The Siberian Mousterian

——An outsider's view of the Middle Paleolithic of the Gorno-Altaysk District——

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Recent research on Middle Paleolithic cultures, especially those in the Levant has become very entangled and complicated. Many scientific methods such as age dating and environmental data have produced results in various spheres, but they are different from each other in method and premise. Therefore the reliability of their results is not easily comparable. Since most scholars work on the basis of results in many spheres, their understanding of the past is often hindered. Each hypothesis should be proposed independently within its own field anthropologically, ecologically or archaeologically.

Fossil skeletal remains are rarely found. However once they are discovered, anthropological data take on a conclusive role as at Qafzeh in Palestine (Valladas et al. 1987, 1988). If the remains are thought to be related with lithic assemblages then related assemblages from many sites are assigned as products of men who belonged to the same group of mankind. At first, we archaeologists should compare and consider assemblages of stone implements from their own characteristics without thinking of anthropological data.

Attribute analysis is the ideal way to compare assemblages. The comparisons of fossil directeur and ratio or indices of each assemblage don't solve the problems. Detailed analysis of the attributes of each artifact should be carried out and one should look for ways to solve problems in the attributes and interrelationships of the attributes. Scholars in each field have to think of features on the basis of their own data. Then the hypotheses which are proposed in each field can be comprehensively discussed, tested and compared.

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In 1990 the author had the chance to visit the Gorno-Altaysk District through the courtesy of Dr. A. P. Derev'anko, Director of the Institute of History, Philology and Philosophy, Siberian branch of the USSR Academy of Sciences. The author visited many Middle Paleolithic sites and observed many stone tools which have already been investigated by members of the Institute.

The author was able to recognise the characteristic features of the Siberian Mousterian, especially flaking techniques and site catchment patterns. He found that a special technique related to Levallois technology was in existence and tentatively named it the "Altay Technique". This is a kind of *chapeau de genderme* technique. It appeared in the early assemblages of the Siberian Mousterian in this region but became less common in the later assemblages. Its development is thought to be closely related with the rise and decline in the ratio of Levallois blades and elongated Levallois points. The lower layers have more Levallois blades and elongated Levallois points whereas the upper layers have more broad centripetal Levallois flakes. The same features are seen in the Levantine Mousterian.

Another characteristic feature is site catchment patterns. The sites in this region are mainly located along the tributaries of the Obi, one of the longest rivers flowing into the Arctic Ocean. They are both cave and open sites. Most cave sites face south. Sites in this region can be divided into two types, large and small. The former are located near the junction of tributaries and therefore have larger foraging areas. The latter are situated in front of narrow gorges and have very limited hunting territories. The two types of sites are thought to have played different roles in the daily life of the people of that time.

The author describes the features of the Siberian Mousterian mainly from the perspectives of flaking technigue and site catchment patterns. It is necessary that the features of the Middle Paleolithic are thought by an archaeologist with his own data without data from other fields. This is the only way to make clear the complexities surrounding the Middle Paleolithic.

Because of the author's short stay in the Gorno-Altaysk District this paper may contain many misunderstandings. The following perspectives should be seen as an outsider's view of the Siberian Mousterian. The author thinks that it is useful to attempt to place the Siberian Mousterian in its appropriate position in the Old World Prehistory.

As its name implies the Siberian Mousterian belongs to the western tradition of the Old World Paleolithic. It has close relations with the Mousterian of the southwestern USSR and the Levantine Mousterian and is thought to be the most eastern group of the Mousterian family. In Mongolia, some industries which are called Mousterian have been reported, but the Mousterian elements are considered much diluted and the author thinks they do not belong to the Mousterian tradition.

3

The Gorno-Altaysk District is mountainous, with many ranges with an altitude of about

2500–3000m. The highest peak is Mt. Belukha with an altitude of 4506m. The many tributaries of the Obi cut through these ranges and make deep gorges. In the midst of the mountains, there are many plateau basins at altitudes of 500–1000m. At present people mainly live in these basins, raising animals. The sites of the Siberian Mousterian are also located around these basins.

There are meadows at the bottom and lower slopes of the basins. Mixed forest grows on the steeper slopes and near summits with lower altitudes. Coniferous forest is seen at the top of ranges with an altitude higher than 1000m. The natural vegetation of the Gorno-Altaysk District is thought to be grassland with sporadic forest.

The mean annual temperature of Barnaul which is located on the plain near the mountainous Gorno-Altaysk region is 1.4°C. Barnaul has an altitude of 196m. It becomes hot in summer with a mean temperature in July of 20.0°C and cold in winter with a mean January temperature of −17.7°C. The climate of Barnaul is typically continental. The index of warmness proposed by Dr. T. Kira (1971) is useful in the comparison of vegetational zones*[1]. Barnaul has a value of 52.9 which, compared with the mean annual temperature, is rather high (Table 1). The annual rainfall of Barnaul is 454mm which mostly falls in summer. This precipitation is not abundant but adequate for trees to grow. The climate of the central Siberia region including Krasnoyarsk, Kirensk and Semipalatinsk is as continental as that of Barnaul. The sites of the Middle Paleolithic in the Gorno-Altaysk District are mainly situated at an altitude of 500–1000m. Therefore it can be assumed that the mean annual temperature there is 2–3°C lower and the index of warmness is 10–15 lower than that of Barnaul.

The climate of Europe is mild. The mean annual temperature of cities of western and central Europe such as London, Paris, Berlin and Warsaw is 8–11°C and the indices of warmness are 60–75. The mean annual temperature of cities of eastern and northern Europe such as Stockholm, Leningrad and Moscow is 4–6°C and the index of warmness is about 50. The hottest month is July and the mean monthly temperature is almost the same, 17.5 −19.5°C. The annual precipitation of these cities is 500–600mm. Siberia has hotter summers and colder winters. The precipitation of Barnaul is almost the same as these European cities.

It is very hard for humans to live under the climate of Barnaul, especially in winter. The monthly mean temperature of the large European cities rarely drops under −10°C even in the coldest month and most of them are more than 0°C. It is warm and mild in southwestern France where many sites of the Middle Paleolithic are found. For example,

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	mean annu	Ind. of warm
Barnaul	(196:53° 4)	-17.7	-16.3	-9.1	2.8	11.8	18.0	20.0	17.3	10.8	3.3	-8.6	-15.3	1.4	52.9
Krasnoyarsk	(194:56° 0)	-17.2	-15.2	-8.2	1.8	9.2	16.2	18.5	15.2	9.1	2.2	-9.5	-15.8	0.5	43.2
Kirensk	(261:57° 5)	-27.3	-24.2	-14.3	-1.8	7.0	15.2	18.3	14.6	6.9	-1.6	-16.6	-25.4	-4.1	37.0
Irkutsk	(467:52° 2)	-20.8	-17.8	-9.3	1.6	8.8	15.4	17.9	15.1	8.2	1.1	-10.8	-18.5	-0.8	40.4
Chita	(662:52° 0)	-26.0	-21.4	-11.5	0.2	8.6	16.0	18.2	15.5	7.5	-0.9	-14.6	-23.4	-2.7	40.8
Semipalatinsk	(206:50° 2)	-16.8	-15.8	-8.1	5.5	14.3	20.3	22.2	19.6	12.8	5.0	-7.0	-13.8	3.4	64.7
London	(5:51° 5)	4.2	4.4	6.6	9.3	12.4	15.8	17.6	17.2	14.8	10.8	7.2	5.2	10.5	66.9
Paris	(53:49° 0)	3.1	3.8	7.2	10.3	14.0	17.1	19.0	18.5	15.9	11.1	6.8	4.1	10.9	74.9
Berlin	(49:52° 5)	-0.5	0.2	3.9	9.0	14.3	17.7	19.4	18.8	15.0	9.6	4.7	1.2	9.5	68.8
Warszawa	(107:52° 2)	-2.4	-3.3	0.6	7.3	12.9	17.3	18.7	17.8	13.1	8.2	3.0	0.4	7.8	60.3
Moskva	(156:55° 8)	-9.9	-9.5	-4.2	4.7	11.9	16.8	19.0	17.1	11.2	4.5	-1.9	-6.8	4.4	51.0
Leningrad	(4:60° 0)	-7.6	-7.9	-4.3	3.3	9.9	15.4	18.4	16.8	11.2	5.1	-0.2	-4.4	4.6	46.8
Stockholm	(10:59° 4)	-2.9	-3.1	-0.7	4.4	10.1	14.9	17.8	16.6	12.1	7.1	2.8	0.1	6.6	48.7

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	annu rainfall
Barnaul	(196:53° 4)	19	18	20	26	38	52	79	52	39	40	40	31	454
Krasnoyarsk	(194:56° 0)	12	9	10	22	38	58	83	65	47	34	25	17	419
Kirensk	(261:57° 5)	19	11	7	14	27	66	67	56	36	28	25	25	381
Irkutsk	(467:52° 2)	12	8	9	15	29	83	102	99	49	20	17	15	458
Chita	(662:52° 0)	2	2	4	7	20	51	93	90	51	12	7	4	343
Semipalatinsk	(206:50° 2)	14	15	17	19	22	30	32	23	21	22	27	22	264
London	(5:51° 5)	53	40	37	38	46	46	56	59	50	57	64	48	594
Paris	(53:49° 0)	54	43	32	38	52	50	55	62	51	49	50	49	585
Berlin	(49:52° 5)	41	37	30	39	44	60	67	65	45	45	44	39	556
Warszawa	(107:52° 2)	25	28	20	32	40	60	79	47	41	31	31	37	471
Moskva	(156:55° 8)	31	28	33	35	52	67	74	74	58	51	36	36	575
Leningrad	(4:60° 0)	36	32	25	34	41	54	69	77	58	52	45	36	559
Stockholm	(10:59° 4)	43	30	26	31	34	45	61	76	60	48	53	48	555

Table 1 Temperature and precipitation of the main cities neighboring the Gorno-Altaysk District and Europe. Numbers in parentheses show the altitude and latitude (°N) of each meterological station.

the mean annual temperatures of Lyon and Toulouse are 11.4 and 12.5°C. Their indices of warmness are 82.8 and 90.3. The coldest monthly mean temperatures are 2.1 and 4.5°C. The climate of the Gorno-Altaysk District today is very severe.

Pollen analysis in the Gorno-Altaysk District shows that the climate of the early Middle Paleolithic had been warmer than today, then it gradually became colder followed by repeated spells of warmness and coldness (Derev'anko et al. 1990:35-38, personal communication with G. M. Levkovskaya, Institute of Archaeology, Leningrad who has undertaken palynological studies in this region). It also shows that grassland has always exceeded forest. It can be assumed that the early inhabitants of this region came there when the climate was warmer and milder. Upper Paleolithic sites are few in number there, especially sites which can be assigned to the last glacial maximum. At that time it was too cold for human habitation. The same features are seen in the Iranian Plateau, the Anatolian highland and the Caucasian Plateau. Middle Paleolithic sites are the most abundant in these regions and sites decreased remarkably in the Upper Paleolithic, only to gradually reappear at the end of the Pleistocene.

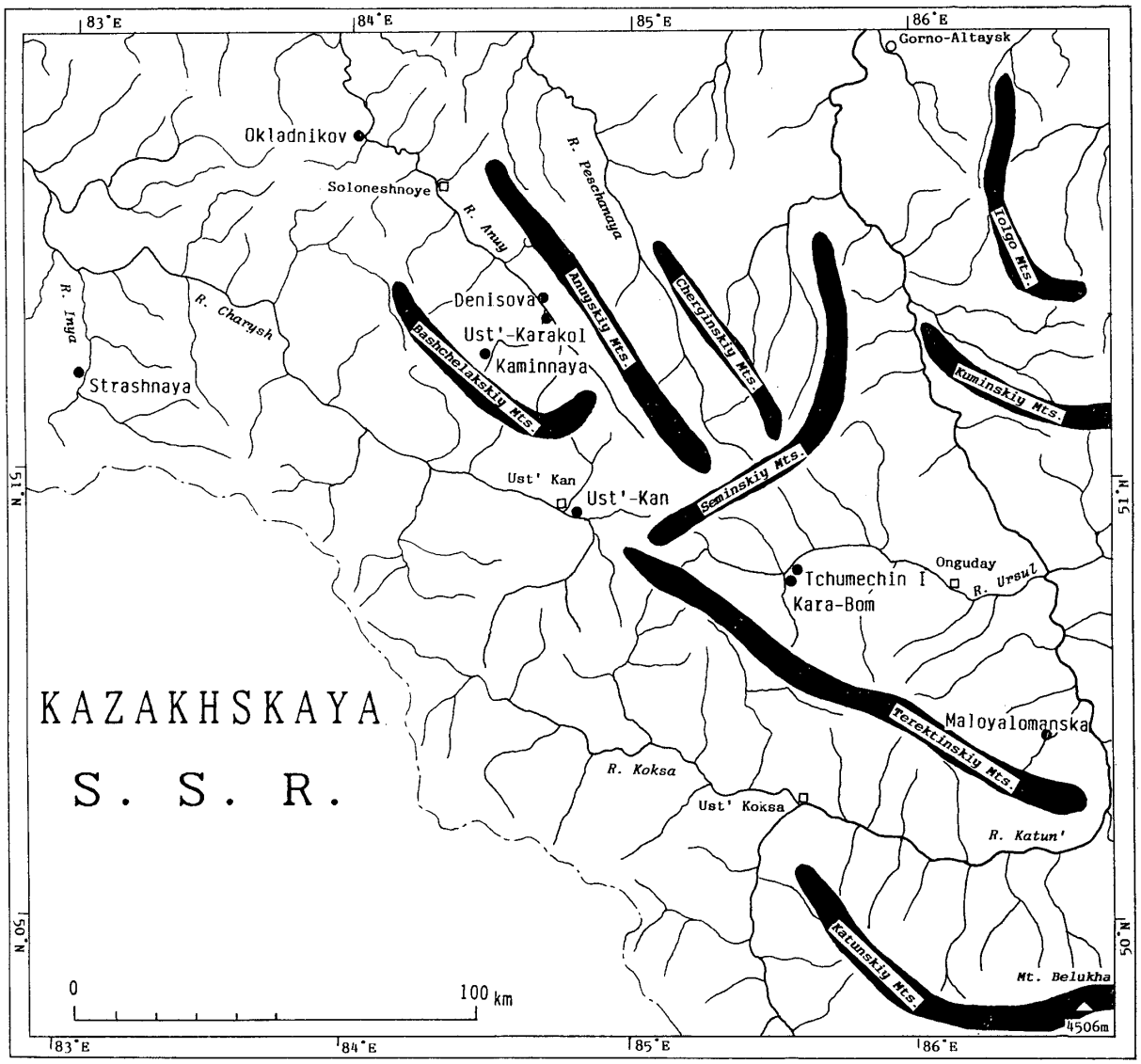

Figure 1 The Gorno-Altaysk District and the main sites of the Middle Paleolithic.

Middle Paleolithic sites in the Gorno-Altaysk District are more numerous than those in the Russian plain. Velichko's (1988) environmental study of the Middle Paleolithic period shows that the climate of the Caucasian Plateau was different from that of the Russian Plain and that the former was milder than the latter. The milder climate extended to the Anatolian highland and the Iranian Plateau. This milder zone is also assumed to have extended to the northeast, via the Kazakh highland to the Gorno-Altaysk Plateau.

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As described above, the Middle Paleolithic sites of this region are located along the tributaries of the Obi (Fig. 1). Cave sites face south, not north. The southern slopes are

steep and naked; on the other hand the northern slopes are gentle and forested (Pl. 1-1, 2). This feature may have been caused by the climate of this region. In winter, it is very cold now and it can be assumed this climate has continued for a very long time, since the beginning of the Pleistocene or ever earlier. The southern slopes are warmed by sunshine in the daytime and the snow and ice melt. Melting water penetrates the fissures of the rocks. At night, this water freezes widening fissures. Finally, the rocks crack and fall down. This process is repeated everyday in winter.

This is assumed to be one of the main landscape formation processes in this region. The mountain ranges are mainly composed of limestone. Penetrating water dissolves the limestone, cracks became gradually larger and larger, then caves appeared. On the other hand, the northern slopes do not become warm even in the daytime and are always frozen in winter. Therefore the rocks of the northern slopes do not split or crack. Because of this, trees have been able to grow and caves have not been formed. The author believes this is the reason why caves do not exist on the northern slopes.

It is thought that the people of the Middle Paleolithic period used stone materials from nearby river beds. Although slight differences are visible, the stone materials used at any one site are almost the same. Pebbles from the nearest river were preferred. Special material of distant origin cannot be recognized. Large river gravels with a length of about 20cm or larger are thought to have been used. Most observed cores have cortex on their surfaces as do a fairly large number of flakes. These features show flaking was carried out at the site.

Analyses of animal remains show that the animals hunted by the Middle Paleolithic people mainly consisted of herbivorous animals, especially several kinds of deer, which always live in herds. Forest-dwelling animals are few in number. As described above, pollen analysis of this region shows that grassland has continued to occupy the larger part of the Gorno-Altaysk District since the beginning of the upper Pleistocene. These results do not contradict each other. It can be thought that hunting herbivorous animals which live in herds was the main subsistence pattern of the Middle Paleolithic people of this region.

Today the main industry of the Gorno-Altaysk District is the raising of various kinds of animals. Mixed faming of cereals, beans and so on occurs in the valley beds, but most of the products are used as animal fodder. Many rock paintings and engravings are seen in the Gorno-Altaysk District and neighboring regions. Herbivorous animals had been painted and engraved on rocks for several thousand years. They were painted and engraved from the bronze age Afanashevo phase to the medieval period. The main theme of these paintings

and engravings is herbivorous animals.. Superimposed figures of animals are sometimes seen. They show the importance of the rock art and that raising or hunting herbivorous animals has long been the most fundamental subsistence pattern in this area. This lifeway is assumed to have begun in the Middle Paleolithic when people first inhabited the Gorno-Altaysk District. Although interrupted many times, it is the traditional and most appropriate way of life for this region.

Today the raising of animals flourishes from the Gorno-Altaysk District to the southwest. It is the basic way of life in the Iranian plateau, the Anatolian highland and the Caucasian plateau, and the drier parts of western Asia might also be included. It is also in these regions that the characteristic feature of numerous Levallois blades and elongated Levallois points with minimal retouch are seen in the early Middle Paleolithic period. It can be assumed that the most appropriate way of life using Levallois blades and elongated Levallois points was formed in these regions at that time. Although each stone tool type underwent changes, this way of life is thought to have been stable and to have continued until the end of the Middle Paleolithic period.

Why then, did this way of life diminish so remarkably in the Upper Paleolithic period? One reason may be the fact that these regions became colder in the Upper Paleolithic, especially during the last glacial maximum. The way of life which had been formed in the Middle Paleolithic period was too specialized for the environments of that time. Therefore, once the climate changed, people were not able to readjust to the new environment.

Keeping the facts mentioned above in mind, the flaking technique of stone implements and site catchment patterns of the Middle Paleolithic period in the Gorno-Altaysk District will be discussed in the following.

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As described above Middle Paleolithic sites in the Gorno-Altaysk District can be divided into two types. The first type is larger and has many lithics and animal remains. Most are located near the junction of the tributaries of the Obi and therefore have wide catchment areas consisting of many different ecological niches: river, riverbank, swamp, grassland and so on. Using these various niches, the site inhabitants were able to exploit diverse resources around the sites. Moreover, the various ecological niches produced different resources seasonally and each niche has a wide area containing an abundance of each resource. This type of site is termed larger or L-type. L-type sites are generally not so high above a riverbed. They are backed by large flat areas or gentle hills and the inhabitants could

exploit those resources, too.

The other type of site is called smaller or S-type. Most have a narrow catchment area and are generally small narrow caves. They do not have many lithics or animal remains. They face deep gorges and therefore have limited exploitation areas within a very simple environment consisting of fast-flowing river and narrow bank. Most are located on steep slopes and do not have flat or gentle hills behind the site. Some of them are very high above the riverbed. The exploitation areas and activities of S-type sites were very restricted. Living in such sites throughout the year would have been impossible.

L-type sites

Okladnikov Cave, Ust'-Kan Cave and Kara-Bom are representative of L-type sites. Okladnikov Cave (Derev'anko 1990:38–44, Derev'anko et al. 1987:13–28, Derev'anko et al. 1990:104–117) is situated on the western bank of the river Anuy, one of the tributaries of the Obi, about 135km west-south-west of Gorno-Altaysk. It is located near the junction of the Anuy and its tributary from the west and has a large exploitation area. Its altitude is about 500m, one of the lowest sites in the Gorno-Altaysk District. It is composed of a shelter, a chamber, three galleries and several unexcavated chambers all of which were made by calcareous dissolution. The bedrock is of limestone.

Artifacts and animal remains were found from these five components. The shelter is 42×8m large, 2m high (Pl. 2–1) and contains the main deposit of this site. The cave is 14m above the riverbed and faces south. The deposits are fairly thin (about 1m). The cave has 7 layers and artifacts and animal remains were found from layers 1, 2, 3, 6 and 7 (the lowest). The total number of stone tools and flakes is 3824. More than three quarters of the artifacts came from layers 2 and 3.

In front of the cave extends the large riverbed of the Anuy and its tributary with various ecological niches such as grassland, marsh and so on. Herds of sheep and goats feed here and there. On the other side of the river, gentle hills mainly of grassland extend to the south, east and west (Pl. 2–2). Behind the cave, grassland also covers the gentle northern slope. The landscape around the cave is mild. The Anuy flows slowly and on a fine summer evening it is a beautiful place. The author felt this to be one of the best spots to live in the Gorno-Altaysk District because of the potential to exploit various natural resources.

Ust'-Kan Cave (Rudenko 1960, Derev'anko et al. 1990:127–133) is situated on the northern bank of the river Charysh, one of the tributaries of the Obi, about 3.5km east of

the small town of Ust'-Kan and about 140km southwest of Gorno-Altaysk. Its altitude is about 1000m. It is located near the junction of the Charysh and its tributary from the south and has a large exploitation area. The cave has a chamber of 9×17m formed from limestone. The height of the entrance is 4m and the highest point of the ceiling is 12m. It has a fairly large chamber of about 150m² (Pl. 3-1, 2). It faces south and as the ceiling of the cave is rather high, it is bright inside. The report notes that it was a warm cave.

The cave is 52m high above the riverbed. It is much higher than Okladnikov Cave, but the slope east of the cave is not so steep that one cannot climb to the cave fairly easily. There was only one Middle Paleolithic layer where 467 artifacts were found. The deposits of this cave are only about 1.5m thick. Sixteen Upper Paleolithic artifacts were found in addition to the Middle Paleolithic artifacts. The stratigraphical relationship of these two assemblages is not clear.

Ust'-Kan Cave has a large exploitation area with various ecological niches such as grassland, marsh, river, riverbank and so on in front of the cave. Ust'-Kan, the main town of the south Gorno-Altaysk District is located in the same environment. Many tributaries flow into the Charysh from the south and north, forming a basin 20km to 15km long. On the southern bank of the Charysh, gentle hills of grassland extend far to the south (Pl. 3-3). Directly behind the cave, there is a steep slope, but this slope becomes gradually gentler to the east and the west. Around the cave, extend various large ecological niches. The inhabitants of this cave were able to exploit rich natural resources in all seasons,

Kara-Bom is not a cave but an open site under the large rock named Kara-Bom (black rock). It has springs nearby. It is situated on the eastern bank of the river Ursul, near the junction with its tributaries (Derev'anko et al. 1990:133-142), about 135km south-south-west of Gorno-Altaysk. Its altitude is about 1100m, It faces south to southwest. It is a large site of about 30 ×15m. Because of the shape of bedrock, its deposits are uneven and the deepest is about 2.5m thick. The deposits are divided into 6 geological layers and 3 cultural stages: upper: the early stage of the Upper Paleolithic; middle: the transitional stage from the Middle to the Upper Paleolithic; and lower: the Middle Paleolithic. As the investigation of the site is still continuing, the full inventory of remains has not been published but many artifacts have been discovered.

Kara-Bom is surrounded by various ecological niches. There is marsh directly in front of the site; grassland, river, riverbed and so on extend to the south and to the west. Grassland extends widely to the east and to the southeast of the site. As many tributaries of the Ursul join that river nearby, a basin of 25km by 10km is formed. In this basin

small settlements are seen here and there. The exploitation area is varied and large, and gentle grassland spreads all around. It is one of the best places for hunting herbivorous animals.

As mentioned above, L-type sites share certain similarities: they are large-sized sites, with wide exploitation areas and various ecological niches and are located in a basin near the junction of tributaries. Flat or gentle grassland extends around the sites and many artifacts are found. The large-sized sites could have been inhabited by a large number of people. Large and varied exploitation areas can maintain many people. The various ecological niches can be used in diverse seasons.

These features observed in all of the L-type sites show that they had the same basic meaning in the life of the inhabitants of the Middle Paleolithic period of the Gorno-Altaysk district. The inhabitants of that time are mainly assumed to have depended on L-type sites. Therefore, the L-type sites were the most important for the society of that time in this region. For understanding the basic life of the Middle Paleolithic people it is important to analyse the features of the L-type sites from all angles.

S-type sites

Strashnaya and Maloyalomanska Caves are typical S-type sites. Denisova Cave has a large chamber, but a very narrow exploitation area so it must be considered an S-type site. Size of exploitation area was more important than size of living space. Strashnaya Cave (Derev'anko et al. 1990:117–123) is situated on the western bank of the Inya, a tributary of the Charysh, about 220km southwest of Gorno-Altaysk. Its altitude is about 600m. It is a small cave of 3×10m with a height of 2–3m. Only a few people would have been able to inhabit such a cave. Because the ceiling of the entrance is low, it is dark inside. It is 45m above the riverbed, and the slope from the riverbed to the cave is too steep to climb. The cave faces southeast. It has deep deposits of 9.6m which are divided into 6 layers. Artifacts are not numerous.

Although the riverbank is fairly wide, exploitation areas are narrow. The slope around the cave is mainly grassland with a few small tree and is too steep to exploit. On the other side of the river, a steep slope also cannot be easily exploited. The only exploitable zone is riverside grassland with sporadic small trees. This zone is about 100m or so wide and a very simple ecological niche extending south to north along the river.

Only limited subsistence activity is possible in a simple ecological niche. It is very difficult for numerous people to stay long. Very narrow living space, small exploitation

areas and a simple ecological niche are assumed to have been used for limited activity of several people in a restricted season such as the hunting of migratory herbivorous animals. If animals migrated along the river, this cave would be the best place for watching animal movements or for hunting. Anyhow, the features of this cave are completely different from those of the L-type sites. S-type sites had a different role from L-type sites in the subsistence pattern of the inhabitants of this region.

Maloyalomanska Cave (Derev'anko et al. 1990:149–156) is situated on the northwestern bank of the Malyy (little or lesser) Yaloman, one of the tributaries of the Obi, about 175km south of Gorno-Altaysk. Its altitude is about 900m. It is a small cave with two chambers. The eastern chamber is short (1.8m×6.5m) and the western chamber is 2.3m×3.75m long with two corridors 32m and 16m long. The height of the entrance is about 2m. Both chambers are too narrow for numerous people to inhabit. As the ceiling is low, it is dark in the cave. It is 27m above the riverbed (Pl. 4–1) and faces southeast. The cave deposits are only about 1m thick and are divided into 4 layers. Artifacts are not numerous. Although the thickness of deposit is different, this cave is almost the same as Strashnaya Cave in many features.

The exploitation territory around the cave is narrow. Both sides of the river are steep grassland with sporadic trees. Because of their steepness, they cannot be used as exploitation areas. The only exploitable area around the cave is the riverside as was the case with Strashnaya Cave. The river flows from the southwest to the northeast. The same ecological niche extends along the river (Pl. 4–2). Although the riverbank is narrow and the river small, the situation around the cave is almost the same as that at Strashnaya.

Narrow living space, small exploitation areas and a simple ecological niche are all aspects seen around Strashnaya Cave. Maloyalomanska Cave is thought to have been used for the limited activity of several people in a certain season. This is fundamentally different from the features of L-type sites.

Denisova Cave (Derev'anko 1990:33–38, Derev'anko et al. 1987:4–13, Derev'anko et al. 1990:27–49) is situated on the northeastern bank of the river Anuy, one of the large tributaries of the Obi, about 105km southwest of Gorno-Altaysk. Its altitude is about 700m. It is a fairly large cave of 32m×7m. Its width increases in the back and the widest part is 10–11m wide. Its height is about 4–5m. It has a chimney with a diameter of 1m in the main chamber. In addition, there are two galleries to the east. It faces southwest. Because of the height of the ceiling, it is bright at the entrance but it becomes darker at the back. It is 28m high above the riverbed. It is a limestone cave and has been eagerly investigated

by the Institute of History, Philology and Philosophy in Novosibirsk since 1977. The main chamber and the terrace in front of the main chamber have been partly excavated.

The deposits of the main chamber are 5.6m thick and divided into 22 layers. The upper 8 layers (layers 1 to 8) are assigned to the metal age. The lower 14 layers (layers 9 to 22) are thought to be Paleolithic. The deposits of the terrace are also about 7.5m thick and are divided into 17 layers. The upper 4 layers are of the metal age while layers 5 to 10 are thought to belong to the Paleolithic period. The lower 7 layers are sterile. Both sequences are tentatively correlated on the basis of lithic typology as follows:

Chamber	Layers 9–11*[2]	Layers 12–18	Layers 20, 21	Layer 22
Terrace	Layers 5, 6	Layers 7, 8	Layer 9	Layer 10

Although there are some problems in detail, this correlation is considered reasonable. Layer 19 probably belongs to the group of layers 20 and 21 of the chamber.

Pollen analysis was carried out and the tentative history of the terrace was related during the author's visit to the cave (G. M. Levkovskaya, Institute of Archaeology, Leningrad). The outline of the results is as follows; in layer 15 it was warm, becoming colder by layers 13 and 14; at the time of layers 10 and 11 broadleaf forest grew so it was warmer but in layer 9 gradually became colder, and by layer 8 broadleaf trees disappeared; at last in layer 6 all trees completely disappeared to reappear in layer 5. In this pollen-diagram, one can see warmness and coldness fluctuating repeatedly. It can be assumed that most parts of layers 9–15 are assigned to Stage 5 of Emiliani (Emiliani 1972, Emiliani-Shackleton 1974) and layer 6 to the last glacial maximum.

The artifacts are fairly numerous, but considering the thickness of the deposits, the number of artifacts per layer is not so large. As described later, some very interesting features of the artifacts are seen. The aspects of change of the stone industries in this cave are regarded as standard of the Siberian Mousterian.

Although it has a fairly large chamber and numerous people can inhabit it, exploitation areas are narrow. There are no flat and gentle spaces except for very narrow riversides. The slopes of both sides of the river are too steep to easily exploit natural resources. The Anuy river is about 20m wide in front of the cave. The riverside plains are also narrow. The plain of the cave side is somewhat wide (about 30m) but the plain on the opposite side of the cave is only several metres wide. Grass and low trees grow. It is a very simple environment.

The width of the riverside plains varies somewhat and the same situation extends not only to the upper courses but also downstream. There is a junction at about 3km upstream

from the cave where the Ust'-Karakol sites are located. Here, various ecological niches appear. At about 7km downstream from the cave, another junction is in existence where various ecological niches and rather large exploitation areas are seen. Between the junctions, the valley of the Anuy is narrow and only riverside plains are exploitable. From the catchment analysis point of view it is thought to be too far to exploit the junctions.

Denisova cave has only very simple and narrow exploitation areas. Therefore, even though it has a fairly large living space, Denisova Cave might be an S-type site. It was used only for limited activity in a certain season like Strashnaya and Maloyalomanska Caves. As it has a fairly large chamber, it has been used for a long time and thick deposits have accumulated.

As mentioned above, S-type sites are almost the same in their narrow exploitation areas, in their simple ecological niche and in their location facing narrow gorges. S-type sites are not suitable for the normal daily life of numerous people who need various and large exploitation areas. On the other hand, they are the best places for hunting or gathering mobile resources moving through the river or riverside plain. The author thinks that S-type sites were used for hunting migratory animals on the riverside plain. Most S-type sites are located beside rivers which stretch straight to the mountains. This is thought to match the course of migratory animal movements.

The Middle Paleolithic sites in the Gorno-Altaysk District can be divided into two types, L- and S-type sites, on the basis of their patterns of use. These two types of site had a completely different meaning in prehistory. L-type sites were used in usual daily life in many seasons as a base camp; on the other hand, S-type sites were mainly used as a hunting camp in hunting herds of migratory animals. It is probable that sites for other tasks were also in existence but they have not yet been recognised.

This is a working hypothesis from the location of the sites. Future analysis and investigation in many spheres such as quantitative comparison of animal remains and total reconstruction of the environments of that time are necessary to prove this hypothesis. Then, a comprehensive understanding of the daily life of the Middle Paleolithic people of this region can be reached.

6

Two main flaking techniques are seen in the Middle Paleolithic assemblages of the Gorno-Altaysk District. One is the Levallois technique and the other is the so-called disc-core technique. Most assemblages have both, but the ratio and details of techniques are

different. The author analysed flaking techniques mainly on the basis of the unique technique tentatively called the "Altay technique" and on the ratio of Levallois blades and elongated Levallois points.

The author has described the Altay technique elsewhere in detail (Fujimoto 1991). It is a kind of so-called *chapeau de gendarme* technique (Bordes 1947:7-8). The *chapeau de gendarme* technique has a close relationship with the Levallois technique. Flakes struck by the *chapeau de gendarme* technique have a pronounced ridge at the centre of the flaking platform. Bordes divided the platform of Levallois flakes into four types: A-D (1961:5-7). A part of the convex platform, named C by Bordes, is related to the Altay technique. Brézillon also divided the platforms of flakes and blades (1983:69-72) and a part of 13 and 22 in his classification is related to the Altay technique. Lyubin (1965:43-46) reclassified the platforms of Middle Paleolithic flakes in the USSR on the basis of Bordes' classification. Lyubin's classification is more detailed than Bordes' and is divided into 15 types. 14 and 15 in Lyubin's classification are thought to be those made by the Altay technique of the present author.

A flake made by the *chapeau de gendarme* technique has a ridge made by two or more facets on its platform. As the percussion point forms a pronounced ridge, percussion does not misshit even if it slips off the correct point. The Altay technique has a broader percussion surface, generally of about 1cm breadth. What the author believes to be the most typical flaking platform of the Altay technique is shown in the lowest row of Figure 2. Its flaking platform is formed by several preparing facets from the dorsal side. Then, a broad platform like a summit is made. A flake is detached by percussion at this point. The same or better effect than the *chapeau de gendarme* technique is expected. One can detach an intended flake without misshitting. Observing the bulb of percussion, the percussion point is generally located on a broad projecting part like a ridge. A detached flake has a broad and flat surface at the proximal end like the summit of a volcanic mountain.

A platform of the Altay technique is generally prepared from the dorsal side. Most scars on a flake platform have negative bulbs. This aspect shows that once a flake was detached, re-preparation of the platform was carried out, then the next flake was detached. These processes were repeated several times. Although not frequent, two or three flakes are detached continuously by percussion at almost the same spot. The flakes which are detached in this way are generally Levallois points. The bulbs of percussion are large. They are thought to have been struck by strong direct percussion. Flaking technique is

good and flakes with hinge-fractures or thick distal ends are few in number. The flaking platform which remains at the proximal end of a flake is commonly 5-7mm thick.

Most Altay technique flakes have scars running in the same direction showing that the flaking was carried out continuously from a single platform core. Some flakes have scars in opposite directions, however, showing that flaking was executed from two platforms which are situated at both sides of a core. A flake with centripetal flaking scars, which is sometimes called a typical Levallois flake with the Altay technique, is very rare and is thought to be a late specimen. The features on cores are almost the same. Several to ten flakes are thought to have been detached from a core by the Altay technique. In sum, Altay technique flakes have scars in the same direction and parallel ridges. Most of them are Levallois blades and elongated Levallois points. There are some which have scars running in opposite directions, but these are few in number. More than half of the Levallois flakes which were not detached by the Altay technique have centripetal flaking scars. The facts mentioned above show the Altay technique has close relationships with Levallois blades and elongated Levallois points with parallel ridges.

The aspects of each site which the author was able to observe by himself in his short stay in the Gorno-Altaysk District will be described. As the author did not observe all specimens and time was limited, it is impossible to perform a statistical analysis. The statistical indices of flaking technology were sometimes reported, but the standard of classification is different from that of the present author and any reference to the Altay technique has not been described. The reported statistical indices cannot be used as they are. Therefore, the following description is based on the author's observations without statistical indice. However the author believes it is not far from the truth.

The most interesting aspects are seen in the assemblages from Denisova Cave (Fig. 2, Pls. 5-7) where the most numerous layers have been recognised. Layers 12-22 in the chamber and layers 7-10 in the terrace are reported to belong to the Middle Paleolithic period. Although the number of specimens is not large, the changing pattern of flaking technique can be seen the most clearly. The assemblages from Denisova Cave will be analysed first.

Levallois blades and elongated Levallois points by the Altay technique were found from the lowest layer; layer 22 of the chamber and layer 10 of the terrace. Levallois blades and elongated Levallois points with parallel ridges are the most numerous and most of them were used without secondary retouch. The Altay technique was used to make some of them. The ratio of Levallois blades and elongated Levallois points by the Altay technique is high.

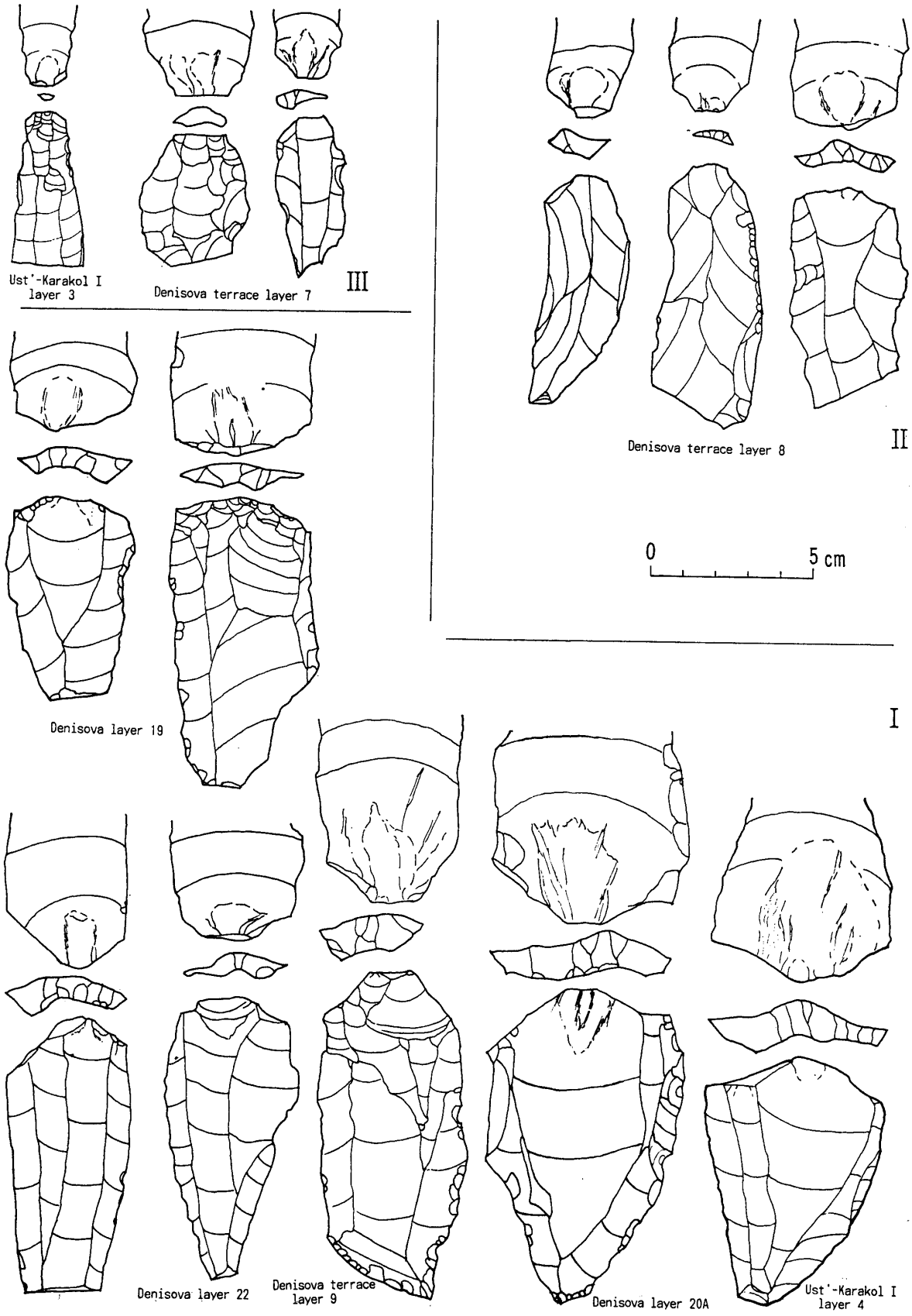

Figure 2 Blanks from Denisova Cave and Ust'-Karakol site.

The flakes with centripetal flaking scars and flakes from disc-cores are few in number. The author tentatively calls this group stage I a. The characteristic features of stage I a are as follows:

1. Levallois blades and elongated Levallois points from a single platform core are numerous.
2. The ratio of the Altay technique is high.
3. Ridges and flaking scars of a dorsal surface are parallel or convergent near the distal end.
4. Secondary retouch is scarce.

Layers 19–21 in the chamber and layer 9 in the terrace have clear affinities and they belong to one group. Resemblance in many aspects can be observed between this group and the former one, layers 22 and 10. However, some differences are also seen. Levallois blades from a single platform core are the most common. Flakes with scars running in opposite directions increase and Levallois points become more common. The Levallois points of this group are wider and shorter. Retouched pieces are few in number as in stage I a. Flakes from disc-cores and disc-cores themselves appear in some quantity. The author tentatively calls this group stage I b. The differences between stages I a and I b are not so grest as the later stages. The characteristic features of stage I b are as follows:

1. Levallois blades and Levallois points from a single platform core are numerous. Levallois points became wider and shorter. More numerous flakes and cores with opposite platforms are seen.
2. The ratio of the Altay technique is high.
3. Ridges and flaking scars of a dorsal surface are parallel or convergent near the distal end.
4. Secondary retouch is scarce.
5. The disc-core technique appears.

The next group is composed of layers 15–18 in the chamber and layer 8 in the terrace. New aspects appear in many points. The Altay technique is continuously seen, however, its ratio clearly decreased. The Altay technique is used only to make large and long Levallois blanks. There appeared Levallois blades made by the Altay technique with centripetal flaking scars in addition to those with parallel scars. Most Levallois flakes have a smaller platform. The Levallois flakes with centripetal scars increased and became more than half of all Levallois flakes. Moreover, disc-cores and flakes from disc-cores appeared in fairly large numbers. These flakes have a long axis different from the flaking direction.

Great changes occurred in the features of making flakes. A switch from long parallel-sided Levallois blades and Levallois points to centripetal Levallois flakes and flakes from disc-cores occurred. Accompanying this change, the use of the Altay technique declined. The author tentatively called this group stage Ⅱ. The characteristic features of stage Ⅱ are as follows:

1. Centripetal Levallois flakes and flakes from disc-cores became numerous.
2. Flakes became wider and smaller.
3. Use of the Altay technique declined.
4. Flaking platforms became small.

The last group is seen in the assemblages of layers 11–14 in the chamber and layer 7 in the terrace. The Altay technique remained for making long Levallois blades, but their use became rare. Blades are very few in number and most have plain platforms. In the assemblages of the layers above 11 in the chamber and 7 in the terrace, the Altay technique completely disappeared. Flakes became broad and short and are mainly composed of centripetal Levallois flakes and flakes from disc-cores. Retouched pieces on these flakes became numerous. They are Mousterian points on flakes from disc-cores and side-scrapers of various types. The trends which appeared in the former stage were accelerated. This group is tentatively called stage Ⅲ. The characteristic features of stage Ⅲ are summarized as follows:

1. Most flakes are centripetal Levallois flakes and flakes from disc-cores.
2. Broad and short flakes are the most numerous and they are small.
3. The Altay technique remained, but became very rare.
4. Retouched pieces which were mainly composed of Mousterian points and various side-scrapers became numerous.

The shift from stage Ⅰa to stage Ⅲ is clearly seen in many aspects, namely 1) from long parallel-ridged Levallois blades and elongated Levallois points to broad, short and centripetal Levallois flakes and flakes from disc-cores; 2) from long large-sized blanks to short, broad small-sized blanks; 3) from frequent use of the Altay technique to its disappearance; 4) from the retention of large to small platform on flakes; and 5) from less use of secondary retouch to frequent use of it. Although these differences are fundamental, the shift from stage Ⅰa to stage Ⅲ was gradual. The techniques which had been seen in stage Ⅰa remained in stage Ⅲ. The shift from stages Ⅰa and Ⅰb to stages Ⅱ and Ⅲ is large. The major transition can be summarized as a shift from long parallel-ridged Levallois blades made by the Altay technique without retouch to short, broad centripetal or amorphous scarred flakes with varied retouch. On the basis of the thick-deposited, multi-

layered Denisova Cave, four stages of change can be recognised, evidenced by the stratigraphy of the cave. The aspects of the other sites will now be considered according to this classification.

Okladnikov Cave has interesting features. It has 7 layers, but stone implements were found in layers 1, 2, 3, 6 and 7 (Pls. 8–10). Layer 6 had few tools and blanks, therefore it is impossible to analyse them. The Altay technique is seen in the assemblage of layer 7. Levallois blades and Levallois points are fairly large in number. Broad, short Levallois points by the Altay technique are also seen. Most of them are flaked from a single platform core. Flakes from disc-cores exist but are few in number. As the number of stone implements is small, it is difficult to decide the date of the assemblage of this layer on firm evidence. The features of layer 7 are thought to have a close relationship with stage I b of Denisova Cave.

Although some differences are seen in detail, the assemblages of layers 1–3 belong to one group. The Altay technique decreased remarkably and flakes from disc-cores are the most numerous. Most of their platforms are plain. Centripetal Levallois flakes are seen in fairly large numbers. Mousterian points and various types of side-scrapers on flakes from disc-cores and centripetal Levallois flakes are the most numerous in the Siberian Mousterian assemblages which the author has been able to observe. Although retouched pieces are more numerous, these features of layers 1–3 can be assigned to stage III of Denisova Cave.

The features of Denisova Cave are partly reconfirmed on the evidence of this site. It is possible that the detailed aspects of stage III will be clarified by attribute analysis of the assemblages of layers 1–3.

Ust'-Karakol I (Derev'anko et al. 1990:62–75) is an open-site located about 3km upstream from Denisova Cave. The numbers of artifacts are few. The deposits are divided into 4 layers (geological 6 layers). Layers 3 and 4 are of concern here. A broad and short Levallois point made by the Altay technique is found in the lower layer 4 and a blade with a plain platform from the upper layer 3 (Fig. 2, Pl. 11). This fact reconfirms the relation between stages I b and III of Denisova Cave. Leaf-shaped bifacial points are found from layers 3 and 4 but their characteristics are unknown.

Tchumechin I (Derev'anko et al. 1990:142–149) is an open-site located about 2km downstream from Kara-Bom. It faces the river Ursul and stone implements were found in river-deposits. Levallois blades and Levallois points by the Altay technique are fairly large in number (Fig. 3, Pls. 12–13). The characteristics of the deposits are not clear, therefore its date cannot be decided.

As stated before, Kara-Bom has three cultural layers; upper: the early Upper Paleolithic, middle: transitional phase from the Middle to Upper Paleolithic, lower: the Middle Paleolithic. Numerous stone implements are found (Fig. 3, Pls. 14–16), however the excavations are still continuing and precise results have not been reported. Some interesting aspects have been tentatively published. Numerous Levallois blades and points including those by the Altay technique are found in the lower layer. They remained in the middle layer but there are no specimens made by the Altay technique in the upper layer. The Altay technique was employed to make long and narrow blanks in the lower layer. Levallois blades and points in the middle layer became slender and the platform at the proximal end of blanks became thin and small. The deposits of the lower layer are more than 1m thick. They had accumulated for a fairly long time. Dating is difficult but most artifacts from the lower layer are thought to be assignable to stage I b of Denisova Cave.

Burins and end-scrapers made on Levallois blades and points are found in the middle layer. The aspects of these three layers can be summarized in following table:

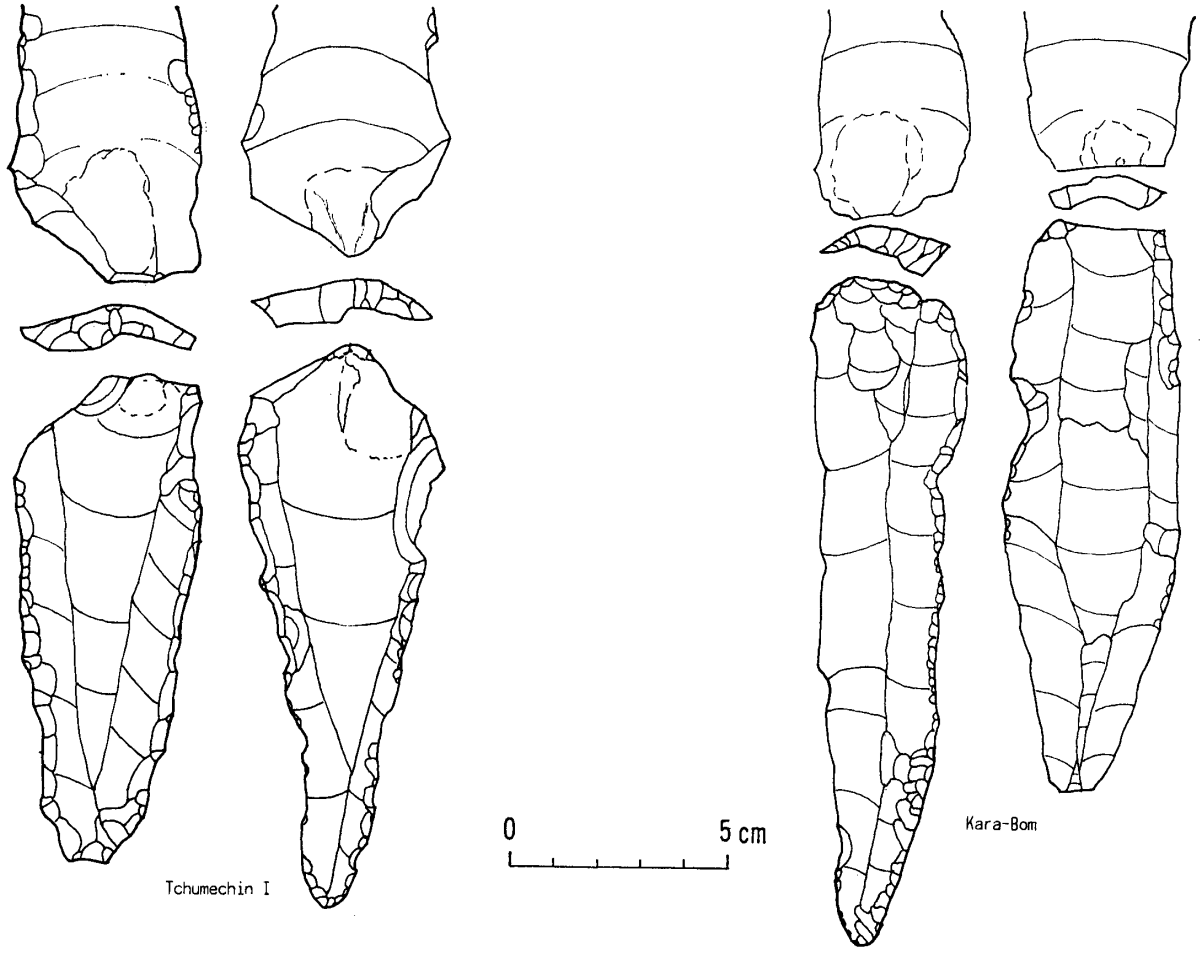

Figure 3 Blanks from Kara-Bom site and Tchumechin I site.

Layer	*Lower*	*Middle*	*Upper*
Altay technique	fairly numerous	some	none
Levallois points	fairly numerous	some	none
Burins	none	some	fairly numerous
End-scrapers on thick flakes	none	very few	fairly numerous

Table 2. Comparison of the aspects of three layers in Kara-Bom

The aspects of the middle layer of this site are exactly transitional. The stone tools which flourished in the Upper Paleolithic period, such as burins and end-scrapers, are made on blanks with Middle Paleolithic characters. The same features are seen in the transitional period of the Levant, western Europe and eastern Europe. These three layers are assumed to be not continuous but intermittent; however, it is possible for the Upper Paleolithic culture of this region to have originated from the Middle Paleolithic culture here. Although they became few in number, Levallois blades and points made by the Altay technique were seen. Some burins and end-scrapers are made on them. They were traditional blanks in this region and had continued since the beginning of the Middle Paleolithic.

The assemblages of the Middle Paleolithic in this region are divided into four stages mainly on the basis of Denisova Cave. They can be combined into two groups; stages Ⅰa-Ⅰb and stages Ⅱ-Ⅲ. The former has numerous elongated Levallois blades and Levallois points which are flaked from a single platform core and the Altay technique is frequently used. Retouched pieces are scarce. The latter group has numerous broad centripetal Levallois flakes and flakes from disc-cores. Blanks are frequently retouched. Typical Mousterian points and various types of side-scrapers are seen.

As these stages Ⅰa, Ⅰb, Ⅱ and Ⅲ are stratigraphically evidenced on the basis of the features of Denisova Cave, Okladnikov Cave and Ust'-Karakol Ⅰ, they show chronological order. The Altay technique was present throughout these stages. This technique characterised the assemblages of the Middle Paleolithic in this region.

Derev'anko divided the Middle Paleolithic industries in this region into two phases mainly on the basis of the palynological studies of G. M. Levkovskaya*[3] (1990:51-52). His "early Moustier of Altay" consists of the lower horizon of Ust'-Karakol Ⅰ (layer 4), layers 6 and 7 of Okladnikov Cave and horizons 21 and 22 of Denisova Cave, and is dated to the final Riss-Würm-Würm Ⅰ. Most of these assemblages belong to the author's stages Ⅰa or Ⅰb.

Derev'anko's "subsequent stage of Moustier" consists of horizons 14-20 of Denisova Cave, the lower horizon of Kara-Bom and horizons 2 and 3 of Okladnikov Cave, and is dated to the final Würm Ⅰ - the beginning of Würm Ⅱ. The assemblages of the second stage of

the Derev'anko classification belong to the author's stages Ⅰb, Ⅱ and Ⅲ. There is no contradiction between them.

Derev'anko's classification is mainly based on palynological studies and the author's subdivisions are mainly based on technological analysis of the attributes of artifacts. The bases of the investigations are different and it is natural that the detailed results differ. However, a fundamental contradiction is not seen. Both schemes corroborate each other.

After stage Ⅲ, a transitional phase which is represented by the assemblage of the middle layer of Kara-Bom is thought to be present. Continuance of the Altay technique can be recognised, but the other aspects are not thought to be continuous. The author cannot guess the reason. Are plural lineages in tradition or in function in existence? Will unknown assemblages be found? Is there a hiatus between the late Middle Paleolithic assemblages and the transitional assemblages? The transition from the Middle to Upper Paleolithic is assumed to be not straight but complicated. Future studies must clarify these problems.

7

The major characteristics of the Middle Paleolithic of the Gorno-Altaysk District have been described in previous sections. The features of the neighboring regions will be briefly mentioned. The catchment areas of sites in these regions have not been observed and cannot be analysed. The following will be limited to the attributes concerning flaking blanks. Cited references are limited to the author's library. There may, therefore, be mistakes in matters of detail but the author's aim is rather to present a rough sketch as a perspective for future study.

In the Yenisey river basin, the typical Levallois points made by the Altay technique are found at the Kurtaksk sites which are situated about 100km upstream from Krasnoyarsk (Drozdov et al. 1990:66-70). The sites are located along the Yenisey about 20km (now, the Krasnoyarsk Reservoir has been made around here) and in hilly areas. Cores with a single platform and two opposite platforms, and of disc-type were also found. Flakes with parallel ridges and centripetal dorsal scars existed. As the sites have only been found recently, detailed features are unknown. It is not certain, but these sites are thought to resemble those of stage Ⅰb of the Gorno-Altaysk District. Anyhow, these assemblages have close relationships with the Middle Paleolithic industries in the Gorno-Altaysk District. Although detailed aspects are unknown, these sites are the most eastern ones which possess distinct Mousterian elements.

In Tuva, located in the upper Yenisey basin, so-called Mousterian assemblages were reported and both the Levallois and disc-core techniques were seen (Abramova 1984: 146); however detailed aspects are unknown to the author. As the same environments extend, it is possible that the same industries as the Gorno-Altaysk District are found in the mountainous zone of Tuva.

In western Mongolia where the mountainous zone is widely present, numerous so-called Mousterian sites were found (Alekseev red. 1990). The Levallois elements are clearly recognised in the assemblages of these sites such as Barlagin Gol 1, 2 and 3 sites (Alekseev red. 1990:425–444). Centripetal Levallois cores, Levallois cores with opposite platforms and flakes struck from these cores are seen. However, the other types of blanks and cores are numerous and the most typical Mousterian tools such as Mousterian points, various types of side-scrapers and Levallois points are few in number. Blanks made by the Altay technique have not been found.

The author thinks that Mousterian elements are very diluted in the so-called Mousterian assemblages of western Mongolia and they cannot really be called Mousterian. The areas where Levallois elements are seen are limited to the west Mongolia mountainous zone. Here, similar environments to the Gorno-Altaysk District are assumed to have extended at that time. Even though a few Levallois traits are sporadically seen, Mousterian elements are never found in central and eastern Mongolia. The regions to the southeast of the Gorno-Altaysk mountain ranges have few or no Mousterian elements and a completely different techno-typological complex from the Siberian Mousterian is assumed to have been in existence. It can be thought that the west Mongolia mountainous zone was one of the transitional zones between the western and eastern techno-typological complexs of the Old World in the Middle Paleolithic.

Let us next turn west and southwest. Excavations in these regions are sporadic and only a few references are available. In Soviet Central Asia, Mousterian sites are found in the Kirgiz, Tadzhik, Uzbek, Turkmen and Kazakh Republics. (Beregovaya 1960, Ranov 1971, Ranov and Davis 1979, Abramova 1984). They are the most numerous of the Paleolithic period throughout these regions and most are located in the mountainous zone. The Levallois and disc-core techniques were used to make blanks. Compared with the assemblages in the Gorno-Altaysk District, bifacial Mousterian points are numerous.

Ranov analysed the assemblages of the Middle Paleolithic sites in these regions. His analysis was based on the specimens from 78 sites of the Middle Paleolithic period in the Turkmen, Uzbek, Tadzhik and Kirgiz Republics. Most of them are surface collections and

even if the site had been excavated, there were many cases where the site reports were not published. Ranov, therefore, chose 16 sites which he was able to analyse with statistics. These 16 sites are as follows; Kask'r-Bulak (the Turkmen Republic), Teshik-Tash, Tankhyz-Dar'ya, Aman-Kutan, Samarkand, Khodzhikent, Obirakhmat (the Uzbek Republic), Kairak-Kumy, Dzhar-Kutan, Kairma-Sai, Margidar, Semigantch, Ak-Dzhar, Kara-Bura (the Tadzhik Republic), Bosteri, Tossor (the Kirgiz Republic).

Ranov compared the cores, blanks, points, side-scrapers and the other tools from these sites not only quantitatively but also qualitatively. His comparison of cores and blanks showed that two types of sites were in existence in these regions: one has numerous disc-cores and flakes from disc-cores and the other has numerous cores with a single platform or opposite platform and elongated flakes or blades. The typical former sites are Teshik-Tash and Kara-Bula, and the representative latter sites are Khodzhikent and Dzhar-Kutan. The latter sites have numerous cores and flakes of Levallois technique, and show high Bordesian blade indices. These blades are thought to be made by Levallois technique.

The Altay technique is seen on the elongated flakes or blades by Levallois technique from sites such as Kayrak-Kumy and Dzhar-Kutan (Ranov 1971:219). The ratio of the Altay technique is unknown because the author has not observed the specimens from these regions. The *chapeau de gendarme* technigue is also seen on Levallois blanks of these regions. It is rare in the Gorno-Altaysk District. This is one example of the differences.

According to Ranov, Levallois blades, points or flakes have little secondary retouch. Even if they were retouched, retouch was limited to side-edges and secondary retouch covering the whole surface was not seen (1971:227). On the other hand, flakes from disc-cores often has secondary retouch. This retouch was always long and sometimes covered more than half of a surface.

Very interesting aspects were described by Ranov (1971:220–227). The assemblages which have numerous Levallois cores and blanks possess Levallois points without retouch and side-scrapers were only side-edge retouched. In the assemblages with many disc-cores and blanks from disc-cores, Mousterian points and various side-scrapers with heavy retouch are seen. The former can be called a Levalloisian facies and the latter a Mousterian facies. These features are also seen in the assemblages of the Middle Paleolithic in the Gorno-Altaysk District.

Ranov divided his analysed assemblages into four groups; Levallois group: Khodzhikent, Dzhar-Kutan and Obirakhmat (?): Levallois-Moustier group: Kairak-Kumy, Kapchgai and Tossor (?): Moustier (Mountain Moustier) group: Teshik-Tash and Semigantch (?):

Moustier-Soan group: Kara-Bula and Ak-Dzhar (?) (1971:230). His Levallois group and Levallois-Moustier group are thought to belong a Levalloisian facies and Moustier group and Moustier-Soan group to a Mousterian facies. These sites are located throughout Soviet Central Asia and the Kazakh Republic. The differences of the groups do not refer to the local distribution of each group. Ranov looked for the origin of each group and reached the conclusion that the group differences came from the traditions from which they had originated (Ranov 1971:230-231).

Another explanation can be proposed; the difference of the assemblages means the difference of time. The author prefers this explanation. In the Gorno-Altaysk District, the group of elongated Levallois blanks with little retouch appeared early and the group of short, broad Levallois blanks or flakes from disc-cores with heavy retouch came after. Although Levallois blanks are not so numerous here as in the Gorno-Altaysk District and more stone implements are retouched, the group with elongated Levallois blanks and with short side-retouch appeared first, then the group of short, broad flakes with heavy flat retouch came next. In the other words, Ranov's Levallois facies appeared early and his Moustier facies came later.

A multi-layered site named Kul'bulak is found in the Angren river basin, a tributary of the Syr-Dar'a in the eastern Uzbek Republic. It has nine cultural layers; layers 1-3: Upper Paleolithic, layers 4-8: Middle Paleolithic, layer 9: Lower Paleolithic (Kasymov 1972). Levallois blanks are not numerous, however elongated Levallois blanks are more numerous in the lower layers 7 and 8 than in the upper layers 4-6, and blanks by the Altay technique are seen in the assemblages of these layers. The retouch of the lower layers is short and side-edged. On the other hand, the stone implements of the upper layers 4-6 are short and broad and their retouch is flat and sometimes covers the whole dorsal surface. There are specimens whose surfaces are completely retouched bifacially. In the assemblage of layer 4, small, parallel-sided, rough blades with small platforms appeared and the blades of this type are seen also in the assemblages of layers 2 and 3. The change from layer 8 (Middle Paleolithic) to 1 (Upper Paleolithic) is gradual. This aspect might show that the Upper Paleolithic culture in this region originated from the local Middle Paleolithic culture.

Numerous Middle Paleolithic sites are found on the Caucasian plateau (Lyubin 1977, 1984 etc.). Excavations have been carried out and the reports published. Also their assemblages have been variously analysed (Lyubin 1965, Korobkov 1965 etc.). Numerous Levallois blanks are seen in these regions, appearing in the Lower Paleolithic industries. Most of them are parallel-ridged, elongated blanks.

The sites of the Middle Paleolithic are located in the mountainous regions, especially, in the basins of the Kura which flows into the Caspian Sea, the Rioni which flows into the Black Sea and the small rivers which flow into the Black Sea near Sochi and Sukhumi. About 400 Middle Paleolithic sites were found here.

Many articles have already been published. Reading all of these articles is beyond the author's ability and describing the detailed features of the Caucasian plateau is not the main theme of this article, therefore, only a short description will be attempted.

Kudaro Cave I is located in the mountainous zone of southern Osetia and its altitude is about 1600m. It has four Middle Paleolithic cultural layers; 3a, 3b, 3v and 4 (Lyubin 1977:23-27). Dzharuchula Cave is also located in the mountainous zone of southern Osetia. It has 16 geological layers and two cultural layers (upper and lower) (Lyubin 1977:70-72). Both caves are situated in the Rioni basin.

The assemblages from both caves show strong Levallois tendencies and numerous Levallois blades and elongated points are seen. The assemblages of Kudaro I Cave can be divided into two groups: those from layers 3a, 3b, 3v and that from layer 4. The differences are rather small but can be observed in many points. The blanks of the lower layer 4 are slightly longer and more slender (mean length: 7.4cm [layer 4], 6.3cm [layer 3], mean ratio of length/width: 2.3 [layer 4], 2.1 [layer 3])*4. A centripetal Levallois core is seen in the assemblage of layer 3a (Lyubin 1977:Fig. 14-18). Blanks made by the Altay technique are seen in the assemblage of layer 4 (Lyubin 1977:Fig. 18-9, 11, 12). These might show the stratigraphical relationship between centripetal Levallois cores and blanks made by the Altay technique in the Caucasian plateau.

Most retouching of stone implements from layer 4 is short and the retouched parts are limited to near their edges; on the other hand, those of layer 3 are long and sometimes cover the whole surfaces of the tools. Therefore, Mousterian points and various types of side-scrapers were found only in the assemblages of layer 3 (Lyubin 1977:51). Here, the same aspects as those in Soviet Central Asia and the Gorno-Altaysk District can be recognised stratigraphically; from long and narrow blanks to short and broad blanks, and from scarce, short retouch to common, long retouch.

Both assemblages from Dzharuchula Cave are thought to be almost the same. Flatly retouched Levallois blanks are the main stone implements including Mousterian points and various types of side-scrapers. They can be tentatively assigned to the assemblages from layer 3 of Kudaro I Cave. Lyubin (1977:94) called this group "Kudaro-Dzharuchula".

The author thinks that the assemblages from Tamarasheni I, Monasheskaya Cave and

Gubskii Nabes No 1 (Lyubin 1977:130–139, 144–187) come after the Kudaro-Dzharuchula group. They have numerous short and broad flakes made by the Levallois and disc-core techniques. Mousterian points and various types of side-scrapers with flat and long retouch are seen more frequently. The tendency which is stratigraphically shown in the assemblages of Kudaro I becomes more clear.

If these suppositions are correct, the same general tendency is widely seen in the mountainous areas from the Caucasian plateau via Soviet Central Asia to the Gorno-Altaysk District. The shifts of the techno-typological complex which are commonly observed in these wider areas are as follows; 1) blanks: from elongated and narrow Levallois blades and points which are sometimes made by the Altay technique to short and broad flakes which are struck from centripetal Levallois cores or disc-cores, 2) cores: from single-platform and parallel-ridged Levallois cores to centripetal Levallois cores and disc-cores, 3) points: from scarcely or un-retouched slender Levallois points to broad, short and heavily-retouched Mousterian points, 4) side-scraper: from single side-scrapers or simple flakes without retouch to variously retouched side-scrapers and 5) retouch: from short and fairly steep retouch to long flat retouch. Although they differ somewhat from region to region or from assemblage to assemblage, the general orientation or the common tendency can be admitted.

As they are the fundamental techno-typological elements of the Middle Paleolithic industries, these features cannot happen accidentally but they are closely related with each other. They show that almost the same industries were widely distributed and underwent similar change in the similar environments.

West and north of these mountainous zones, in the Ukraine, Crimea and the Russian plains, completely different industries were found (Klein 1973, Praslov 1984 etc.). Levallois elements are not as strong as in the regions discussed here and bifacial Mousterian points are numerous.

Some aspects of the industries in eastern Europe must be described. A Levallois technique resembling the Altay technique is seen in assemblages such as Moldova I in the Dnestr basin (Praslov 1984). The same aspects are seen in the assemblages of the Bohunice industry in Moravia (Svoboda 1988). The Bohunice industry is the transitional industry between the Middle Paleolithic and the Upper Paleolithic. It has numerous Levallois points, most of which are thought to have been made by a Levallois technique resembling the Altay technique. The author cannot guess the characters of both techniques. Are they related to each other? Do they have any relation with the Altay technique proper? The author cannot answer these questions on any firm evidence, but his opinion is rather

negative.

In the Iranian plateau and the Anatolian highland, Middle Paleolithic industries with diluted Levallois traits have been described (Minzoni-Déroche・Yalçinkaya 1985) and some of them are termed "Zagros Mousterian".

In the Zagros mountains, especially on their southwestern slopes, so-called Zagros Mousterian Middle Paleolithic assemblages have been found and were statistically analysed by H. L. Dibble and S. J. Holdaway (1990). They analysed the assemblages from Warwasi and compared the other assemblages from the Zagros region and the Levant. They selected four units, A (lower) - D (upper) from Warwasi and analysed them variously.

Various interesting features were reported (Dibble and Holdaway 1990:625, 630). Levallois traits are diluted, however, ILty (Index of typical Levallois) decreased from lower layer A (20.94) via layer B (15.63) and layer C (9.34) to upper layer D (4.43) and the percentage of uni- and bi-directional scar patterns from layer A (67.5), layer B (62.6), layer C (56.1) and layer D (40.0). On the other hand, the percentage of semi and full centripetal or radial scar patterns increased from layer A (18.5), via layer B (24.3) and layer C (27.5) to layer D (34.6). The same technological tendencies in the assemblages from the southern mountainous regions of the USSR, especially those from the Caucasian plateau can be seen: the ratio of Levallois traits, and of uni- and bi-directional scar patterns decreased in the later assemblage, but the ratio of centripetal scar patterns increased.

The principal tools of the Zagros Mousterian are various kinds of side-scrapers. Dibble and Holdaway analysed side-scrapers mainly based on an Index of Reduction (double, convergent and transverse scrapers / all scrapers) (1990:634–636). The high Index of Reduction means that tools are retouched more heavily. The Index of Reduction becomes high in the later assemblage; layer A (0.449), layer B (0.459), layer C (0.473) and layer D (0.670)*[5]. This means more retouching was used in the later assemblages. This tendency is also seen in the assemblages of the Caucasian plateau, Soviet Central Asia and the Gorno-Altaysk District.

In the the Zagros Mousterian assemblages with very low Levallois traits and a high Index of Reduction, such as Shanidar D and Hazer Merd, exist. If the assemblages of the Zagros Mousterian shifted in one direction, these assemblages would be positioned after that of Warwasi D.

As pointed out on the basis of their principal components analysis (Dibble and Holdaway 1990:635–637), the Levallois technique and a type of side-scraper are fundamental elements of the assemblages of the Zagros Mousterian. Although there are some differences, these

fundamental elements shift in the same direction as those of the Caucasian plateau, Soviet Central Asia and the Gorno-Altaysk District. The author thinks this is not accidental, but a closely related phenomenon.

The Levant is one of the most precisely researched areas of the World, but, many hypotheses have been proposed and studies on the Middle Paleolithic of the Levant have become chaotic. So-called scientific methods have produced many results such as age deteminations and environmental data. Based on such scientific data, new hypotheses have been advocated (Bar-Yosef 1988, Bar-Yosef and Goldberg 1988, Tchernov 1988 etc.). These hypotheses have been considered without precise comparisons of stone industries. As pointed out by Jelinek (1990), if the results of the age determinations from all the various methods were true, the chronological framework would become very strange.

The various methods of age determination have their own respective premises (Schwarcz coord. 1988), therefore, it is necessary to check the data based on the premise of each method or to cross-check the data from various methods. As stated before, prehistoric archaeologists should work mainly on the basis of their own data, comparing the attributes of each assemblage or each artifact. Then, they should check the data of the age determination against their results of attribute analysis. Prehistoric archaeologists should not simply accept the age determined by so-called scientific methods, but should check it from their own data. Checked in this way, the methods of the age determination will be improved.

Although some criticisms have been proposed (Jelinek 1981, 1982 etc.) and some modification was done by herself (1981), Copeland's hypothesis on the chronology of the Middle Paleolithic industries of the Levant is widely accepted in outline. She divided the industries into three groups, Tabun D, Tabun C and Tabun B, mainly on the basis of stratigraphy and techno-typological characteristics of the assemblages (Copeland 1975). She described the characteristics of each group as follows (1975:329–335):

"Phase 1 (Model-Tabun D) (1) predominantly one-axis methods of preparation of the Levallois cores, (2) the laminar, triangular parallel sided blank which is struck off along the same axis as the core preparation, evidently by stone hammer, …… plain butts are quite common on flakes, blades, or points.

Phase 2 (Model-Tabun C) (1) the virtual absence of triangular points, the majority of the flakes consisting of broad, transverse, oval, or offset types, either radially prepared on the dorsal surface, or struck off obliquely to the axis of the preparation of the flake. (2) one axis cores, the main type of phase 1, are virtually absent. (3) very small flakes

are abundant. (4) side-scrapers and denticulates are the only common tool types. …… (5) retouched Levallois tools are almost absent, apparently replaced by side scrapers.

Phase 3 (Model-Tabun B) (1) monotony, and the precision with which a standard product (the triangular Levallois point) could be produced. (2) to combine those of Phases 1 and 2; the points are struck from either one axis or radially prepared cores. (3) the flakes are light and thin, resembling in this the broader forms of Phase 2, but now laminar and narrow form prevail."

At least in the northern Levant, many scholars admit the shift from Tabun D to Tabun C or B. This means the same general tendency as the mountainous regions of the southern USSR and the Zagros can also be recognised in the Middle Paleolithic assemblages in the Levant.

Although some differences exist from region to region, almost the same aspects in the production of blanks, their size and characteristics, the types of tools, and the patterns of secondary retouch of blanks are observed in the Middle Paleolithic industries of the wide area from the Levant and the Zagros via the southern mountainous border of the USSR, the Caucasian plateau, Soviet Central Asia to the Gorno-Altaysk District.

According to Boëda (1988a, b), blanks with centripetal or radial flaking scars and those with parallel flaking scars differed somewhat from each other. Ohnuma (1990:127-128) experimentally confirmed this fact. Therefore, the difference of flaking blanks is thought to be fundamental. It is not accidental for the same changing pattern of flaking blanks to be seen in such wide areas but it is probable that the shifts in each region had close relations each other.

8

The author has described the features of the Middle Paleolithic industries of the Gorno-Altaysk District mainly on the basis of site catchment patterns and the flaking technique of the blanks. The perspectives described are summarized as follows:

Two types of sites, termed L-type and S-type, existed. These types had a different meaning. The former had larger, varied exploitation areas and a larger inhabiting space, and the latter smaller and simple exploitation areas and a smaller inhabiting space.

It is thought that the former was used as a base camp inhabited almost throughout the year and the latter as a hunting camp used during the limited seasons when migratory animals moved along a riverbank.

The unique flaking technique, named the "Altay technique" is seen mainly in the early

assemblages. This technique is closely related with parallel-ridged Levallois blades and points, and sometimes is seen in the assemblages of the Middle Paleolithic in Soviet Central Asia and the Caucasian plateau.

Long and narrow parallel-ridged Levallois blanks from a single platform appeared first and short and broad centripetal blanks or flakes from a disc-core came later.

Retouched pieces were scarce in earlier times and retouched tools such as Mousterian points and various types of side-scrapers became abundant later.

Retouch itself changed from short, steep retouch near the edge to long, flat retouch covering almost the whole surface.

These characteristic features of stone technology and typology are seen in the mountainous regions of Soviet Central Asia and the Caucasian plateau. Although some differences existed from region to region, the assemblages in these wide areas are thought to have close relationships with each other. The people with these assemblages inhabited similar environments.

Resembling features are also seen in the Levant and in the Zagros mountains. This means that the close relation of technology and typology can be recognised not only in the assemblages of the southern mountainous border of the USSR but also in those of the Zagros and the Levant.

Now it is necessary to consider Middle Paleolithic assemblages over a wider area, especially those in similar environments. The problems of the Levant cannot be solved if investigations and studies are limited to that region. At least, the features of the Caucasian plateau must be considered. Of course, we need a general chronology over a wide area. We archaeologists should produce our own data on archaeological evidences to be checked against the data from other spheres. Attributes analysis of the assemblages from wide areas is desirable.

* * *

Middle Paleolithic cultures and societies are not as simple as were formerly thought. After the aspects of western Europe, where the history of studies and excavations of Middle Paleolithic cultures is the longest, were clarified by Bordes and his colleagues (Bordes 1961, Bordes and Bourgon 1951 etc.), fundamental questions of Bordes' scheme arose (Binford and Binford 1966, Roland 1977, 1988 etc.). Information on Middle Paleolithic cultures is scarce and one must consider them from this limited evidences. We must try to get more information from attributes of raw specimens and interrelationships between attributes. On

the basis of such information a working hypothesis is proposed, then the working hypothesis should be checked from different points of view. Repeating these processes, the features of the Middle Paleolithic cultures and societies will be clarified.

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Notes

*1 Index of warmness = $\sum$ (mean monthly temperature [more than 5°C] − 5) (Kira 1971:124–125). Kira divided the World's forests on the basis of his index of warmness into four groups; tropical and sub-tropical forest (index of warmness: ›180): warm temperate broadleaf forest (index of warmness: 180› ›85): cold temperate broadleaf forest (index of warmness: 85› ›45) and sub-arctic coniferous forest (index of warmness: 45› ›15). The zone where index of warmness is under 15 is tundra without forest (Kira 1971:149–152).

*2 The author's analysis revealed that the assemblage of layer 11 should belong to the group of layers 12–18 and that of layer 19 to the group of layers 20, 21, and that the group of layers 11–18 can be sub-divided into two groups 11–14 and layers 15–18. Therefore, afterwards the assemblages of the chamber were divided into five groups; 1. layer 22, 2. layers 21–19, 3. layers 18–15, 4. layers 14–11, and 5. layers 10–9, and are described based on this classification.

*3 During personal communication with her in August 1990, she has not conclusively decided to what general chronological stages her palynological results were assigned.

*4 Numbers are calculated from Tables 2 and 3 (Lyubin 1977:32–33).

*5 Scores are quoted from their Table 1. The different scores are shown in Figure 8. The difference is assumed to come from the difference of raw contentents; Table 1: double, convergent and transverse scrapers, Figure 8: points, double and convergent scrapers.

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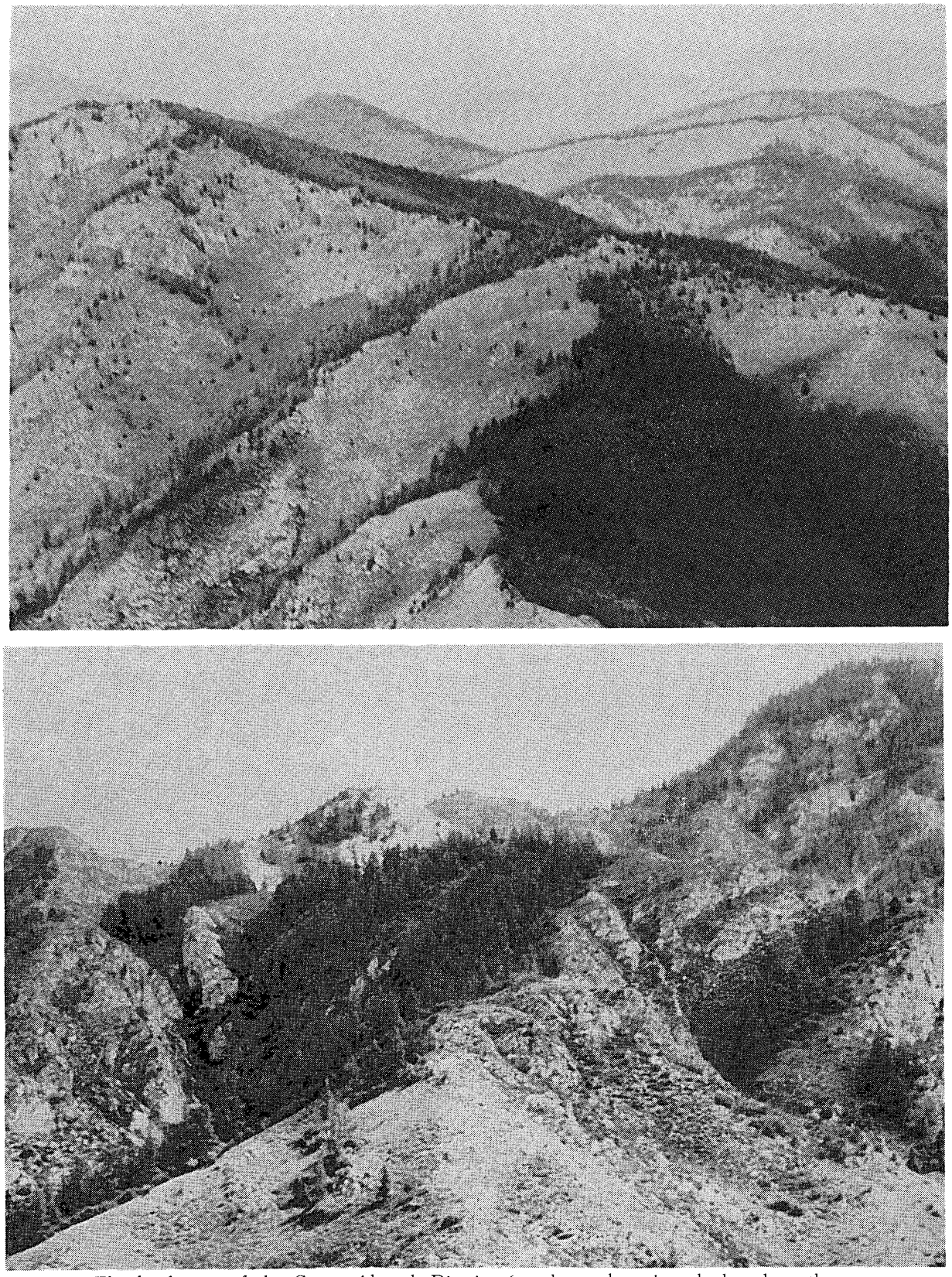
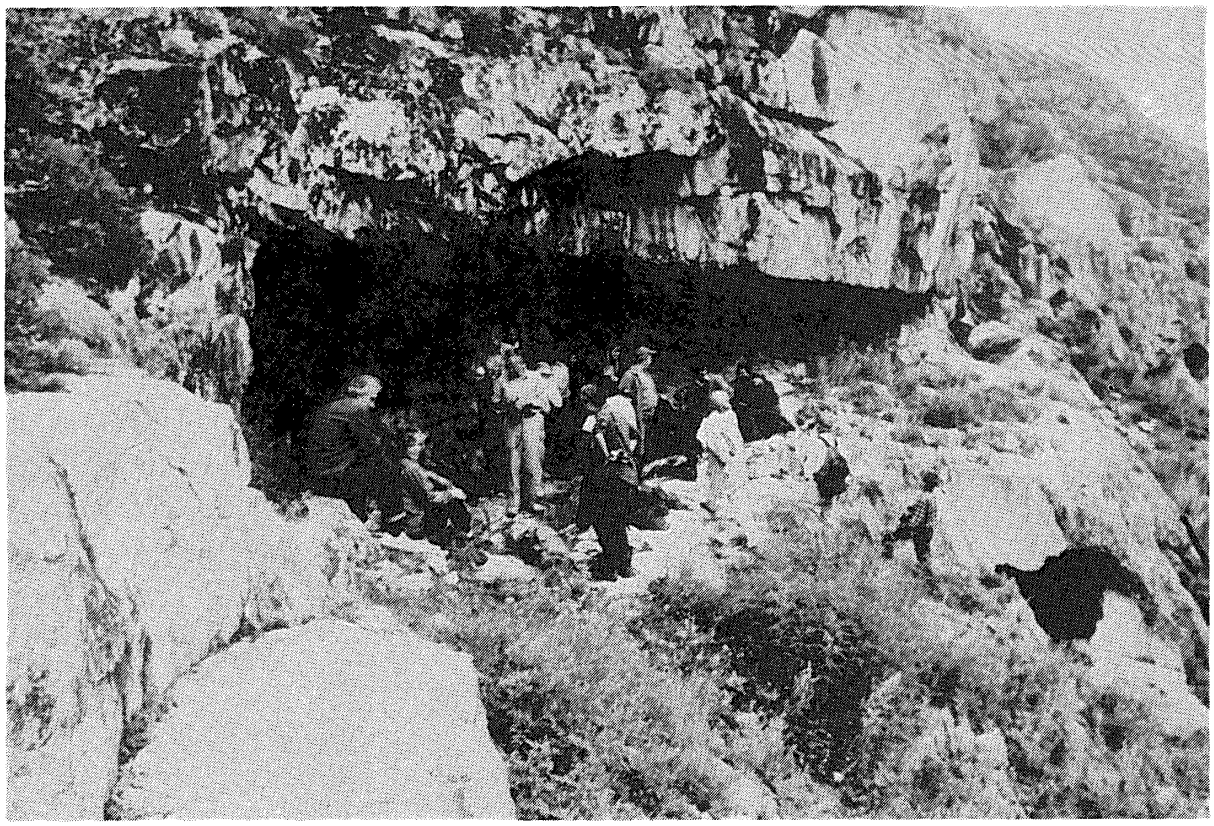
Plate 1



The landscape of the Gorno-Altaysk District (southern slope is naked and northern slope is forested).

Plate 2

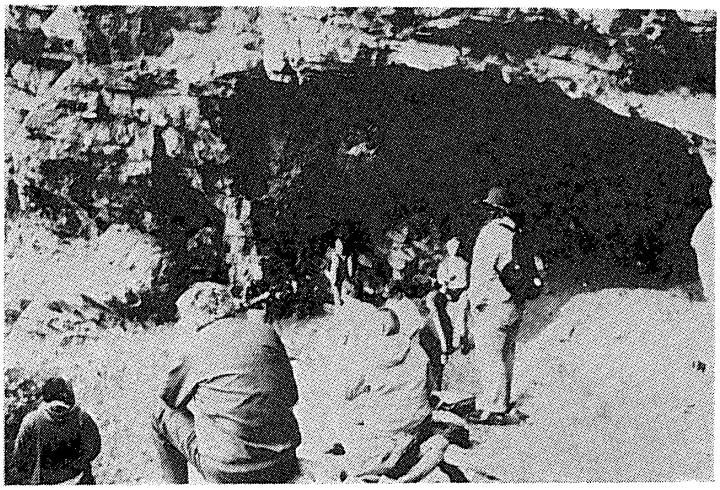


1. View of Okladnikov Cave.

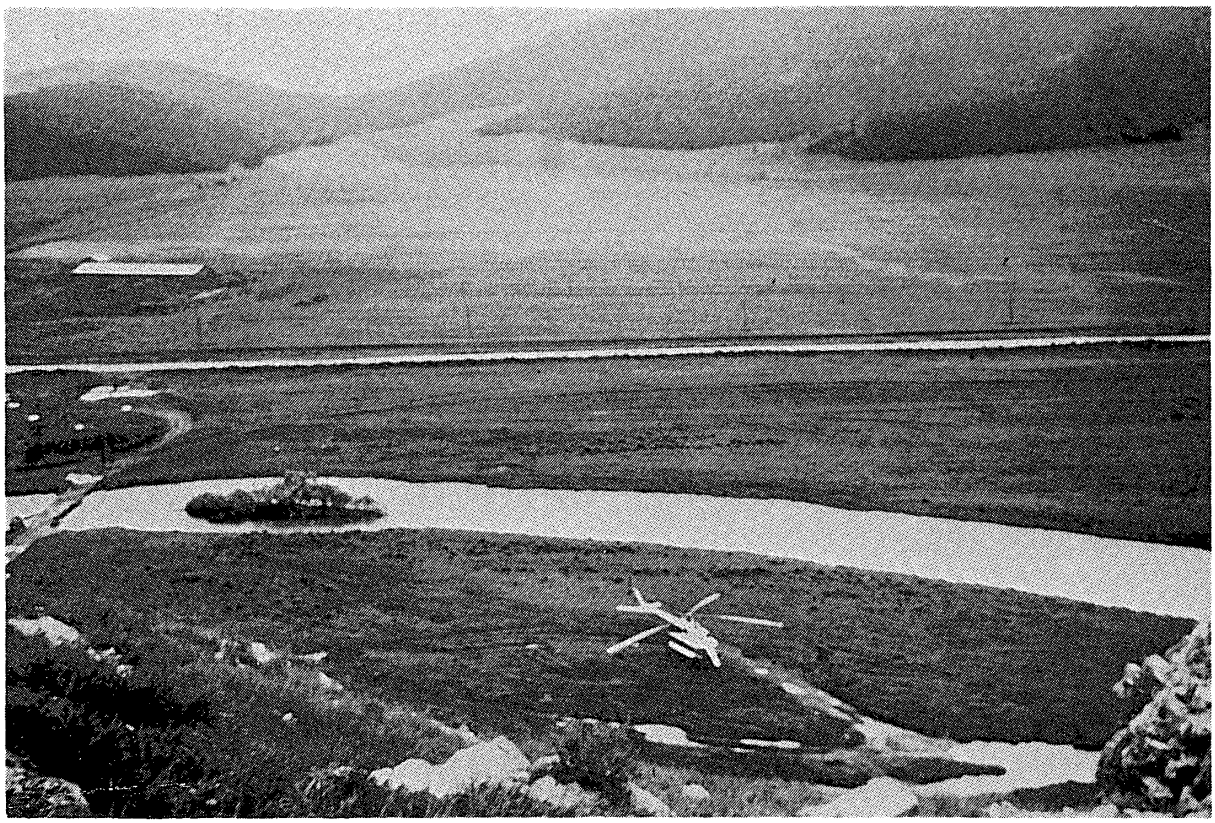
2. View to the south from the Cave.

Plate 3

1. View of Ust'-Kan cave.



2. View of Ust'-Kan Cave.

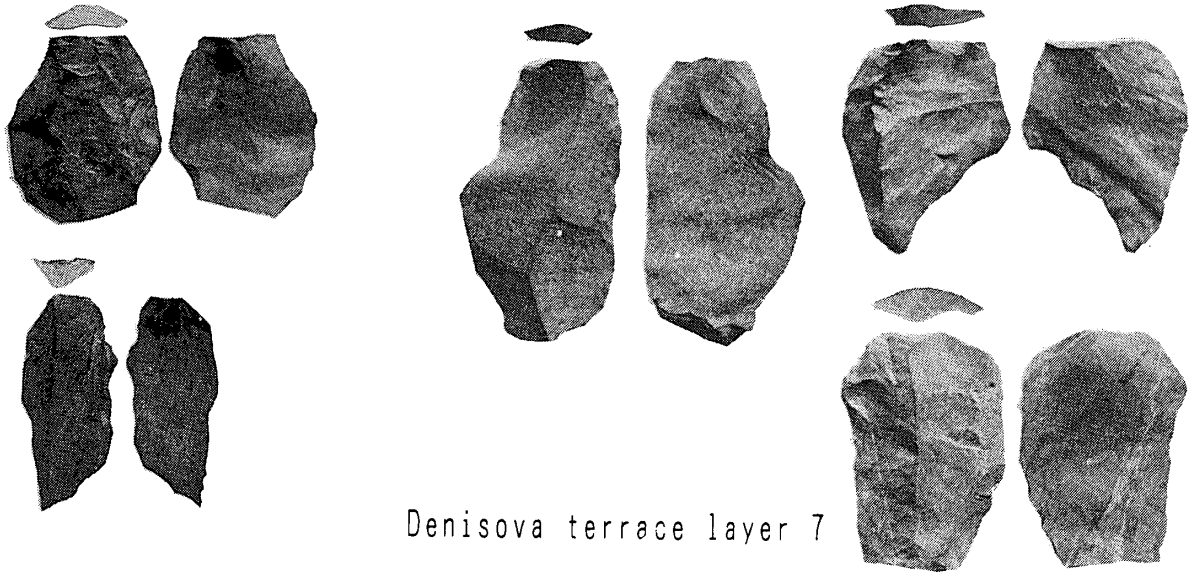


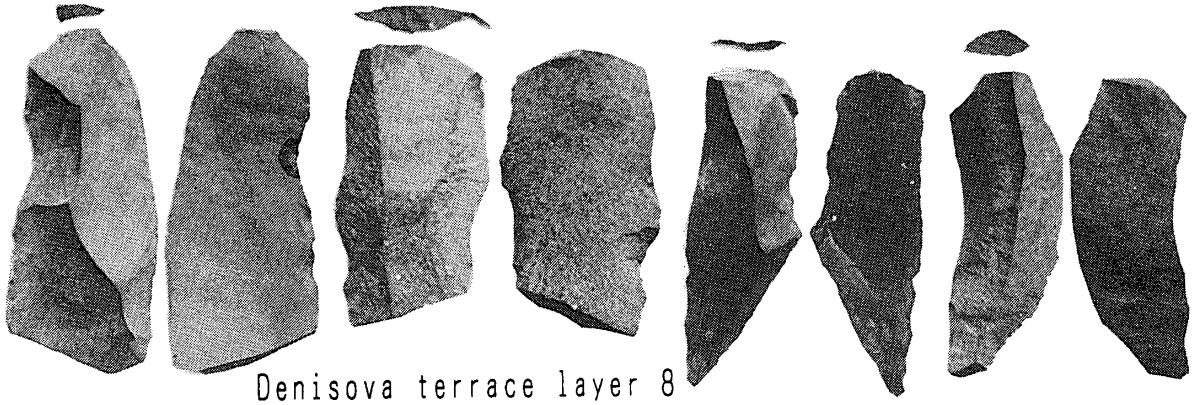
3 . View to the south from the Cave.

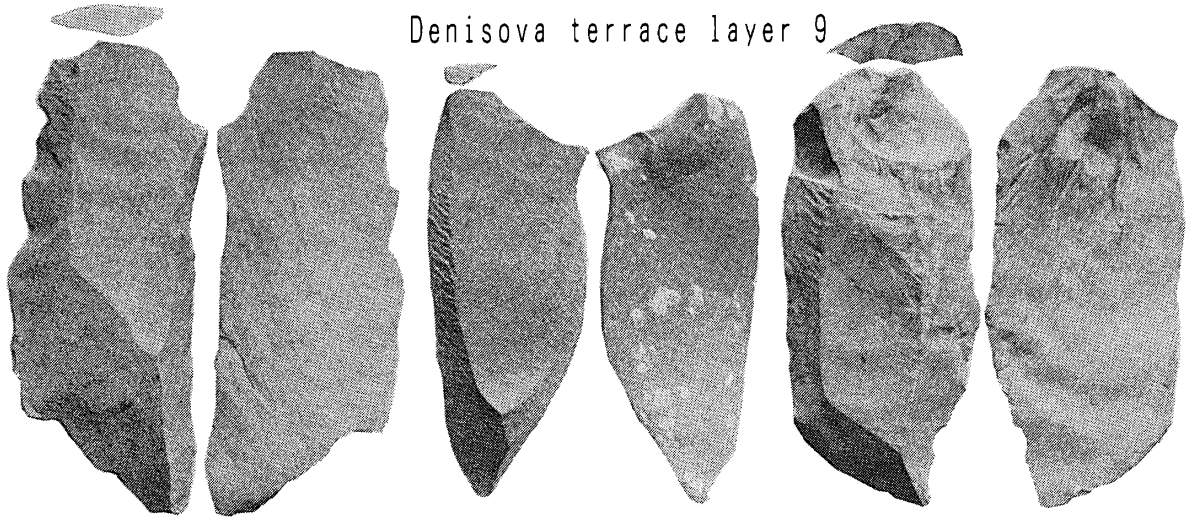
Plate 4

1. View of Maloyalomanska Cave (triangle shows the entrance of the Cave).

2. View to the southwest from the Cave.

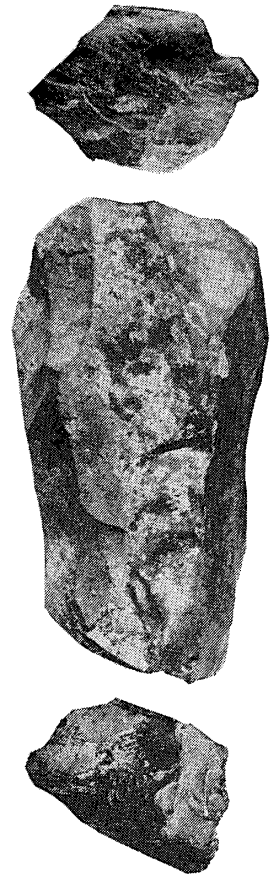




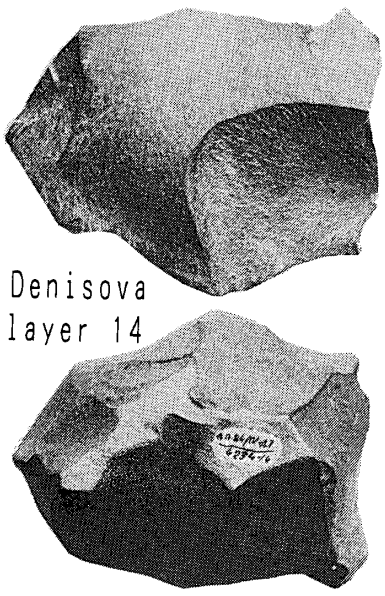


Blanks from Denisova Cave (1/2).

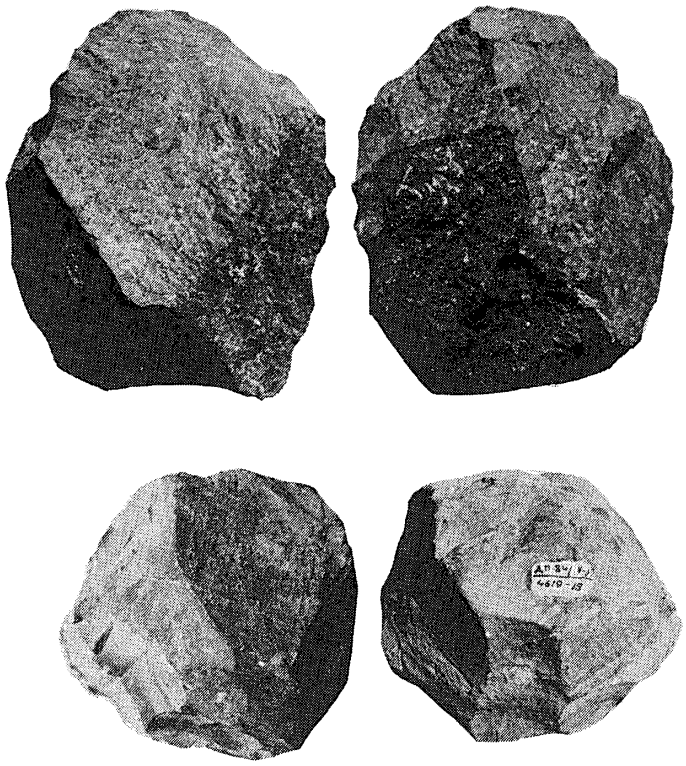
Plate 6

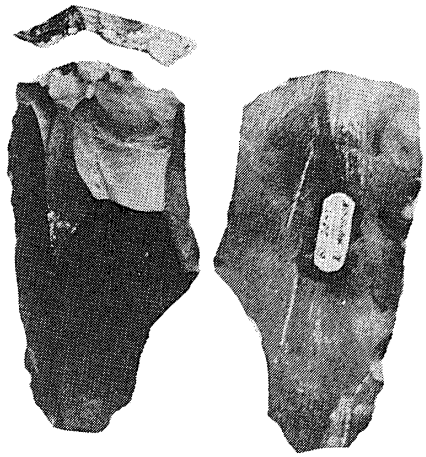


Denisova layer 13

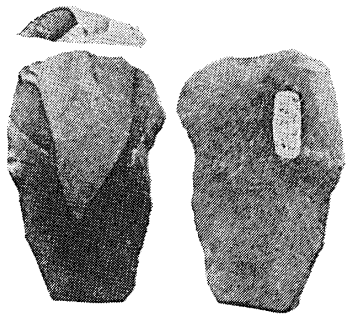


Denisova layer 14



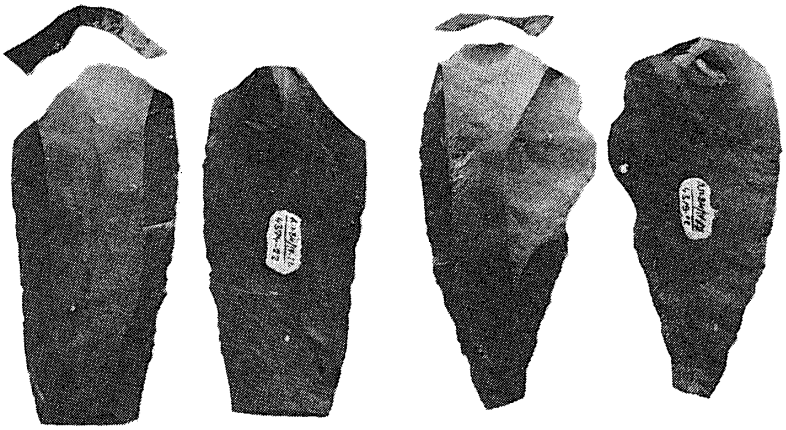


Denisova layer 19

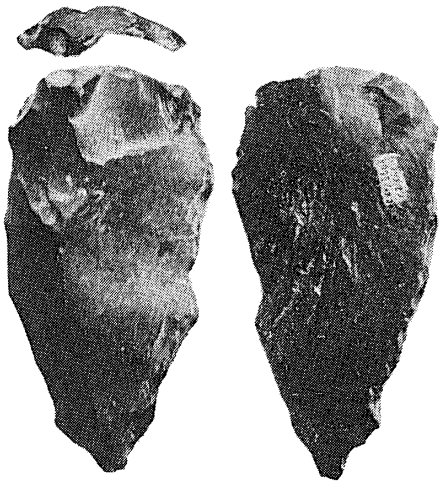


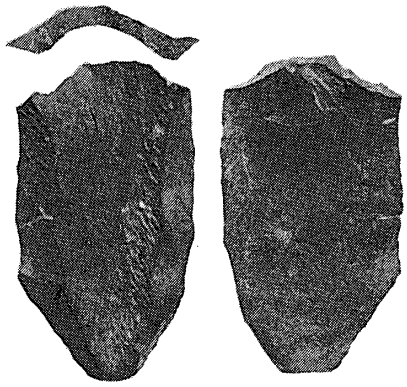
Blanks and cores from Denisova Cave (1/2).

Denisova layer 20A



Denisova layer 22

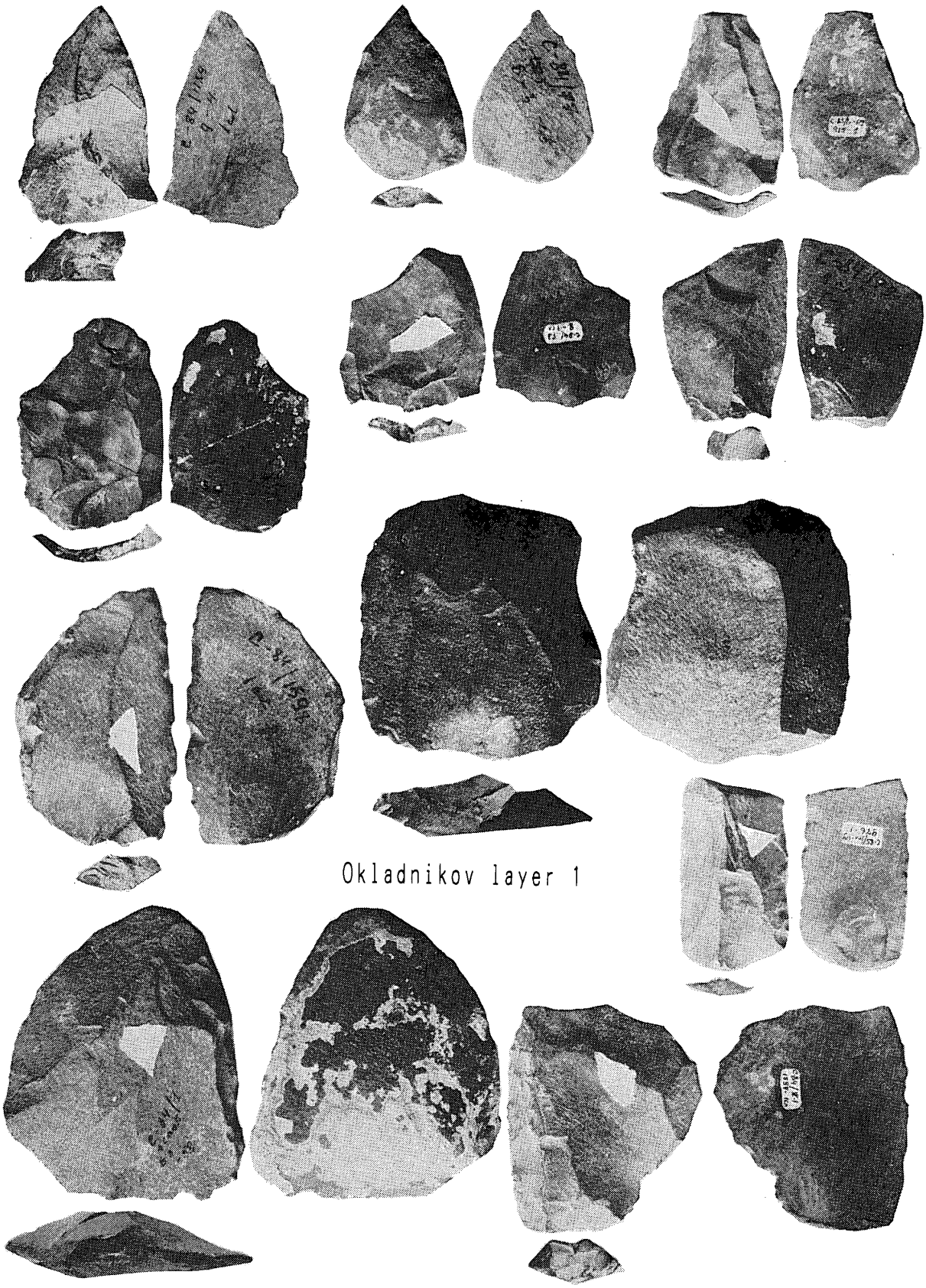




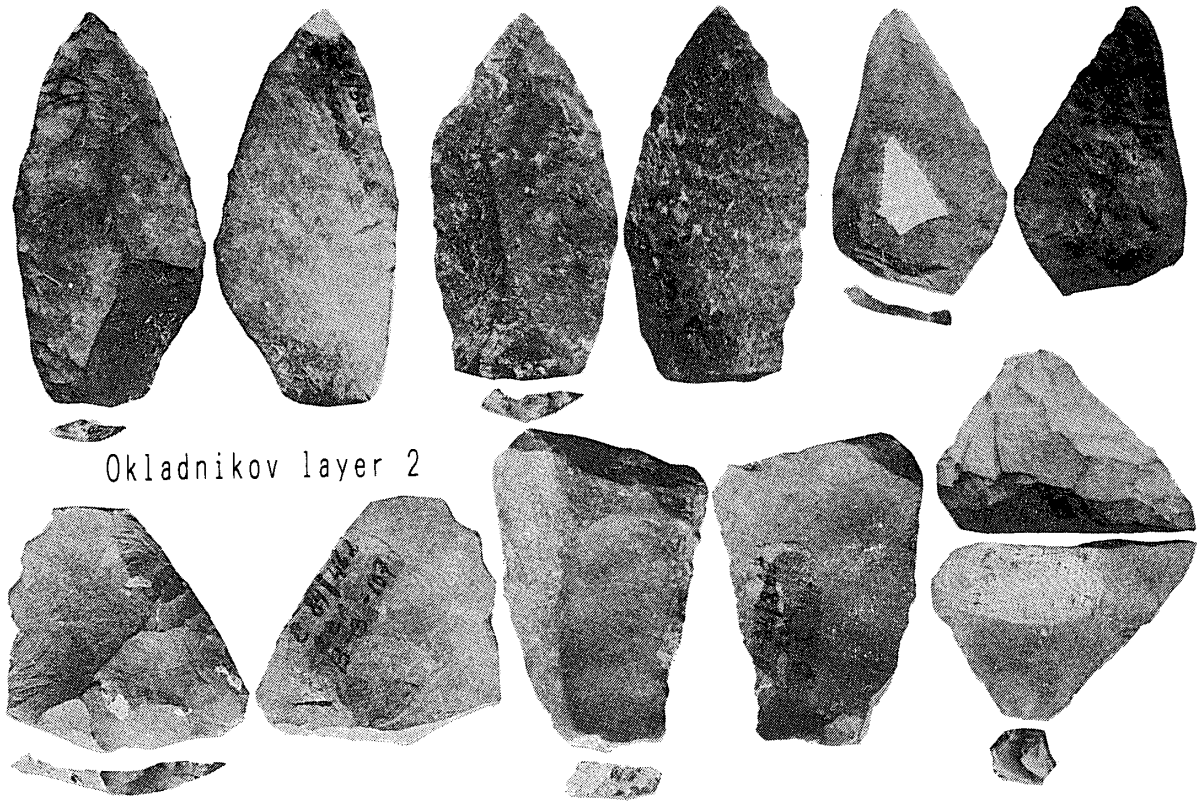
Denisova terrace

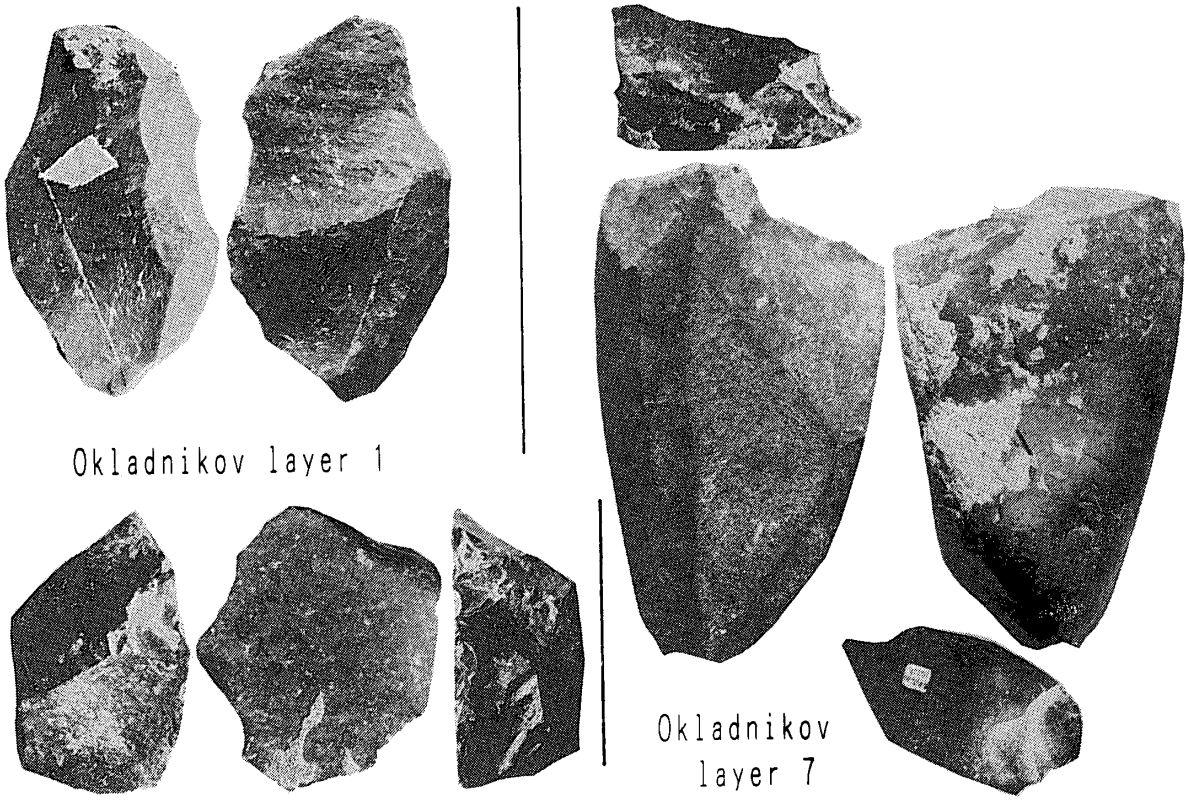
Blanks from Denisova Cave (1/2).

Plate 8



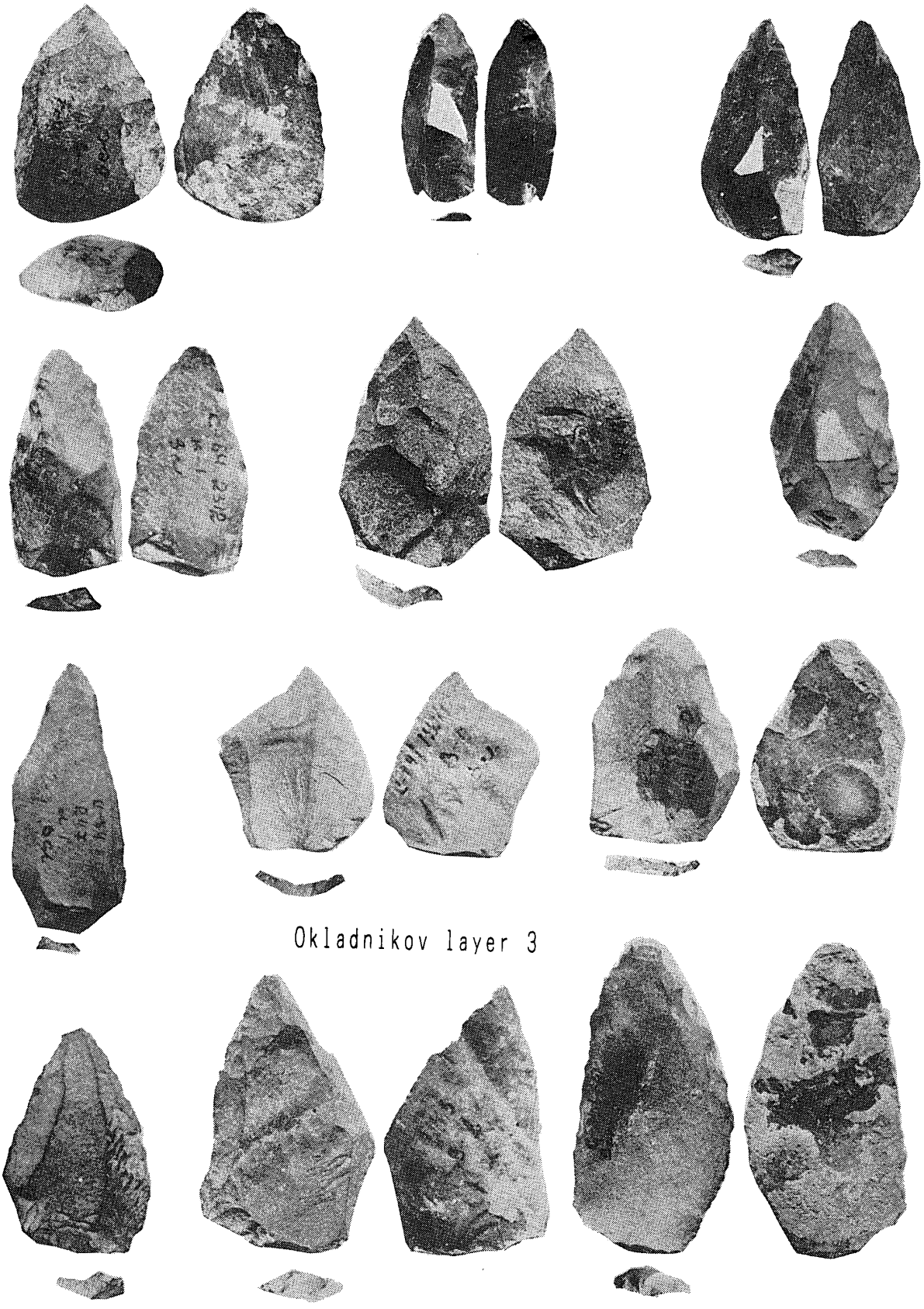
Tools from Okladnikov Cave (1/2).





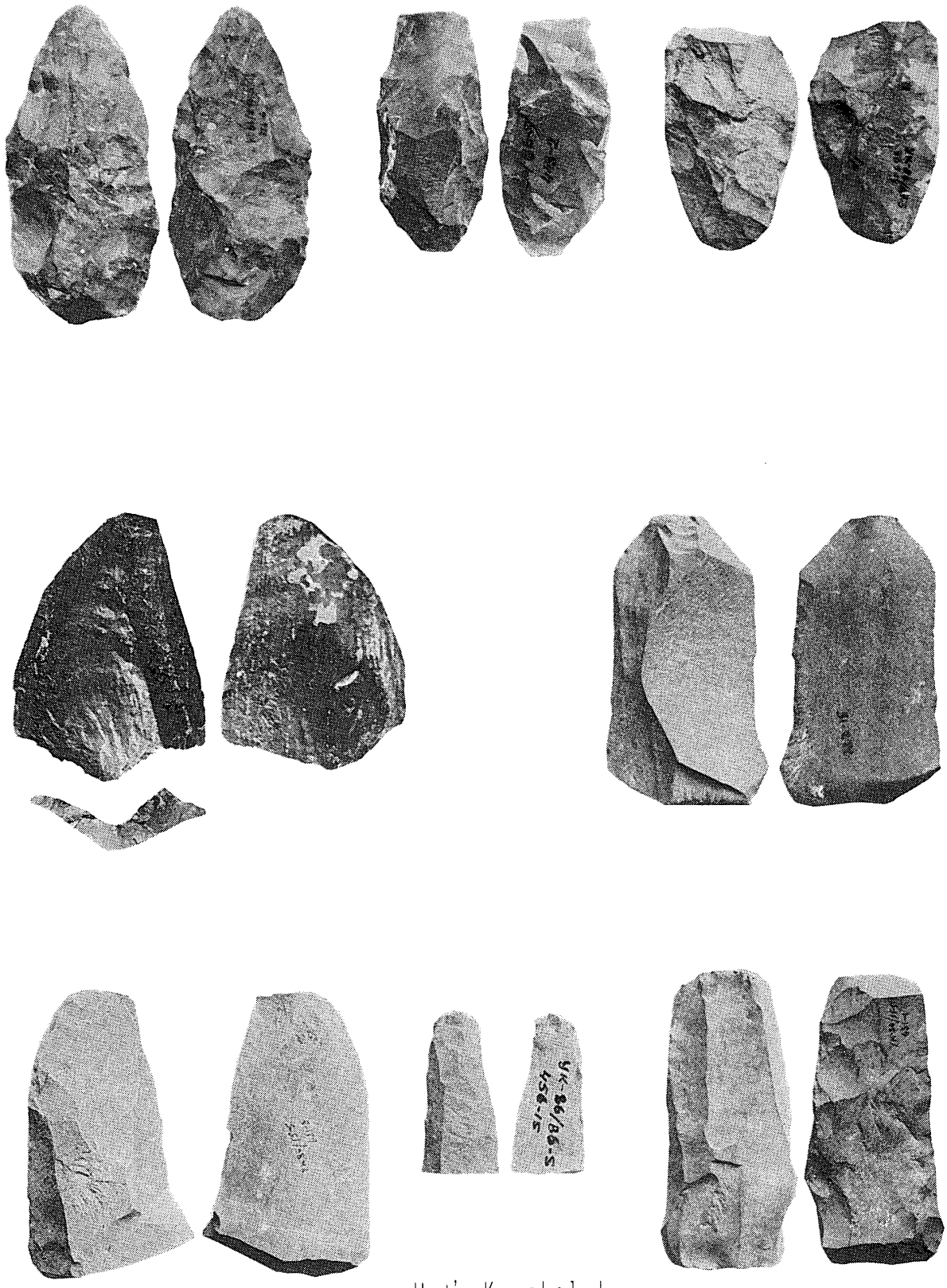
Tools and cores from Okladnikov Cave (1/2).

Plate 10



Tools from Okladnikov Cave (1/2).

Plate 11

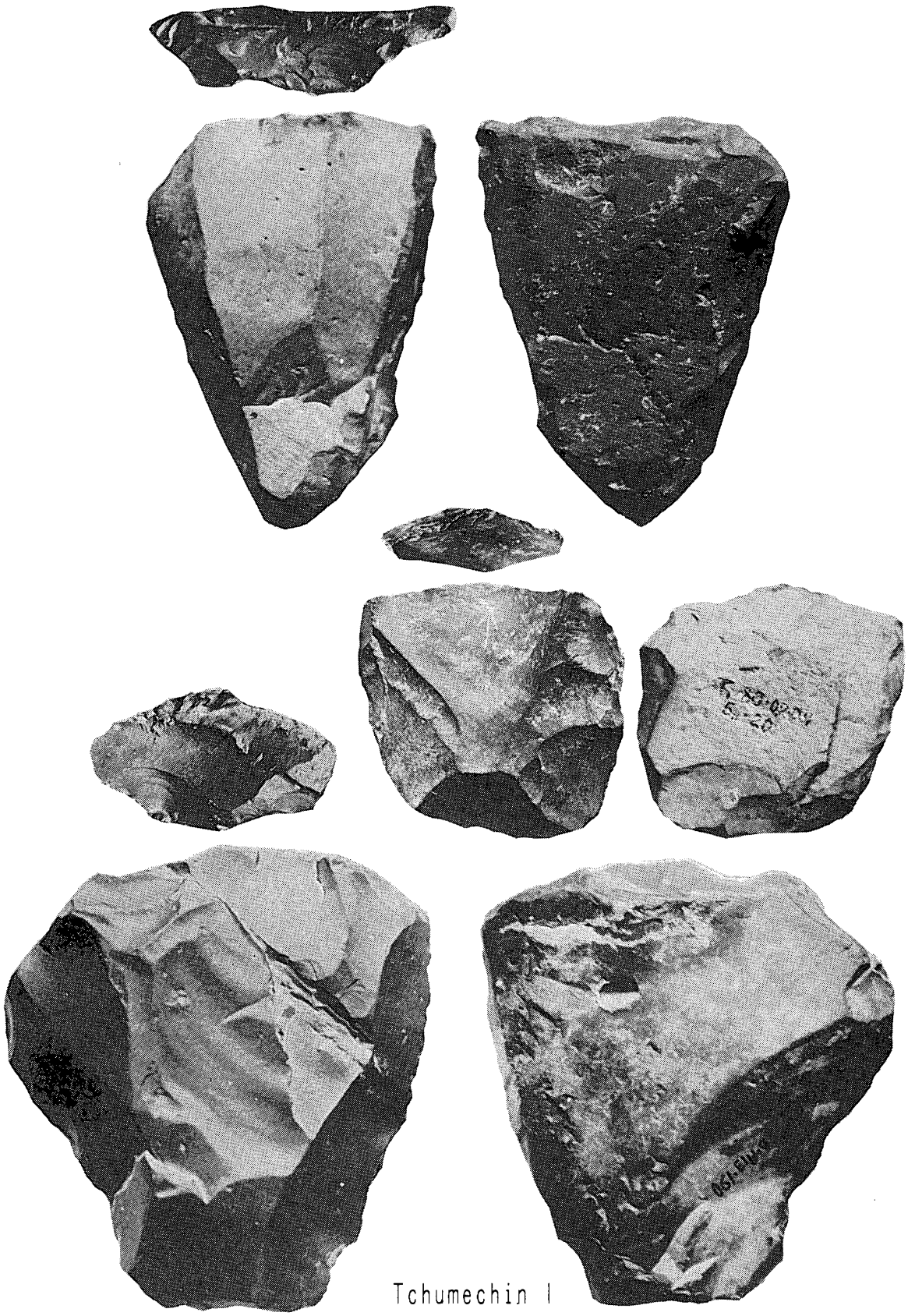


Ust'-Karakol I

Tools, blanks and core from Ust'-Karakol site (1/2).

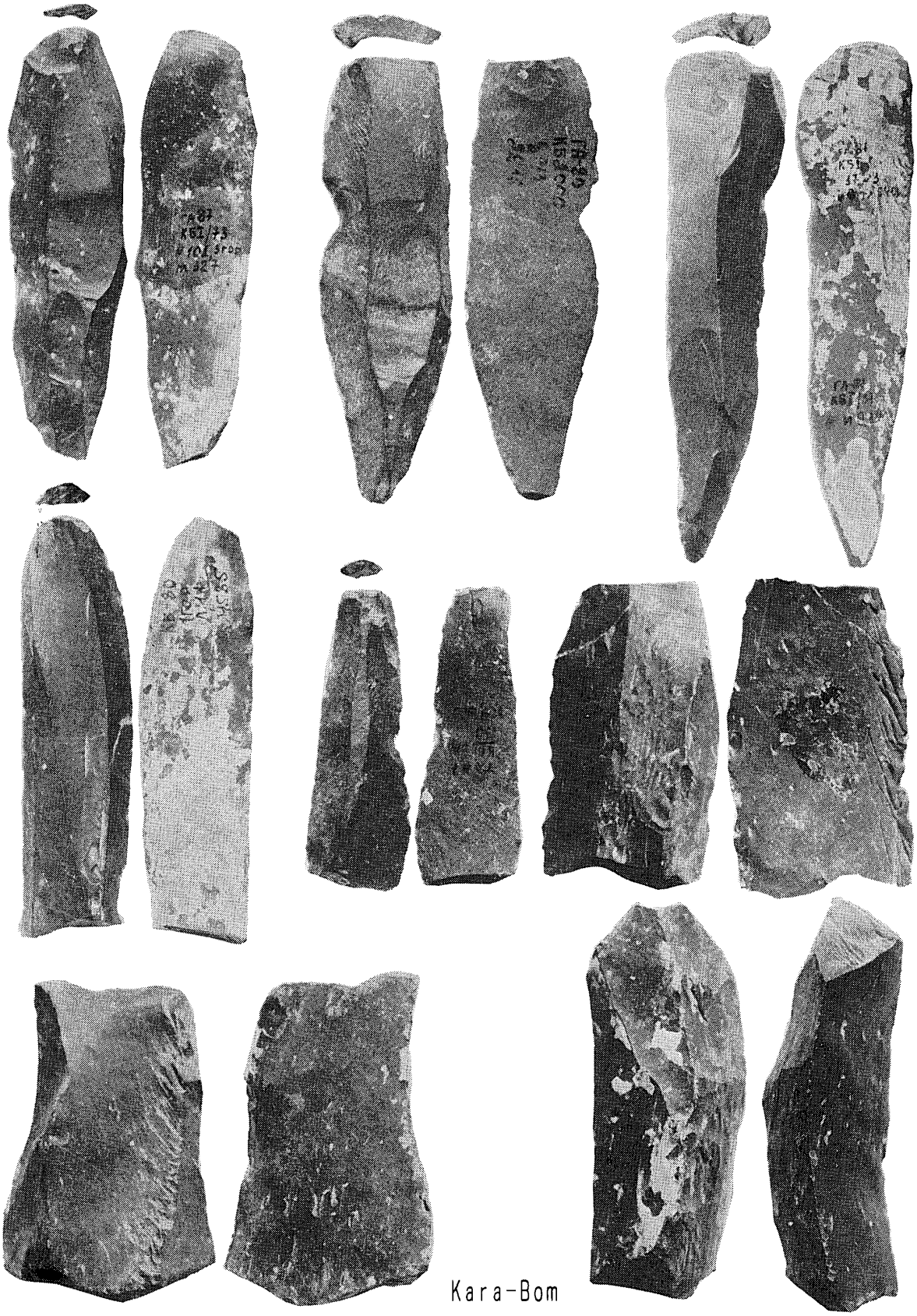
Plate 12

Blanks and cores from Tchumechin I site (1/2).

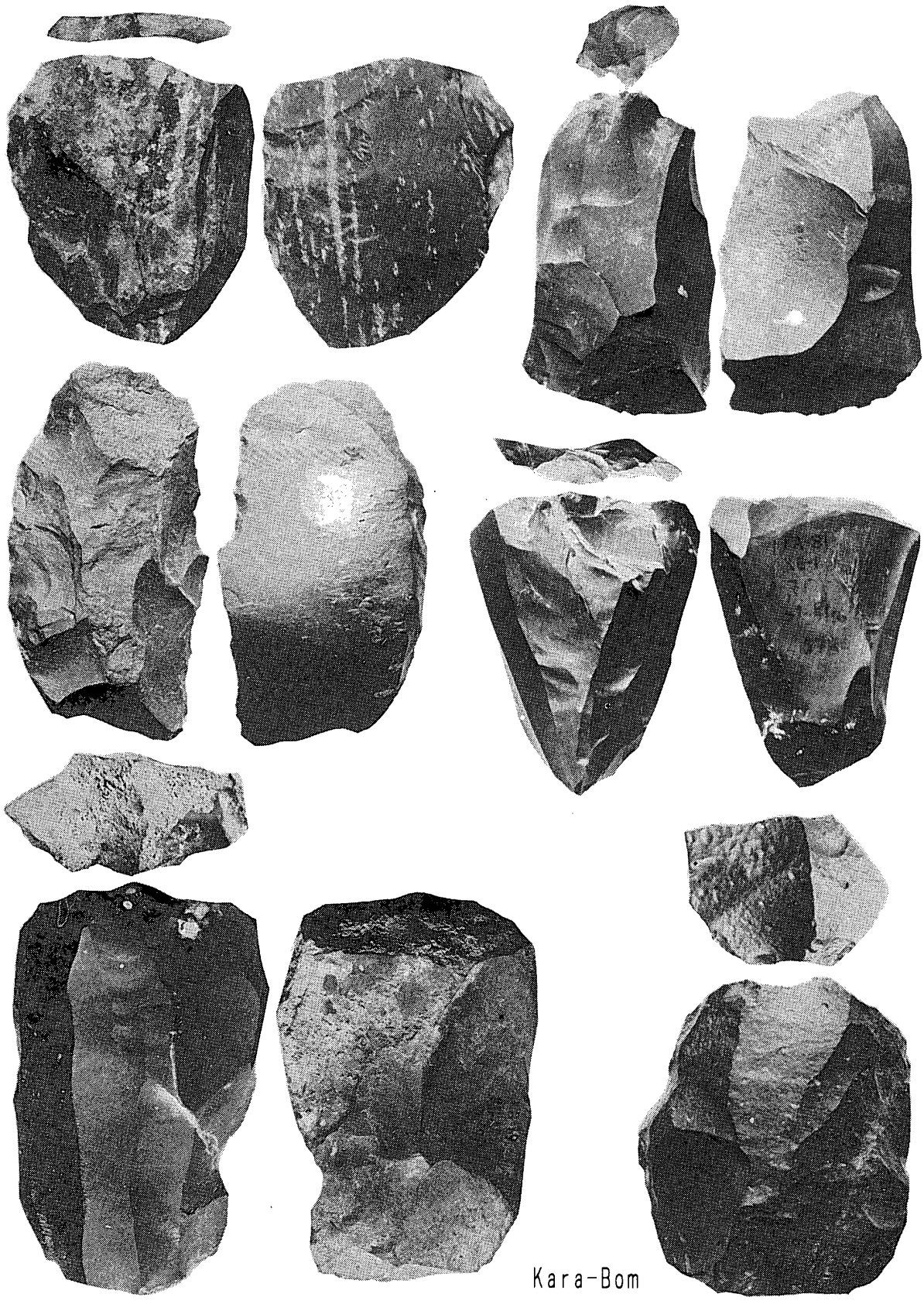


Cores from Tchumechin I site (1/2).

Plate 14

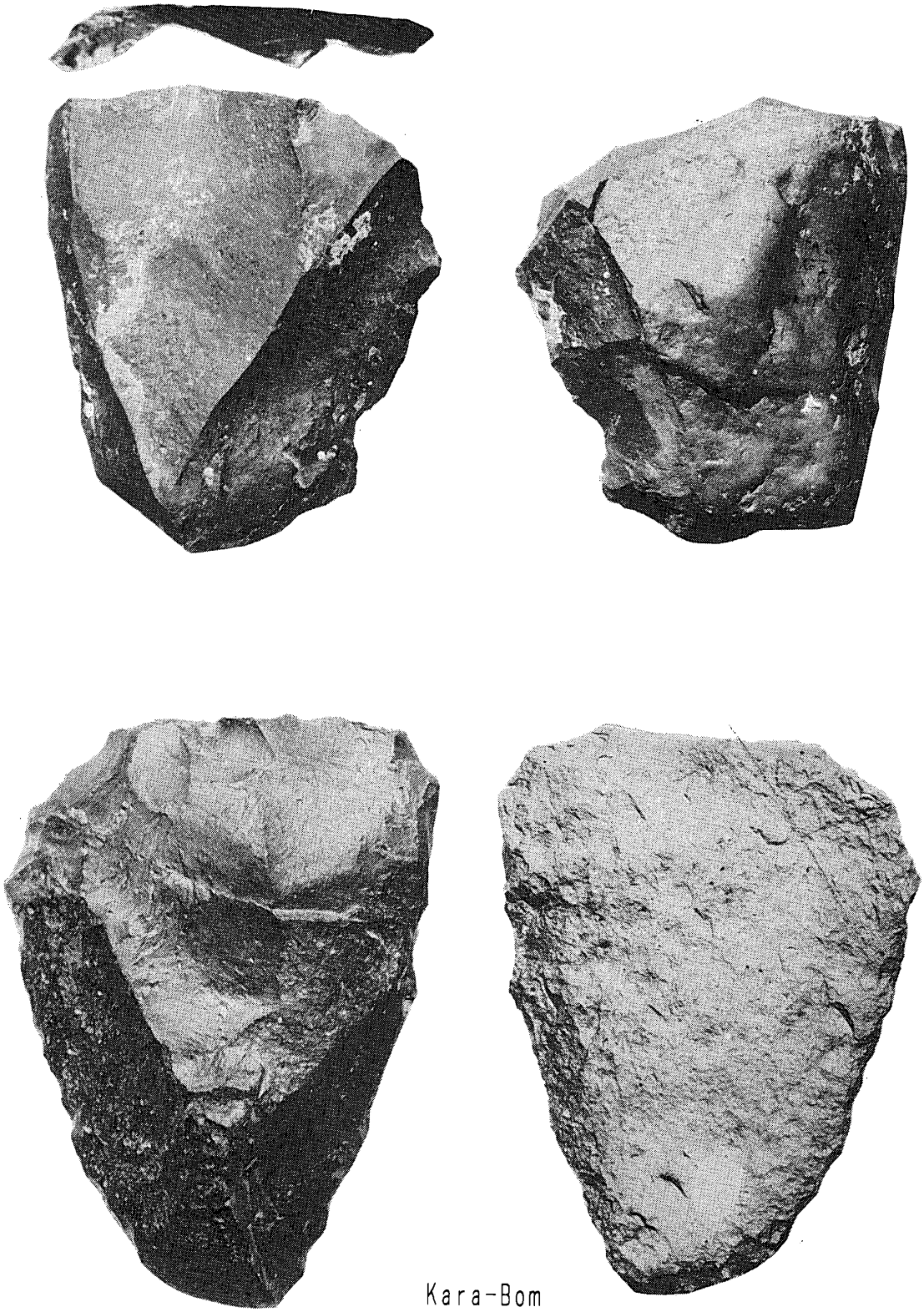


Blanks from Kara-Bom site (1/2).



Blanks and cores from Kara-Bom site (1/2).

Plate 16



Cores from Kara-Bom site (1/2).