middle Paleolithic sites with bifaces in northeastern China, Mongolia, northern Pribalkhash'e, central Kazakstan, in Mangyshlak, and the southern Urals (that is, in the whole huge expanse along the southern boundary of Siberia) attests that the "bifacial" tradition was not some foreign idea from Europe that sporadically influenced the "primordial" East Asian cobble-tool substrate here. Its sources, as the Lan'tyan' site, for example, indicates, are in the regions of Asia neighboring Siberia, at least during the Mindel period. It is entirely possible that the development of the Upper Paleolithic "Dyuktai" tradition is connected with the Middle Paleolithic "bifacial" tradition. However, because of the poor study of Middle Paleolithic and early Upper Paleolithic sites in Northern Asia, it is presently impossible to understand precisely the genesis of the different "Dyuktai" cultures. They most probably emerge from different Middle Paleolithic "bifacial" cultures of the Urals, Kazakstan, Mongolia, and northern China, the appearance of which is still to be clarified.

Typological analysis of the Dyuktai culture represented by the Aldan sites permits the proposal that one of the models of the Middle Paleolithic substrate initial to it was the "Mousterian" complex with an "Acheulean" tradition from the Fonmor site located in France, which belongs to the Hengelo Interstadial, with an age of 45,000 to 33,000 years (Pl. 82).[12] The complex being examined contains artifacts similar to the "Dyuktai": types of bifaces, scrapers, skreblos, angle and dihedral burins, and, especially interesting, multifaceted burins that are almost copies of the simplest wedge-shaped cores from the Ezhantsy site.

The genesis of cultures of the "Mal'ta-Afontova" tradition remains unexplained until now. Here it seems most probable that they emerge from different "Levallois-Mousterian" cultures of Central Asia, for which bifaces were not characteristic.

While study of two separate Paleolithic traditions is still very far from complete, it approaches a resolution to some aspects of the problem regarding the beginning stages of settlement by people of Northeast Asia.

The archaeological and paleogeographic data suggest that the initial settlement of Northern Asia could have occurred on a wide front from the southern Urals, from Kazakstan, Mongolia, and northern China in the Kazantsevo or in early Karginsk times with a climate warmer and moister than today. Evidently characteristic for the local cultures of the earliest population (hunters of "mammoth" fauna) were different types of bifaces and the use of cores specially prepared for flaking off blades and lamellar flakes.

[12] The stone assemblage from the Fonmor site is cited here only as a model of a Middle Paleolithic proto-Dyuktai site, which may be found in the southern regions of Northern Asia, and not to show that the Dyuktai people arrived on the Aldan from Europe.

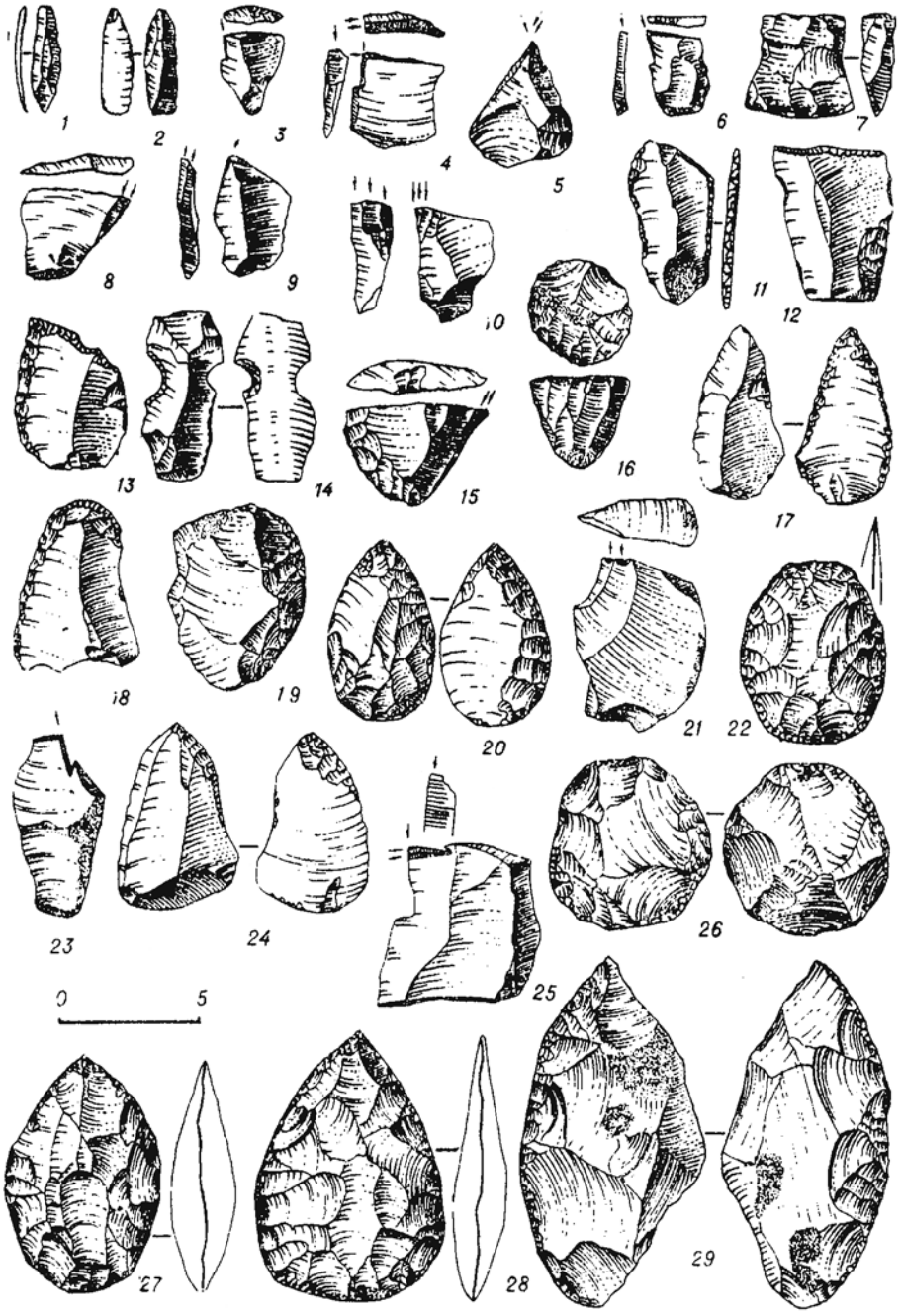

Plate 82. Middle Paleolithic stone assemblage from the Fonmor site (based on L. Pradel and J. Pradel).

The transition from Middle to Upper Paleolithic occurred in Northern Asia about 35,000 years ago, that is, approximately simultaneously with the Near East and Western Europe, and not 20,000 years later, as G. P. Grigor'ev (1968) believed. The basic economy of the Upper Paleolithic population continued to consist of hunting "mammoth" fauna. The earliest Upper Paleolithic cultures probably belonged to the "Dyuktai" tradition. Today the Aldan sites of Ezhantsy and Ust' Mil' II attest to the distribution of the "Dyuktai" tradition east of the Yenisei. Middle Paleolithic sites with bifaces in northern Pribalkhash'e and the southern Urals, as well as the presence of a bifacially worked knife from Ust' Kanska Cave suggest that sites of the Upper Paleolithic "Dyuktai" tradition may be found in Karginsk deposits in the basins of the Ob and Yenisei. Further investigation of the Tarachikha site, discovered on the Yenisei by Z. A. Abramova in 1974, will be interesting since, together with numerous mammoth bones, the first bifacially-worked flint spear point was found in this region (Abramova 1975).

We suggest that during the first half of the Upper Paleolithic (approximately 35,000–22,000 BP) in northern Eurasia, from the Rhine to Chukotka, extended a separate zone of "bifacial" cultures, which H. Müller-Beck was the first to note, citing similarities between European and American Paleolithic sites (Müller-Beck 1966). However, the similarity between them (for example, the "Szeletian" and the "Dyuktai") can most probably be explained not by the spread of these cultures from Europe to Asia, as Müller-Beck thought, but by their origin from different European and Asian Middle Paleolithic "bifacial" cultures with shared stone assemblage technical-typological characteristics. South of this Upper Paleolithic "bifacial zone" were various cultures for which bifacially-worked stone tools (especially knives and spear points) were not characteristic.

The precise time of appearance in Northern Asia of the different cultures of the "Mal'ta-Afontova" tradition, apparently genetically connected with the "Levallois-Mousterian" tradition of Central Asia, is presently unknown. At least by the beginning of Sartan times, about 22,000 to 20,000 years ago, traces of these cultures are recorded both on the Yenisei (Afontova Gora II) and on the Angara (Mal'ta), and perhaps in the basin of the Selengi (Sannyi Mys). These cultures possibly appeared in southern Siberia even earlier.

The subsequent wide distribution of sites of the "Mal'ta-Afontova" tradition primarily west of the Lena basin attests that in Sartan times in Northern Asia two separate cultural provinces were gradually formed—a "western" ("Mal'ta-Afontova") and an "eastern" ("Dyuktai"). The boundary between them likely extended along the watershed between the Lena and Yenisei basins. However, in the south, on the upper reaches of the Lena, Angara, Amur, in the basin of the Selengi, and in Mongolia and northern China, as well as in the west, between the Lena and the Yenisei, sites of the "Mal'ta-Afontova" tradition are encountered together with sites of the "Dyuktai" tradition. This proximity indicates that individual contact areas existed at the intersection of the two provinces. The "Pribaikal'e" contact area can be clearly distinguished, where sites of the Verkholensk culture of the "Dyuktai" tradition and Mal'ta-Badai culture of the "Mal'ta-Afontova" tradition are found nearby.

The area of cultures of the "Dyuktai" tradition during Sartan times primarily included the territory east of the Lena and north of the Amur, as well as, apparently, Sakhalin, Hokkaido, and the northern part of Honshu.[13] Very likely the initial settlement by people of the New World occurred from Northeast Asia (from Yakutia through Chukotka and Alaska). The initial stages of anthropogenesis did not occur in America; rather, it was settled by people of a modern physical type (*Homo sapiens*) from Asia through regions adjoining Bering Strait.

This proposition is based on the recognition of the American Indians' close similarity in physical anthropological type to Mongoloids and the existence at some stage of a land bridge (Beringia) joining

[13] Considering the poor study of the Paleolithic of Northern Asia large "landlocked" areas of "Dyuktai" and "Mal'ta-Afontova" cultures may have existed "holding strips of land," for example, in Priangar'e. However, verifying this proposition would require a detailed Paleolithic map of Northern Asia and a clearly elaborated absolute chronology.

Chukotka with Alaska. However, the discussion still continues of the number of migrations of people from the Old World to the New, when they occurred, in what regions they began, and by what routes they spread to Alaska and farther into the depths of America.

A multitude of often mutually exclusive hypotheses exist about the earliest stages of settlement of America, and not one of them can be considered finally proved (Mochanov 1966c, 1969d, 1973b), due to the poor study of Pleistocene archaeology in America. Clearly stratified and sufficiently informative archaeological sites are unknown there that precede the early Llano culture, the age of which, according to recent data, does not exceed 11,500 to 11,000 years (Haynes 1970).

Of the early sites most recognized among American archaeologists, those treated here are Tlapacoya and Valsequillo in Mexico (Haynes 1969; Wormington 1971), Wilson Butte Cave and Fort Rock in the northwestern United States (Crabtree 1969; Haynes 1969), and Old Crow in northwestern Canada (Irving 1971).

At the site of Tlapacoya, for which there is a radiocarbon date of 23,150 ± 950 BP, only one broken knifelike blade was found (Pl. 83:8). At the Valsequillo site (radiocarbon dated at 21,850 ± 850 BP), scrapers on flakes and knifelike blades (?) were recorded. At Wilson Butte Cave (with a radiocarbon date of 14,500 ± 500 BP) were found a fragment of a bifacially worked spear point (Pl. 83:24), a piece of a crude blade with retouch (Pl. 83:23), and some flakes. At Fort Rock Cave (radiocarbon dated at 13,200 ± 170 BP) were found two bifacially worked spear points and several scrapers on flakes. At the Old Crow site (radiocarbon dates of 25,750 ± 1800/1500 BP, 27,000 ± 3000/2000 BP, and 29,000 ± 3000/2000 BP) were found several scrapers and corelike artifacts made from mammoth, bison (?), horse, and reindeer bones.

These materials attest to the existence of people in America during the interval of 25,000 to 13,000 years ago. Very little is known about the culture of this time. Still, about 23,000 years ago the technique of making knifelike blades was known there, and by about 15,000 years ago, the technique of making bifaces.

Both blades and bifaces are also characteristic for the earliest archaeological sites of Northeast Asia, suggesting that part of the Dyuktai population, which settled in Yakutia about 35,000 years ago, also turned out to be the population that penetrated into America through Chukotka and Beringia, which presumably existed 33,000 to 30,000 years ago (the Konoshel' cooling within the Karginsk Interglacial). Unfortunately, insufficient evidence exists to confirm or reject this proposal.

Substantially more physical materials are available to compare the Dyuktai and early Llano cultures. The latter is basically represented by Clovis points (Pl. 83:21, 22, 25, 30). Sites with Sandia points possibly belong to one of its local variants or chronological stages (Pl. 83:9, 15, 16). Both types of points, spread predominantly throughout the southern United States, likely were approximately synchronic (Haynes 1970; Irwin 1971; Willey 1966).

At sites of the early Llano and Dyuktai cultures the stone tools encountered are very close, from our point of view, in technical-typological characteristics: bifacially worked points of spears and darts and knives, skreblos, scrapers, burins, and large knifelike blades. The primary difference between the cultures is that among the Dyuktai people points with flutes in the base are absent, while among the early Llano people wedge-shaped cores and microblades are lacking.

The absence of flutes on Dyuktai points can most likely be explained by the fact that this technical method was devised by emigrants from Northeast Asia already in America. For some reason this method did not become widespread in Asia, though the principle of longitudinally trimming the base of a point was known (Pl. 3:1).

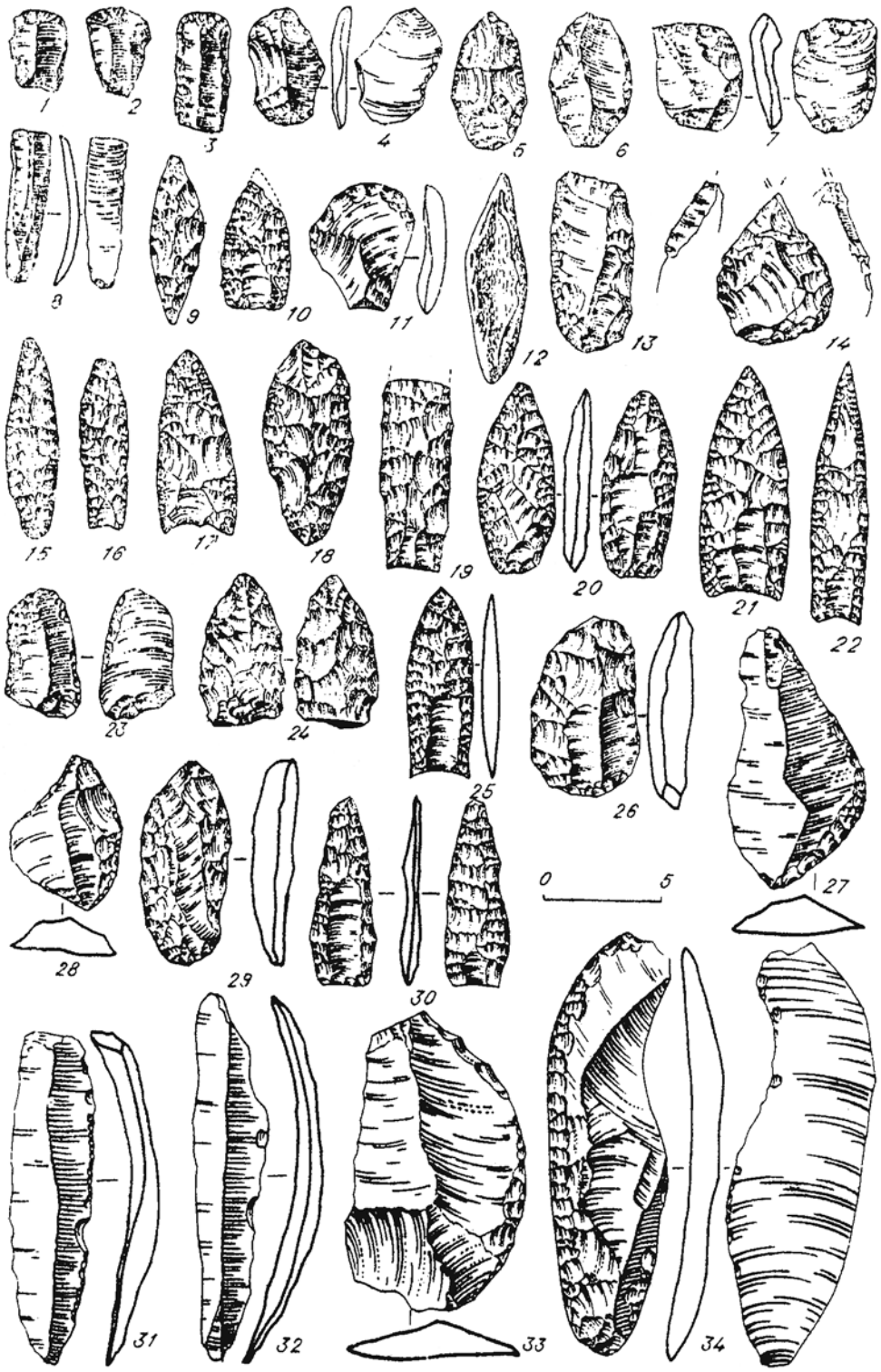

Plate 83. Stone assemblage from Paleolithic sites in America distributed between 20° and 45° north latitude (based on R. Bell, R. Butter, J. Epstein, J. Warnica, G. Willey, H. Wright, and W. Roosa).

At this point the absence of wedge-shaped cores and microblades in early Llano sites is very difficult to explain. They simply may not have been found there yet. The first series of early Llano blades was found only in 1962, when F. Green continued investigation at the Blackwater I site (Green 1963), excavations that were begun in 1933 (Wormington 1957). Until this time, only one early Llano (?) knifelike blade was known in America. It was discovered together with mammoth bones in 1952 at the Santa Isabel Istapan in Mexico (Wormington 1957). The report by I. P. Laricheva (1971) regarding the presence of such an artifact in the "Folsom" complex, which is considered genetically connected to the "early Llano," also favors discovery of wedge-shaped cores in early Llano sites.

However, if further excavations of early Llano sites reveal no wedge-shaped cores, then the "Dyuktai" tradition in Asia likely was represented by two different substrates from the initial time of the Upper Paleolithic: one with bifaces and wedge-shaped cores and one with bifaces but without wedge-shaped cores.

Distinct from the first substrate, to which can be assigned most presently known sites of the "Dyuktai" tradition, which contains wedge-shaped cores, the second substrate remains undiscovered. However, it may be represented by the Kukhtui III site (northwestern coast of the Sea of Okhotsk), in which no wedge-shaped cores have been recorded to date (Pl. 28). However, the study of this site is not yet concluded.

About 11,000 to 10,500 years ago the Dyuktai culture in Northeast Asia disappeared. It was replaced by the Sumnagin culture, which belonged to the "Mal'ta-Afontova" tradition. The fate of the last northeastern Dyuktai people is unclear. Some of them most probably went to Alaska where the cultural complexes of Denali, Akmak, and some others 11,000 to 10,000 years old and younger can be assigned to the "Dyuktai" tradition (Pl. 84).

At the same time, in spite of the substantial distribution of the area of the "Mal'ta-Afontova" cultures due to the abbreviation of the area of the "Dyuktai" cultures, some of the latter continued their development into the Holocene of Northern Asia, primarily in some regions of Pribaikal'e, Zabaikal'e, and Priamur'e. Thus, M. P. Aksenov (1969) believes that connected with the Verkholensk culture, which we believe belongs to the "Dyuktai" tradition, is the origin of the Isakov-Serov Neolithic culture of Pribaikal'e. Meanwhile, A. P. Derevyanko (1970a) notes that the Osipov culture, which we also think belongs to the "Dyuktai" tradition, is continued in the Neolithic Gromatukha culture of Priamur'e. Formation of the Syalakh Early Neolithic culture (Pls. 87, 88), which appeared in Northeast Asia about 6,000 years ago, probably emerged from the crossing of the Sumnagin culture with some still unknown early Holocene Zabaikal'e (?) culture of the "Dyuktai" tradition.

Such, in our view, is the most general picture of the earliest stages of settlement by people of Northeast Asia—schematic and hypothetical, since the facts, based on attempts to reconstruct the early epochs, are too fragmentary. Nevertheless, at present the division of two different Paleolithic cultural traditions ("Dyuktai" and "Mal'ta-Afontova") seems the most fruitful not only for clarification of various aspects of the most remote past of Northeast Asia, but also for resolution of the problem of the initial settlement by people of the New World.

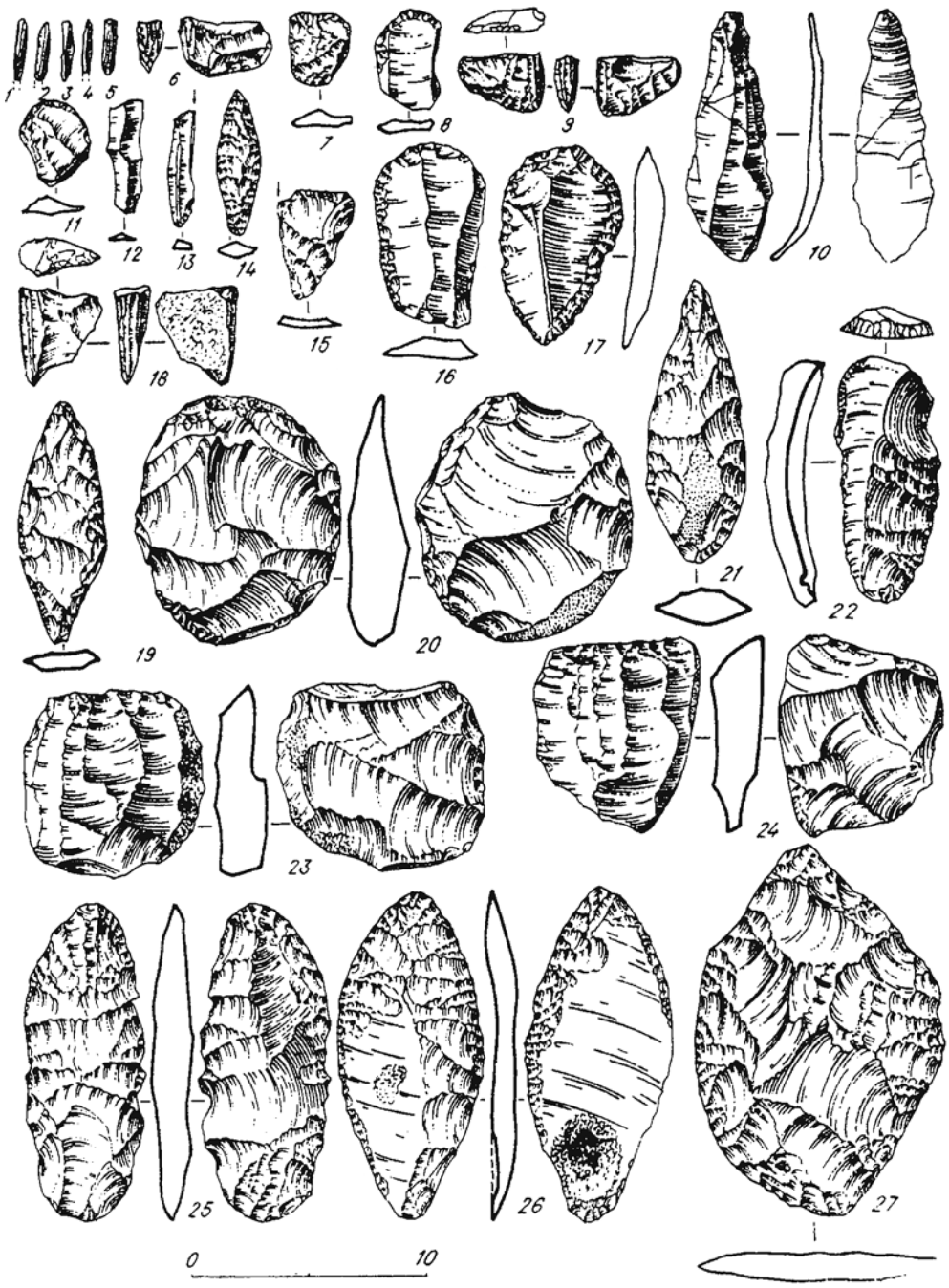

Plate 84. Stone assemblage from Paleolithic sites in Alaska (based on G. Anderson, H. Bandi, N. Nelson, and F. West).

Chapter V

THE SUMNAGIN CULTURE (10,500–6000 YEARS AGO) AND ITS PLACE IN THE STONE AGE OF NORTHEAST ASIA

In 1965 archaeological sites were discovered on the Aldan. The analysis of the materials permitted isolating a distinctive archaeological culture that was given the name "Sumnagin" (Mochanov 1966a). In addition to the Aldan, traces of the culture have been recorded on the Vilyui (Fedoseeva 1972), Taimyr (Khlobystin 1973a, 1973b), Amga, Mai, Lena, Vitim, Olekma, Indigirka, Kolyma, and Ul'ya (Fig. 18).

The presence of Sumnagin sites on the Kolyma, as well as sites in Alaska with similar materials (Dixon 1973), suggest that sites of the Sumnagin culture will also be found in Chukotka. In addition, Sumnagin materials from the northwest coast of the Sea of Okhotsk point to discovery of this culture in Kamchatka as well. N. N. Dikov observed that the flaking in the so-called "first Ushki Mesolithic or Early Neolithic complex" of Kamchatka, with an age of 5,000 to 3,000 B.C., showed definite influence from the Sumnagin culture (Dikov 1971b:210, 226).

The number of sites of the Sumnagin culture, increasing with each new field season, suggests that its area embraced the whole territory lying east of the Yenisei and north of the Amur. Moreover, finds on the lower reaches of the Kolyma and the Ul'ya attest that the Sumnagin people lived not only in continental but also in coastal regions of Northeast Asia.

The Sumnagin culture is most fully represented at present by sites on the Aldan. This does not mean that the Aldan was the center from which the Sumnagin people emigrated, but that the Aldan is the best studied region of the Sumnagin area today. With the expansion of archaeological work into other regions, no less interesting Sumnagin sites will be discovered. Proof of this may be the multicomponent Ust' Chirkuo site on the upper Vilyui.

Judging by the stratigraphic position of its sites and numerous radiocarbon dates (Figs. 22, 30, 36), the Sumnagin culture existed in Northeast Asia between 10,500 and 6,000 years ago. Its earliest stage corresponds to the beginning of the Holocene. The relief, climate, and plant and animal world in almost all regions occupied by the Sumnagin culture have, in general features, a modern look. The latitudinal zonality of the plant cover, which was breached by the last (Sartan) glaciation, has been reconstructed (Giterman et al. 1968). Mammoth, woolly rhinoceros, bison, horse, and some other species of animals, which people hunted in the upper Pleistocene, became extinct. Moose, reindeer, and roe deer became the most widespread game animals (Egorov 1965).

The climatic fluctuations that took place during the Holocene in Northeast Asia did not fundamentally influence the life of the people. The fluctuations are evident only in some displacements of the plant zones in the tundra and taiga to the south or to the north no more than 150 to 300 km. The basic type of vegetation and species composition of fauna remained unchanged throughout the Holocene. In

addition, during the Holocene, forest vegetation and the animals connected with it penetrated deep into the tundra along the river valleys, where people usually lived, and closely approached the sea coast washing Northeast Asia.

Analysis of influence of the natural environment on humans indicates that during the early Holocene Northeast Asia, the cold zone of the Northern Hemisphere, was—as now—one of the most severe regions on our planet. However, as archaeological data attest, such harsh conditions were not an insuperable barrier to widespread and intensive settlement by the Sumnagin people, who managed to adapt well to the surrounding environment.

The sites of the Sumnagin people, as once the Dyuktai people, are most often situated on points at the mouths of streams. They are confined to the lower part of the floodplain facies of alluvium of the high floodplain, or to the covering loams and sandy loams of the terraces above the floodplain. The cultural remains lie in the sites in small clusters around hearths, some of which are lined with cobbles.

Sometimes the artifact clusters are oval in plan, with average areal dimensions of approximately 3–5 x 2–2.5 m. These clusters were evidently left where houses once stood (Fig. 27). No artificial depression or other diagnostic details of the latter were preserved. The basic type of the Sumnagin house likely was a surface frame built with an oval plan. Apparently small logs, poles, bark, and animal skins were used in their construction, as ethnographic data indicate (Popov 1961).

Judging by the remains of contemporary houses recorded at the site (in clusters up to four) we can suppose that the Sumnagin people lived both as separate families and as small clans consisting of several small families.

The absence of any thick accumulation of cultural remains probably attests to the fact that the Sumnagin people, like the Dyuktai people, led a migrant form of life, often moving from place to place in search of the necessary food resources.

The cultural remains in the Sumnagin sites are represented primarily by stone artifacts and debitage from production, as well as kitchen refuse.

The overwhelming number of tools were made from knifelike blades taken from single-platform (Pls. 32:16, 20; 54:16–18; 72:9, 10) or double-platform (Pls. 35:18–21; 52:39; 76:20) cores, and prismatic flint cores, most often having a pencil-shaped form (Pls. 35:23; 38:42). Tools from blades comprise 85 to 95% of the total number of stone tools (Tables 2 and 3), with about 30% of them having microdimensions (the width not exceeding 0.4 cm). Tools from blades are represented by unretouched inset blades (Pls. 44:7; 45:3; 50:23–26; 73:2–5); inset blades with one (Pl. 38:15, 25) or two (Pl. 38:16) retouched longitudinal edges; angle burins (Pl. 36:10, 18, 31); lateral burins (Pls. 36:41; 38:19; 55:17–18); end scrapers (Pls. 42:3; 50:15, 19, 21; 54:22; 70:6; 77:9, 11); blades with a beveled edge (Pls. 36:2, 3; 52:2, 8); blades with a notch (Pls. 38:37; 50:20); punches (Pls. 33:9; 38:31; 42:1); and chisel-like tools (Pl. 48:2).

Characteristic tools are gravers (Pl. 33:7, 15). In distinction from angle burins, their working edge was formed not by the removal of a burin spall, but rather by retouch. Of interest are blades with two retouched beveled edges (Pl. 85). They have the appearance of a parallelogram and they do not yield to the so-called “geometric microliths” of Eurasia in regularity of form—trapezoids, segments, and triangles—and are even smaller in size. In comparison with Northern Asian “parallelograms” some classic “geometric microliths” give the impression of “macroliths” (see, for example, N. Bader 1970:Figs. 1:10, 41; 2:60).

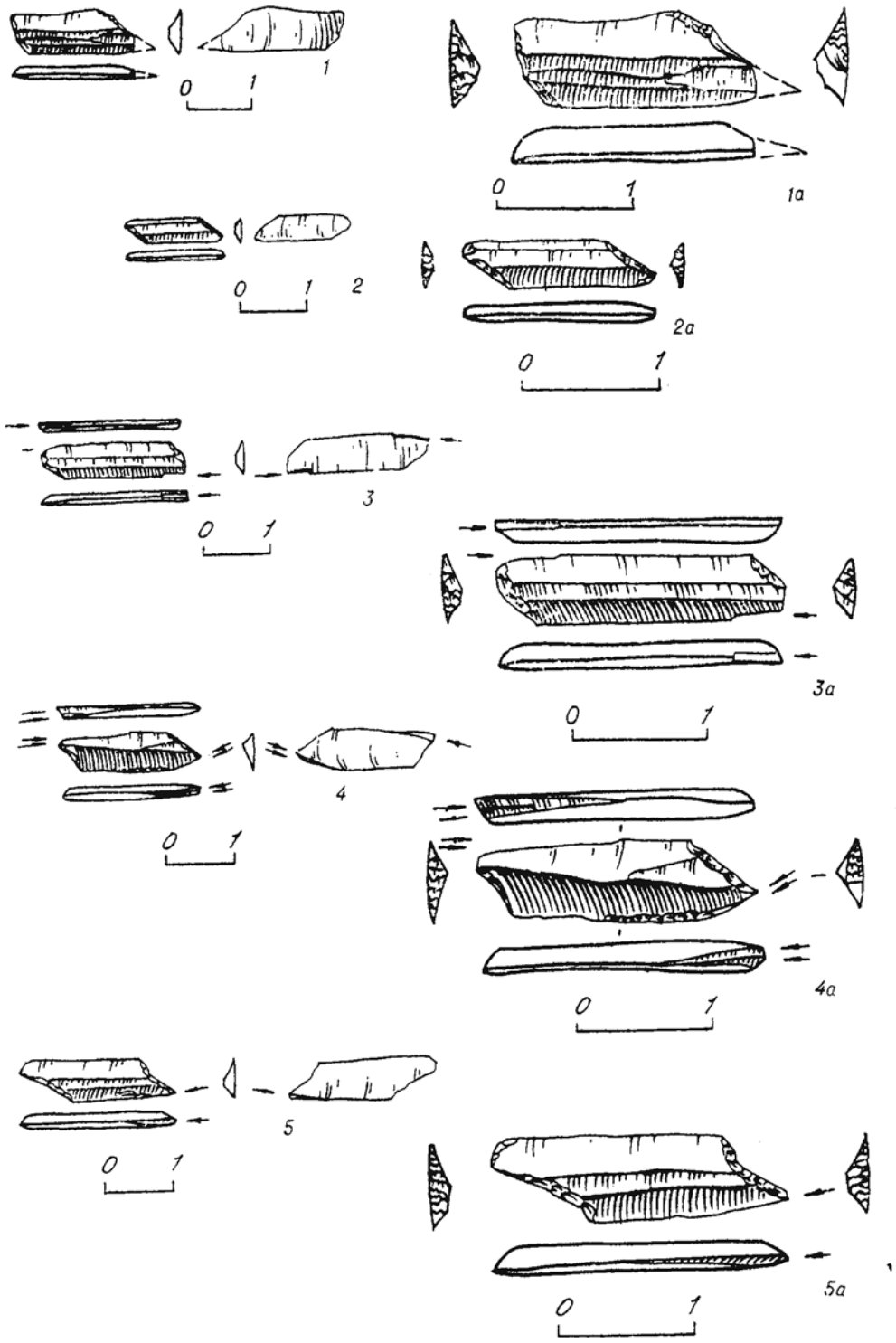

Plate 85. Sumnagin culture. Stone tools.

Earlier, only two "parallelograms" were known among the Sumnagin people (Layer XI of the Bel'kachi I site) (Mochanov 1973a). Today three more analogous tools are known (Layers IVa, IV, and IVb of the Ust' Timpton site), leading to the conclusion that more "parallelograms" will be found in Sumnagin sites. Judging by the published materials, such artifacts have not been recorded in the Stone Age sites of Northeast Asia. At the same time the Aldan "parallelograms" have analogies at several early Holocene sites in the Urals (Matyushin 1969:Figs. 3:11; 9:19), Eastern Europe (Vekilova 1966:Fig. 5:18), and Western Europe (Mongait 1973:174, first illustration in the bottom row). Analogies also have been found in the Kel'teminar Neolithic site of Kavata VII , located in the southern Aral area (Korobkova 1969:Fig. 27:8–12). Of course, these artifacts differ from the Aldan ones by the fact that they possess one retouched longitudinal working edge.

The number of tools from flakes in different Sumnagin sites amounts to 1.5 to 6% of the total number of stone tools. Special cores for obtaining flakes have not been found among the Sumnagin people. All the flakes were production debitage from prismatic cores, axes, adzes, and skreblos. Over 95% of the tools from flakes were made from flint or various siliceous stones, while the rest are of diabase or quartzite. End scrapers were chiefly made from flakes (Pl. 38:39, 51). Many of them have a lamellar form (Pl. 59:2, 12) and are almost no different from end scrapers made on broad blades. Some end scrapers have barely noticeable ears on the working edge (Pls. 35:32; 77:21). Scrapers with an irregular rounded form (Pl. 54:12), side scrapers (Pls. 35:8; 38:52), and knives (Pls. 41:1; 55:20) are also encountered. Angle, lateral, and dihedral multifaceted burins with a corelike (Pl. 54:15) or retouched (Pl. 59:7) handle occur as individual specimens.

Tools made from whole or split diabase or quartzite cobbles make up an insignificant share of the stone assemblage: from 0.5 to 3.5% of the total number. Even if inset blades[14] are not included in the total number (in various sites amounting to 55 to 70%), the number of "cobble" tools does not exceed 8%.

Many researchers now note the low percentage of "cobble" tools in the assemblage of various late Pleistocene and early Holocene archaeological sites of Siberia. Thus, based on Z. A. Abramova's (1972b) data, the number of "cobble" tools in late Pleistocene sites of the Kokoreva group on the Yenisei is most probably 0.6 to 1.6% of the total number of tools; only in rare cases does it reach 4.6%. "In spite of the fact that cobble tools are present without fail in the assemblage of each site on the Yenisei," wrote Abramova (1972b:139),

> their relatively small number indicates that they did not play a leading role in the assemblage. They differ in basic form from the Lower Paleolithic uniface choppers of Southeast Asia by the presence of careful secondary work on the working edge. The lack of such tools in the only Mousterian site in Siberia—Ust' Kanska Cave—suggests that the cobble tools of the Yenisei were not archaic elements, but rather emerged from direct economic necessity in a rather late stage of the Upper Paleolithic of Siberia. This idea is not new. G. P. Sosnovskii adhered to it, speaking of the advancement of chopping tools at the end of the late Paleolithic, and it was especially clearly expressed by A. P. Okladnikov.

G. I. Medvedev (1968a:19) cited similar data for the early Holocene sites of the upper Angara area. "Artifacts from cobbles (among which there is frequently not a single chopper)," he wrote, "represent here insignificant groups consisting on average 0.5 to 1% of the total number of artifacts. And what is

[14] Lamellar inset blades, the majority of which have dimensions not exceeding 0.7 x 3 cm, cannot be viewed as individual tools. Several dozen lamellar inset blades were often used for equipping bone or wood compound piercing and cutting tools with a double-working edge (see, for example, Petrin 1974:Fig. 1:1; Fedoseeva 1968:Fig. 8:1).

more, no preservation of Paleolithic forms can be observed in the group of cobble tools, but rather the appearance of new types of tools, approaching Neolithic (flaked axes, adzelike instruments with lateral notches, and true adzes as far as being worked by grinding)."

The cited material confirms the inadequacy of assigning all of Northern Asia to a separate "East Asian-Siberian" cultural region, in which allegedly for hundreds of millennia, from the time of the Lower Paleolithic to the Neolithic, "instead of small artifacts, the primary bulk of stone tools consist of large ones of early Asiatic form: choppers, large skreblos, and cores of Levallois appearance" (Okladnikov 1966:222).

The so-called "cobble" tools of the Sumnagin people are represented generally by adzes (Pls. 57:5, 7; 59:18, 20; 62:6; 63:4, 5) and axes (Pls. 41:2; 63:3). Specimens with ears on the butt are of special interest (Pls. 53:3; 57:2, 6, 10; 58). Until the work by the PAE, these artifacts were thought to have appeared in Siberia only in the developed Neolithic, about 5,000 years ago. New materials suggest that they existed among the Sumnagin people by at least 9,500 to 8,500 years ago. That chopping tools with ears were widespread not only on the Aldan, but also in all of the Sumnagin area, is confirmed by excellent specimens of these artifacts (Pl. 78) found in the upper Vilyui site of Ust' Chirkuo in deposits dated by radiocarbon to 7600 ± 80 BP (LE-996). The site of Ust' Chirkuo is located on the boundary between the Lena and Yenisei basins. Today it is the westernmost site of the Sumnagin culture.

Besides chopping tools, skreblos were occasionally made from split cobbles (Pls. 34:4; 37:1; 39:7, 9; 57:1, 4). The working edge of one of them has a well formed beak (Pl. 51). Data from the first work on the Aldan indicated that individual "crude cobble chopping tools" are encountered among the Sumnagin people that in form and technique of working are somewhat reminiscent of undiagnostic hand cleavers, uniface choppers, and biface choppers (Mochanov 1966a, 1973a). The most detailed study of these objects (Pls. 34:6; 37:2) suggests that they are most probably blanks of axes, adzes, and skreblos.

In 1965, in the upper interlayer of Layer IVa at the Ust' Timpton site, which contained the remains of the terminal stage of the Sumnagin culture, eight small quartzite cobbles with undiagnostic lateral notches were found lying in a pile. Such cobbles could have been used as sinkers for fish nets. But for proof of this, additional data are necessary. Unfortunately, over the last ten years artifacts similar to the sinkers have not been recorded in a single Sumnagin site. A citation by A. A. Formozov (1970) on sinkers for nets from the Sumnagin layers of the Bel'kachi I site was based on misunderstanding.

Abraders are represented only by solitary specimens—slabs of large-grained and small-grained sandstone (Pls. 34:1–3; 39:2, 6; 56:1, 4). Fourteen of them were found in the Bel'kachi I and Ust' Timpton sites.

Technical-typological analysis of the Sumnagin stone assemblage indicates that ground artifacts and bifacially retouched flint tools are entirely uncharacteristic for it.[15] Among the latter only the working edge was worked by edge retouch. Very rarely retouch went onto the ventral and dorsal sides adjoining the working edge.[16]

One of the most significant features of the Sumnagin assemblage, sharply distinguishing it from the preceding (Dyuktai) and subsequent (Syalakh), is the general absence of bifacially retouched stone knives, as well as the points of spears and darts.

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[15] Grinding, on the working edge of a diabase axe, can be seen on only one piece, from Layer IVa of the Ust' Timpton site (Pl. 52:43). The "polished axe" from the Sumnagin layers of the Bel'kachi I site, as appeared in the article by A. A. Formozov (1970), is incomprehensible.

[16] The exception is one bifacially retouched chisel-like tool of discoid form (Pl. 56:5) and one scraper with a retouched dorsal surface (Pl. 54:12) from Layer IVb of the Ust' Timpton site, as well as one scraper with retouch on the dorsal and ventral sides (Pl. 35:25) from Layer X of the Bel'kachi I site.

This absence probably explains the exceptionally wide use of combination artifacts as piercing and cutting tools. These had the form of a bone or wooden base with slots for inserting inset blades. It is no wonder that inset blades turn out to be the prevalent type of artifacts in all of Sumnagin sites.

The bone bases of compound combination tools are presently represented only by flat knife blades with one lateral slot (Pl. 43:18) and a spindle-shaped point of a dart (?) with one lateral slot (Pl. 50:27).

For many years the absence in Sumnagin sites of arrow points has been perplexing, especially so after the discovery at Dyuktai Cave of a tiny willow-leaf biface (Pl. 2:1), since this artifact suggested that the bow and arrow could have been used by the end of the Pleistocene.

Based on materials from the first years of the investigation of early Holocene sites we surmised that the Sumnagin culture did not know the bow and arrow (Mochanov 1966a, 1969a, 1973a). This assertion, at first glance, appears to be confirmed by the fact that until now, even with the most extensive excavations, arrow points have not been encountered in Sumnagin sites under clear stratigraphic conditions. However, materials attesting to the spread of the bow and arrow at the end of the Pleistocene and beginning of the Holocene in the vast territory of Eurasia suggest that arrow points may be found in Sumnagin sites as well. Based on the fundamental technical-typological characteristics of the stone assemblage, arrow points of the Sumnagin people presumably were made from knifelike blades with the aid of edge retouch. At least part of the lamellar points found in various sites of Northeast Asia, but not yet dated, probablywill be assigned to the Sumnagin culture (Pl. 86).

These points are represented by two types: stemmed and willow-leaf. They were worked chiefly on the base and tip.

A. P. Okladnikov, the first to turn attention to lamellar stemmed arrow points in Northeast Asia, discovered them in 1942 at a site and in a burial at Lake Uolba. He determined the time of their existence on the lower Lena as approximately the third millennium B.C. and noted that they represented “if not the earliest then in any case one of the most ancient stages of settlement by man of the northernmost regions of eastern Siberia” (Okladnikov 1955:114). Okladnikov believed that prototypes of the Uolba points first came into the forest zone of Pribaikal’e from the steppes of Eurasia, most probably from Zabaikal’e and the upper reaches of the Amur, and from there to Yakutia (Okladnikov 1950b:162).

The earliest point of those discovered by Okladnikov appears to be a specimen from the lower layer of the Uolba site (Okladnikov 1946:Pl. V:1). In fact, it is very similar to “svideroidnye” stemmed points of Europe. Interestingly, such artifacts are rather widely represented in many early Holocene sites of the Urals and northeastern Europe (O. Bader 1966; Khlobystin 1973d; Kol’tsov 1966; Luzgin 1972; Matyushin 1972). Willow-leaf arrowheads also are widespread in the same place. Lamellar arrowheads found on the Lena, Vilyui, Indigirka, Kolyma, and Kukhtui, and in Chukotka may be evidence of some early connections that existed between the population of northeastern Europe and northern Siberia long before the third millennium B.C. These connections could have been carried out most actively during the period of spread of the Sumnagin culture.

The spindle-shaped bone rod with a split on one end (Pl. 45:7), found in Layer XVI of the Bel’kachi I site, is of definite interest for resolving the question about the time of appearance of the bow and arrow in Yakutia. It could have served as the point of an arrow, but proving this is presently impossible. The supposition must be reinforced by the necessary series of such artifacts.

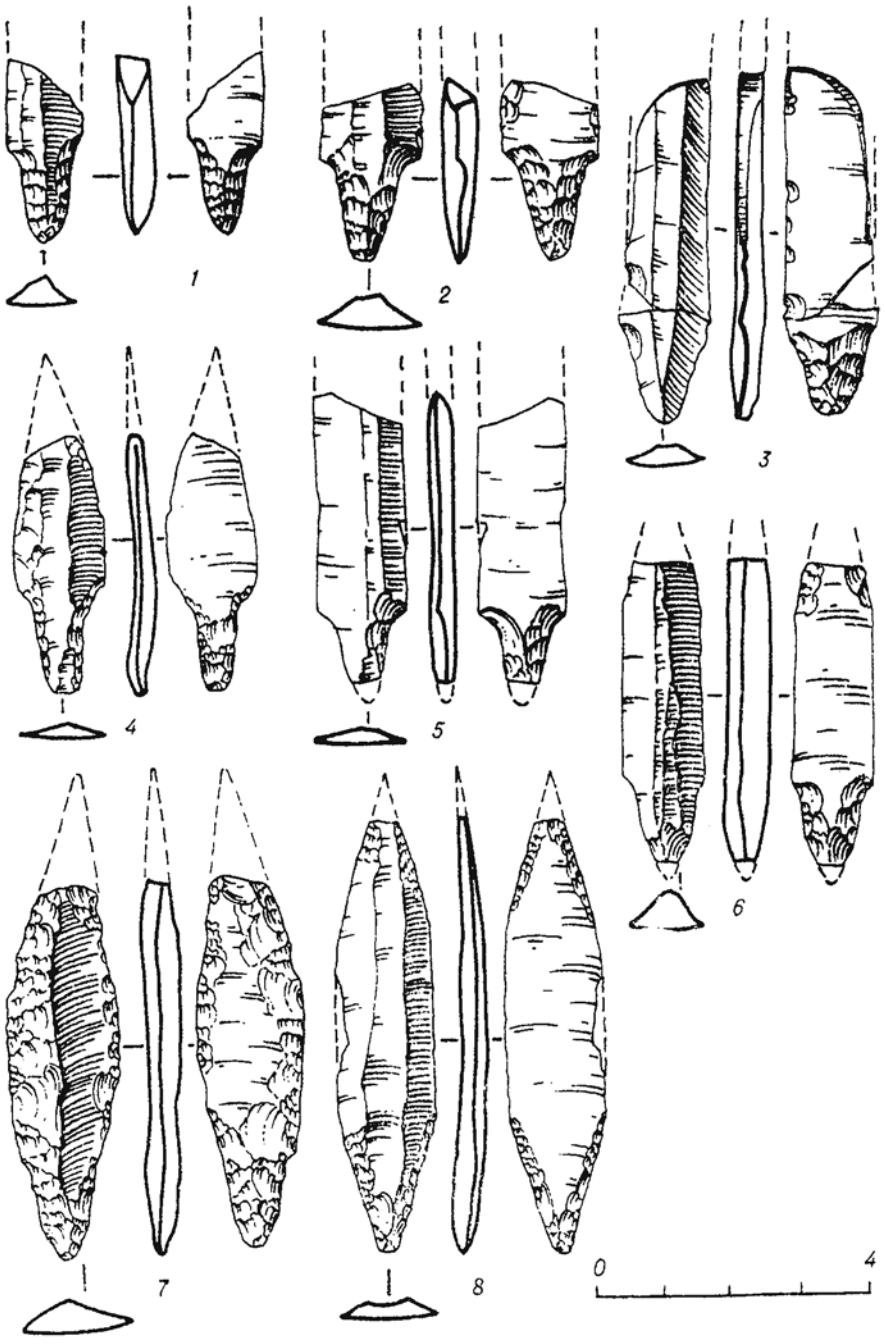

Plate 86. Stone arrowheads (1 from the Ust' Belaya site, based on N. N. Dikov; 2, 5, 6 from the Yubileinaya site, based on V. A. Kashin; and 3 from the Kukhtui II site; 4, 8 from the Tuoi Khaya site; and 7 from the Ust' Chirkuo site, based on S. A. Fedoseeva).

Unfortunately, bone artifacts are only rarely encountered in Sumnagin sites. Besides the three objects noted above, they are represented primarily by awls (Pl. 50:30) and needles (Pl. 45:6).

In addition to the production assemblage examined, in many Sumnagin sites, from the earliest to the latest, pieces of graphite and ocher are often encountered. In Layer XXXVI of the Sumnagin I site a single Sumnagin ornament was found—a pendant of a Siberian stag tusk (Pl. 70:9).

The cooking remains have the greatest significance for characterizing the economy of the Sumnagin people. Analysis of the remains from sites located in taiga regions show that about two-thirds of all edible animals consisted of moose. O. V. Egorov (1969), who studied the fauna from the Sumnagin sites on the Aldan, noted that moose "comprised the basis of food for early man." Besides moose, the Sumnagin people in the taiga regions also hunted reindeer, roe deer, brown bear, and, rarely, boar and waterfowl (Table 1).

The exceptionally small number of fish bones among the cooking remains is noticeable. Of 2,679 specimens of animal bones at the Bel'kachi I site, only 14 belonged to fish.[17] In many Sumnagin sites the bones of fish are generally not encountered.

O. V. Egorov (1969) supposed that the small number of fish "can be explained by the absence of a special pursuit of fish or its more complete use by man and predators." Where fishing, though not the basis of the economy (for example, among the Bel'kachi people and the Ymyyakhtakh people at the Lena sites of Kullaty and Ymyyakhtakh) but nevertheless was practiced, the bones of fish are encountered in rather large quantity (Okladnikov 1950b). A similar picture is also characteristic for the early Iron Age layer at Dyuktai Cave (Fedoseeva 1970b).

These observations together with the small number of fish bones and the absence of special fishing tools (with the exception of the doubtful sinker from the Ust' Timpton site) evoke the assumption that fishing was not developed among the Sumnagin people.

Unfortunately, we do not have the cooking remains from Sumnagin sites located outside the Aldan valley. However, considering the "dependence of the composition of early man's food on the actual regional circumstances and the domination of this or that object of the hunt connected with it," noted by O. V. Egorov (1969), in the northern regions of their area, in the zone of the tundra and forest-tundra, the Sumnagin people probably primarily hunted reindeer. In the southern regions, together with moose hunting, the procurement of red deer could have been essential.

Our study of materials from the Sumnagin culture confirms that it belonged to the final stage of the Upper Paleolithic, which falls in the first half of the Holocene (10,500 to 6,000 years ago) in Northeast Asia.

Based on archaeological and ethnographic data extrapolated into the past, the density of the population of Northeast Asia 9,000 to 5,000 B.C., as in later times, likely was very low. It scarcely exceeded 0.02 persons per 1 km^2, as established for the seventeenth century (Dolgikh 1960). In other words, on average every person had no less than 50 square kilometers of hunting area. We can agree with I. S. Gurvich and B. O. Dolgikh (1970), that "under conditions of low population density, with a weak development of production forces and the absence of any social division of labor, other than by sex and age, social connections were primarily clan alliances."

However, considering the rather uniform appearance of the Sumnagin culture throughout its large territory, it probably had ethnically abandoned the clan population. At the same time, the area of the

[17] Considering the small number of fish bones and the absence of any special tools for fishing in the Sumnagin layers of the Bel'kachi I site, A. A. Formozov's (1970) assertion that this site is a "settlement of fishermen" is nothing short of astonishing. It should also be noted here that in sites confined to alluvial deposits the bones of fish by themselves are generally a very unreliable criterion as a basis for fishing. Their presence can often be explained by natural burial in the bank areas of the body of water.

Sumnagin culture, like the areas of all the later cultures of Stone Age Yakutia, is surprising in its "boundlessness." Such a vast area could have occurred as a consequence of special—though still unexplained—natural-historical conditions formed in Northeast Asia at least by at the beginning of the Holocene. By ethnographic analogy, precisely the same area once occupied the bearers of the Sumnagin culture was, upon arrival of the first Russian explorers, hunted by related Evenk tribes.

However, the outline of such a substantial area of the Sumnagin culture can also be explained by the fact that the comparison of archaeological sites among themselves has presently been carried out by only the most general features, due to insufficient materials (especially series of artifact forms). This can lead to the division of separate local variants and chronological stages of the Sumnagin culture, which will contribute to a deeper comprehension of the ethnogenetic processes that occurred in the early Holocene of Northeast Asia.

One important aspect in the study of the Sumnagin culture remains the question of its origin. At present we suggest that the source of the Sumnagin culture has to be sought beyond the boundaries of this region—where it was widespread 9,000 to 5,000 B.C. This supposition is based on comparison of the Sumnagin culture with the Dyuktai culture, which directly preceded it in time in Northeast Asia. We find no discernible succession of the Sumnagin culture from the Dyuktai culture.

Where did the Sumnagin people come from, and where did their culture form? We could compare the earliest Sumnagin sites recorded in the middle Lena basin with archaeological sites 11,000 to 10,500 years of age located in neighboring regions. Unfortunately, we cannot make this comparison since both in Siberia and the Far East archaeological sites in which pure cultural complexes of this time could have been separated under clear stratigraphic conditions have been very poorly studied. An exception are the well studied sites of the upper Angara area. However, analysis of both the Badai (Medvedev et al. 1971) and Verkholensk (Aksenov 1969) complexes indicate that the sources of the Sumnagin culture are not to be found in the upper Angara area. As G. I. Medvedev (1968b) and M. P. Aksenov (1969) note, the successive development of the bifacial technique occurred here, which was peculiar to the "Dyuktai" Paleolithic cultural tradition.

Judging by its appearance, the Sumnagin culture belongs to the "Mal'ta-Afontova" cultural tradition. However, we cannot connect it with a single presently-known specific culture. Apparently somewhere there must still exist an undiscovered local "Mal'ta-Afontova" Upper Paleolithic culture with an age earlier than 10,500 years from which the Sumnagin culture came. Meanwhile, the latter is most similar to the Kokoreva culture of the Yenisei. Z. A. Abramova (1970) suggests that at the end of the Pleistocene an outflow of population from the upper Yenisei into the north could have occurred. One of the leading scholars on the Paleolithic of the Yenisei, S. N. Astakhov (1973), also notes that "the origin of the Sumnagin culture must be sought on the Yenisei."

Many features similar to synchronic cultures of Eastern Europe and the Urals (blades with a beveled edge, end scrapers on blades, numerous angle burins, gravers, and even "parallelograms") also attest in some degree to a western (Yenisei area?)[18] origin for the Sumnagin culture. If an early Holocene age for the lamellar arrowheads is corroborated in the future, then the only feature distinguishing the Sumnagin culture from the early Holocene culture of Northern Europe is chopping tools with ears. The Sumnagin culture forms the easternmost link of a long chain of early Holocene cultures in northern Eurasia that are close in the appearance of their stone assemblages.

Having reached the middle Lena basin, the Sumnagin people found themselves in a distinctive, unoccupied ecological niche with rather favorable (for Northern Asia) natural conditions. The unoccupied

[18] It must be considered that the Paleolithic cultures close to the Yenisei, as Z. A. Abramova (1968) notes, also existed in the Trans-Baikal area (the Oshurkov culture). Therefore, it is possible that the origin of the Sumnagin people in Northeast Asia could also have occurred on the Vitim, Olekma, and Zeya.

territory and the abundance of game animals predetermined rather quick settlement by the Sumnagin people throughout the boundless expanse of Northeast Asia. However, these same conditions hindered the progressive development of Sumnagin culture. Over the course of more than 4,000 years, from the ninth to the fifth millennium B.C., the level of development and appearance of the Sumnagin culture remained almost unchanged. The problem of increase in the population among the Sumnagin people was due not to an increase in labor production, the development of old branches of the economy, or the appearance of new branches, but rather, most probably, was due to some increase in the density of the population. However, the population was not able play a substantial role in occupying the significant vacant hunting territories and characteristics of the economy. No influx of this new population came from the regions surrounding the Sumnagin area, attested to by the lack of change in the appearance of the culture. And so it continued until the end of the fifth millennium B.C.

At the boundary between the fifth and fourth millennia B.C., a new culture began to penetrate into the territory of the Sumnagin people from the south, a culture characterized by ground stone tools, bows and arrows, bifacially retouched knife blades, bone harpoons, and clay vessels. This culture arises from some early Holocene culture of the "Dyuktai" tradition. The new population most probably arrived from the Trans-Baikal (?) area, considering the increase there in the density of the population and pressure on it from southern neighbors. The new arrivals pushed part of the Sumnagin people aside, into less favorable regions of the Arctic, while those who remained were assimilated. Owing to assimilation of the Sumnagin people by the immigrants from the Trans-Baikal (?) area a new culture was created, called Syalakh (Pls. 87, 88). Over the course of the fourth millennium B.C. the Syalakh culture, including in itself several elements of the Sumnagin culture, spread throughout all Northeast Asia.

At the beginning of the fourth millennium B.C. the remains of the unassimilated Sumnagin people evidently penetrated into Alaska, connecting the wide distribution in Arctic America of various tools made from small knifelike blades. This proposal agrees well with the observations of many American researchers (Borden 1962; Giddings 1964; Irving 1962; Wormington and Forbis 1965). At the same time this proposal suggests that the first penetration of the Sumnagin people into Alaska occurred by the beginning stages of their settlement of Northeast Asia, which probably is corroborated by the Gallagher Flint site (Dixon 1973). This site has an age of about 10,500 years. The Sumnagin people may have been one of the first of the earliest ethnic components of the proto-Eskimos and proto-Aleuts, the final formation of which occurred in the New World.

The study of the Sumnagin culture is important not only for recreating the history of the settlement of Northeast Asia during the early Holocene, but for understanding the general regularities of the historical development of humankind. Comparison of the Sumnagin culture with concurrent archaeological cultures of various regions of Earth indicates that likely in the early Holocene the law of irregularity in the historical development of society is most noticeably manifested.

The Sumnagin culture characterizes that stage of history in Northern Asia when, at the boundary of the Pleistocene and Holocene, a noticeable lag occurred in the tribes that settled it from those centers in which the transition to a production economy occurred. This lag imposed an indelible imprint on all subsequent stages of the Stone Age of Northeast Asia.

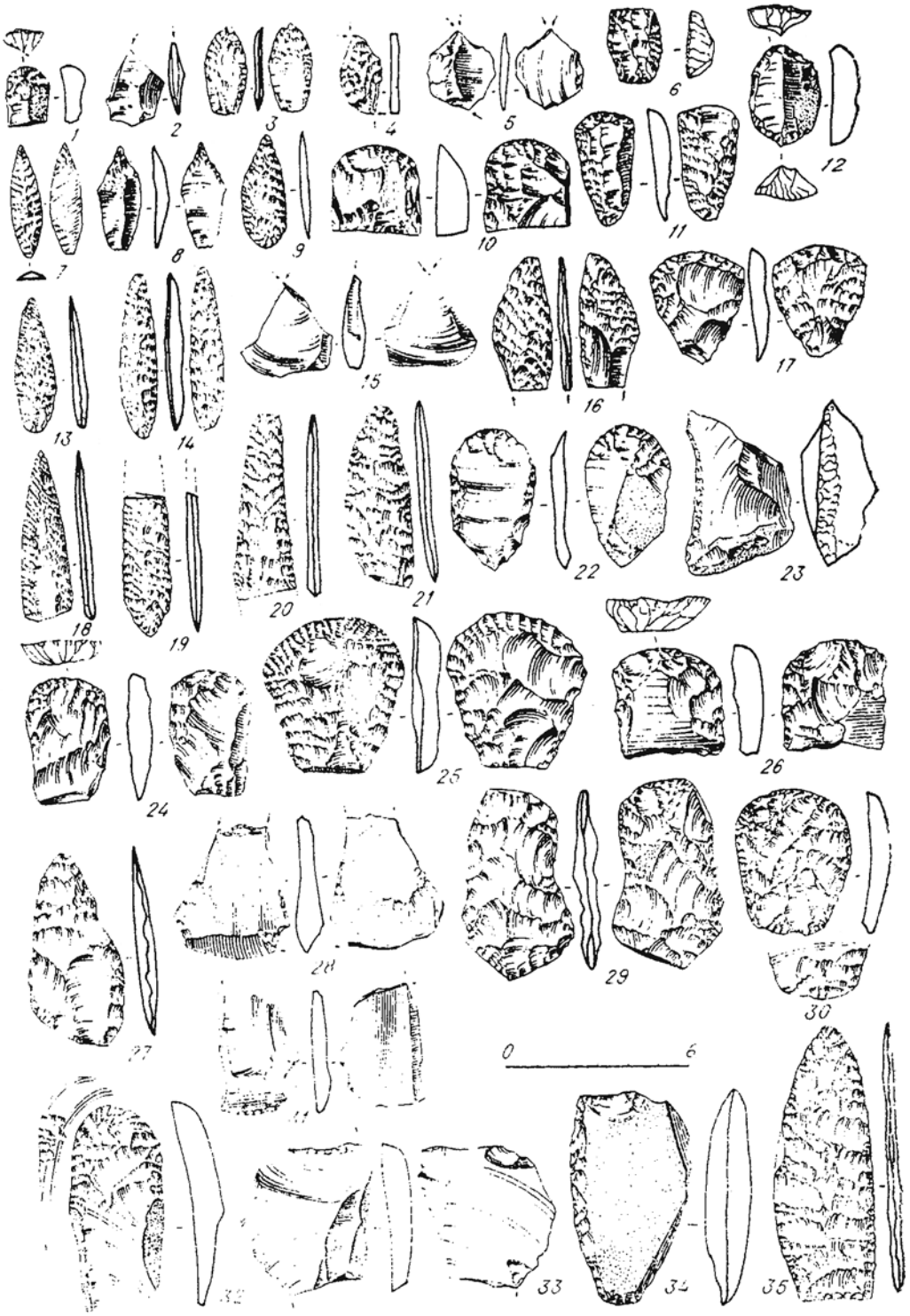

Plate 87. Stone assemblage from the Early Neolithic Syalakh culture.

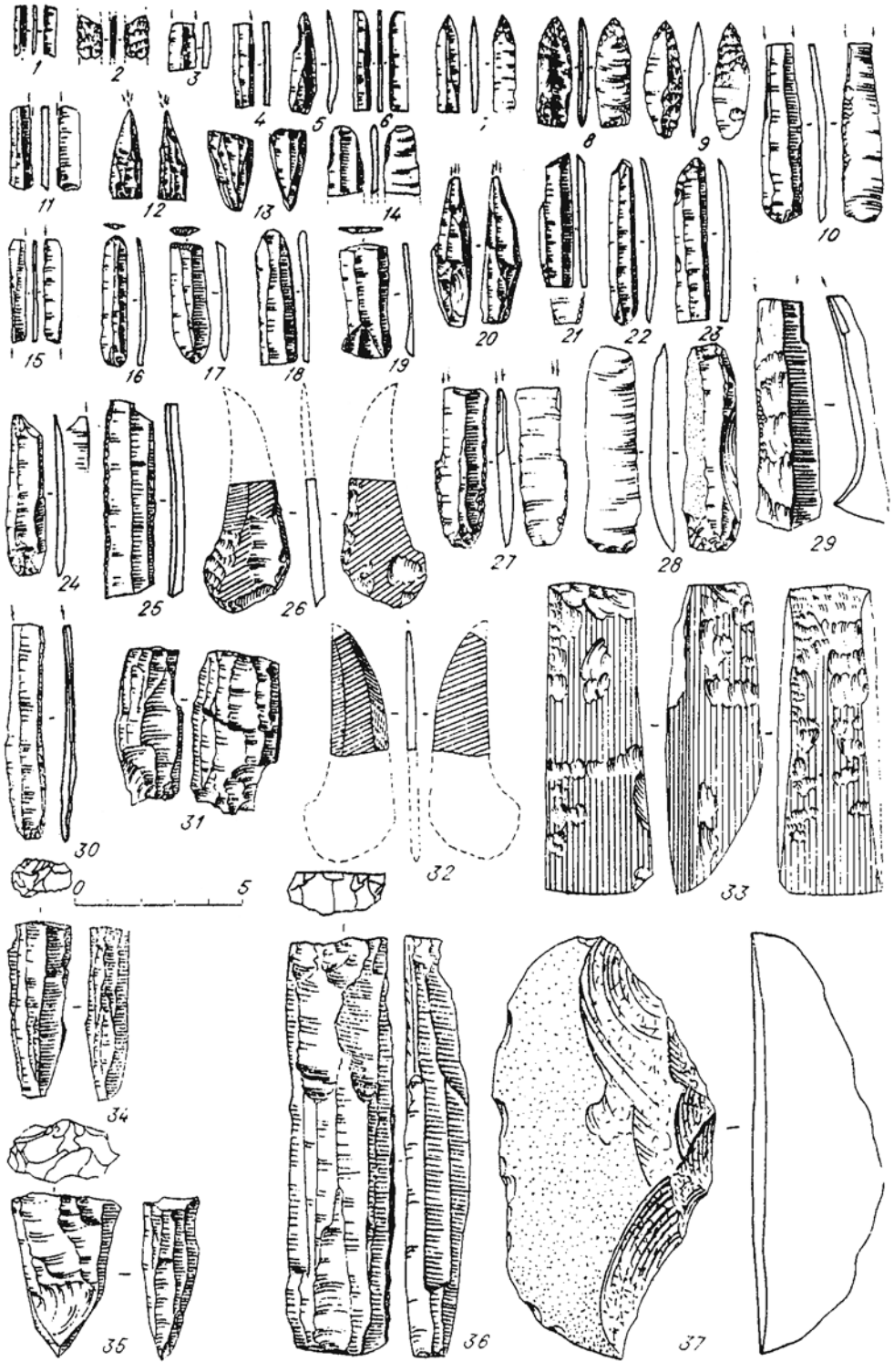

Plate 88. Stone assemblage from the Early Neolithic Syalakh culture.

CONCLUSION

Archaeological and paleogeographic data suggest that people began to settle for the first time in the southern regions of Siberia (up to approximately 54º north latitude) during the Kazantsevo or early Karginsk Interglacial, which had a warmer climate than today. The initial settlement of Siberia occurred over a "broad front" from the southern Urals, Kazakstan, and Central Asia. Characteristic evidently for the earliest Middle Paleolithic culture of Siberia, which remains almost unstudied, were bifaces and tools on blades taken from subprismatic cores.

Considering all the facts, we cannot suppose that the territory lying north of the Angara and Amur basins could have been settled by the Middle Paleolithic, which, based on contemporary data, ended about 40,000 to 35,000 years ago. This is negated by the low level of development in Middle Paleolithic culture, and as a consequence people were not able to withstand the extremely severe climatic conditions of Northeast Asia. The mid-January air temperature here was, based on approximate calculations (Giterman et al. 1968; Grichuk 1969; Sher 1971; Velichko and Gvozdover 1969), at least 25 to 30º lower than in the coldest regions of Eurasia settled by Neanderthals.[19]

The widespread settlement of Upper Paleolithic people throughout Northeast Asia, which began about 35,000 years ago, can be explained in several ways: relative overpopulation in southern regions of Siberia and the Far East; good adaptation of *Homo sapiens* to severe periglacial circumstances by the early stage of the Upper Paleolithic; the presence of well warmed houses and specialized "Arctic" clothing of animal skins (variety of stone scrapers became very numerous in the Upper Paleolithic and bone needles appear); and finally, the comparative uniformity at different latitudes in Northeast Asia of vegetation that included a wealth of grassy pastures. The latter circumstance, together with insubstantial snow cover in winter and hardness of the ground in summer, predetermined a large number of mammals, and in particular, bison, horse, mammoth, and woolly rhinoceros, which were the primary objects of the hunt of Paleolithic people.

The various Upper Paleolithic sites of Northern Asia are presently known to belong to two different cultural traditions. To the first, which was given the name "Mal'ta-Afontova," belong sites that are characterized by stone tools worked primarily by edge retouch. For sites of the second tradition, called "Dyuktai," bifacially worked stone knives and spear points are most typical. Sites of the "Mal'ta-Afontova" tradition are located primarily west of the Lena basin, while "Dyuktai" sites are in the Lena basin and east of it. The difference between them cannot be explained by direct influence of the natural environment, since the raw material for making tools and hunting equipment were practically the same in the different regions of Northern Asia. The local cultures of the first tradition are probably genetically connected with Middle Paleolithic "unifacial" cultures of Central Asia and, in part, of Mongolia. The local cultures of the second tradition evidently go into a Middle Paleolithic "bifacial" cultural stratum, represented by several sites in the Urals, Kazakstan, and Mongolia.

[19] If Middle Paleolithic sites in this territory should one day be discovered, the basic traditional ideas either about the level of development of the material culture of the Middle Paleolithic or about the influence of the climate of Northeast Asia on the life of early people will have to be changed.

Close typological similarity of the Dyuktai artifacts with the earliest Paleoindian ones suggests that separate Dyuktai populations, beginning 33,000 to 30,000 years ago, could have gradually penetrated through Beringia to Alaska following the "mammoth" fauna and farther into the depths of America. The advance of Dyuktai people into Alaska was evidently repeatedly interrupted during the interstadials of the Sartan (Woodfordian) Glaciation, but the approach from Alaska to the south was open at this time through the Canadian ice sheet. The last northeast Dyuktai people, who were evidently ancestors of different populations of American Indians, left their area and went to Alaska about 10,500 years ago. At the same time some Dyuktai populations continued to occupy Cis-Baikal, Trans-Baikal, and the Amur River area.

The place of the Dyuktai people in Northeast Asia about 10,500 years ago became occupied by the Sumnagin people—hunters of moose and reindeer. The Sumnagin people were descendants of some yet unrevealed Yenisei-area (?) population, the culture of which must have belonged to the "Mal'ta-Afontova" tradition. The Sumnagin culture existed in Northeast Asia until the fourth millennium B.C. Some Sumnagin populations, beginning approximately 10,000 years ago, probably moved along the ice from Chukotka to Alaska following the reindeer and gradually spread throughout Arctic America all the way to Greenland. From our point of view, the Sumnagin people who moved to America were one of the primary and earliest components of that which formed the proto-Eskimo-Aleut population.

The radiocarbon dates and analysis of archaeological materials, reinforced by stratigraphic observations, indicate that the Upper Paleolithic has approximately the same antiquity in Northeast Asia as in Europe and the Near East. This brings into doubt the division of the whole Paleolithic world into two regions—"European" and "Afroasiatic"—in the first of which "the Upper Paleolithic emerged simultaneously and 20,000 years earlier than in Africa and the remaining (except the Near East—*Yu. M.*) territory of Asia" (Grigor'ev 1968:123). The supposition that "the process of sapientization in these territories (Africa and Asia without the Near East) passed with the same delay" also does not seem convincing (Grigor'ev 1968:123).

The archaeological and paleogeographic data that are supplemented each year attest that during the Pleistocene in northern Eurasia, which was accessible at different stages for habitation human occupation from the Atlantic to the Pacific Ocean, the historical processes of development of human society, with all its multilinearity and imprinted in the archaeological materials, were carried out in the same direction with approximately identical tempos. This can probably be explained by the equal possibilities placed before the early groups as representatives of the genus *Homo*, who lived in rather similar ecological conditions.

At the boundary of the Pleistocene and Holocene, in some relatively overpopulated regions of the globe, situated primarily between 20º and 40º north latitude, under the influence of changes in natural circumstances that led to a sharp reduction of game animals, and with the simultaneous presence of favorable conditions for the domestication of some species of animals and the cultivation of plants, occurred the gradual change from an appropriating economy (hunting, fishing, and gathering) to a production economy (livestock breeding and agriculture). With time, the earliest stages in history are developed here. Advanced centers begin to show ever more notable progressive influence on neighboring regions.

In Northeast Asia an appropriating economy continues to exist at the beginning of the Holocene. No stimulus or conditions for change to a new economic way of life were found here. The taiga and tundra, as before, provided the necessary requirements for people. The problem of excess population was resolved by more intensively opening of hunting territories.

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ABBREVIATIONS

AIChPE—Assotsiatsiya po izucheniyu chetvertichnogo perioda v Evrope [Association for the Study of the Quaternary Period in Europe].

AN—Akademii nauk [Russian Academy of Sciences].

ASSR—Avtonomnaya Sovetskaya Sotsialisticheskaya Respublika [Autonomous Soviet Socialist Republic].

ChOKM—Chukotskogo okruzhnogo kraevedcheskogo muzeya [Chukotka District Regional Museum].

GAIMK—Gosudarstvennaya akademiya istorii material'noi kul'tury [State Academy of the History of Material Culture].

GIN—Geologicheskii institut Akademii nauk SSSR [Geological Institute of the Academy of Sciences of the USSR].

IE—Institut etnografii [Institute of Ethnography].

In-t—instituta [of the institute].

IYaLI—Institut yazyka, literatury i istorii [Institute of Language, Literature, and History].

Izd-vo—izdatel'stvo [publishing house].

Izv.—izvestie [news].

KSIA—Kratkie soobshcheniya Instituta arkheologii [Brief Reports of the Institute of Archaeology].

KSIIMK—Kratkie soobshcheniya Instituta istorii material'noi kul'tury [Brief Reports of the Institute of Material Culture].

MIA—Materialy i issledovaniya po arkheologii SSSR [Materials and Investigations of the Archaeology of the USSR].

Otd-nie—otdelenie [division].

PAE—Prilenskaya arkheologicheskaya ekspeditsiya [Prilensk Archaeological Expedition].

RAN—Russkaya akademii nauk [Russian Academy of Sciences].

SA—Sovetskaya arkheologiya [Soviet Archaeology].

SE—Sovetskaya etnografiya [Soviet Ethnography].

SO—Severnyi otdel [Northern Division].

SSSR—Soyuz Sovietskikh Sotsialisticheskikh Respublik [Union of Soviet Socialist Republics].

SVKNII—Severo-Vostochnogo kompleksnogo nauchno-issledovatel'skogo instituta [Northeast Interdisciplinary Scientific Research Institute].

Tr.—trudy [works].

TsChO—Tsentral’no-Chernozemnaya oblast’ [Central Chernozem Region].

Un-ta—universiteta [university].

VSORGO—Vostochno-Sibirskoe otdelenie Russkogo geograficheskogo obshchestva [East Siberian Division of the Russian Geographic Society].

Vyp.—vypis’ [issue].

YaGU—Yakutsk gosudarstvennogo universiteta [Yakutsk State University].

Zap.—zapiski [notes].