PALEOBIOCLIMATIC RECONSTRUCTION OF HOLOCENE ARCHAEOLODICAL RELICTS OF PRI-YENISEI SIBIRIA

(according to the paleopedological metod's dates)

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목 차

A man, living during past geological period, was making the considerable influence on evolution of soil cover's formation. It is seen in Holocene (the modern interglacial period) to the greatest degree.

The geological sectiohs of Siberian monuments have complicated stratigraphic bedding of quaternary accumulations.The thickness of holocene's sediments at the archaeological section, as a rule, may be characterized as a holigenetic soil body of policyclic structure.

Inside the holocene's thickness there are counted several paleosoil, which (in accordance with the physico-chemical characteristics) are divided into the genetic horizons.

A lot of sections have the holocene age's accumulations, consisted of ones of different genetics with paleo-soil's holding horizons. Paleosoil's study helps to receive very important information about the habitation's conditions of ancient men (climat, relief, way of habitation and so on).

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Paleosoils are being studied with the help of paleo-pedological method. Being comparatively young, paleopedolodical method of analysis is suffiently informative for reconstruction of ancient men's conditions of inhabitation.

The principle of actualism, assumed as a basis, allows to expose the features of likeness and difference of modern soils and paleosoils. Methods of field and labour diagnostics are used too. Special attention is paid to macro- and micromorpholodical metods and zesearch of organic substance. The paleosoil genesis qives valuable materials for paleoclimatic reconstruction.

Artefacts of the holocene's age of siberian archaeological relics are situated at the surface, in the body, foots of paleosoil. The learning of holocene's paleosoils with the help of field and special diagnostics methods allows to define their genesic and to reconstruct paleobioclimatic conditions of men, s inhabitation. The analisis of holocene age's paleosoils was conducted in the regions of archaeolodical objectcs and geological sections within the territory of southern taiga, subtaiga, forest-steppe and steppes.

The sediment's section of low hypsometric levels of siberian rivers (flood-lands and their low terraces) aere the most informative.

THE MORPHOLOGICAL AND ANALITIC CHARACTERISTIC OF PALEOSOILS

Paleosoils have the stratigraphic bedding in the archaeological sediments'es thichness (fig.1.2). The macromorphological investigations study the soil profile of paleosoil.

It has the genetic horizons of different degree of safety (fig.2).

The micromorpholodical researchs of ground ends allous to diagnose the paleosoils genesis exactlier. Physical and chemical characteristics help to understand the soilformation's peculiarity (fig.3, 4).

Data of physical and chemical analyses of the holocene's age of siberian archaeological relicts (table 1, 2).

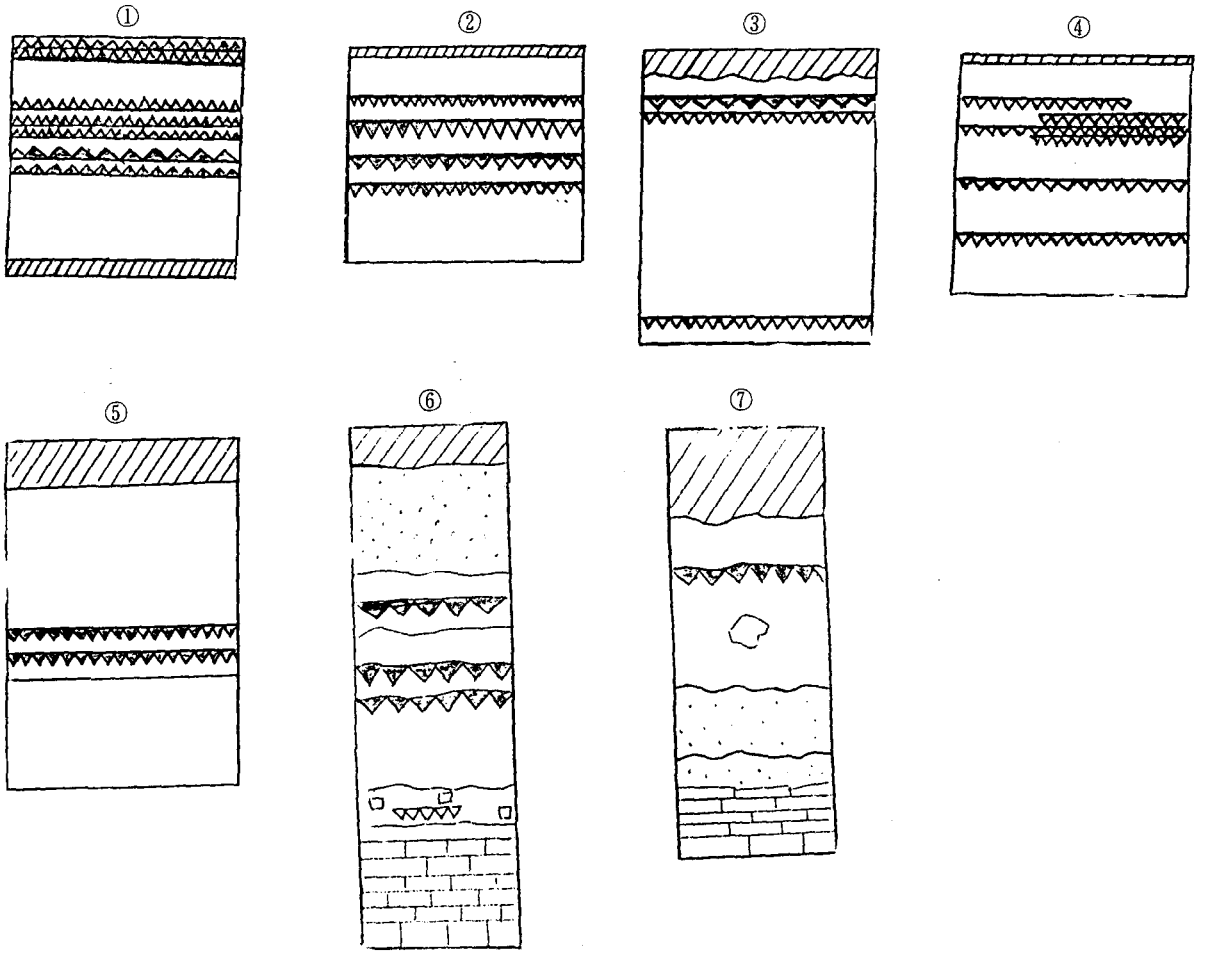

Fig.1. Stratigraphic location of paleosoils in the archaeological site's section in the Middle Yenisei basin.

1 - Nyasha, 2 - Ust'Karaulnaya, 3 - Druzhinikha, 4 - Tatishev, 5 - Musium of Regional Studies, 6 - Ius, 7 - Shush.

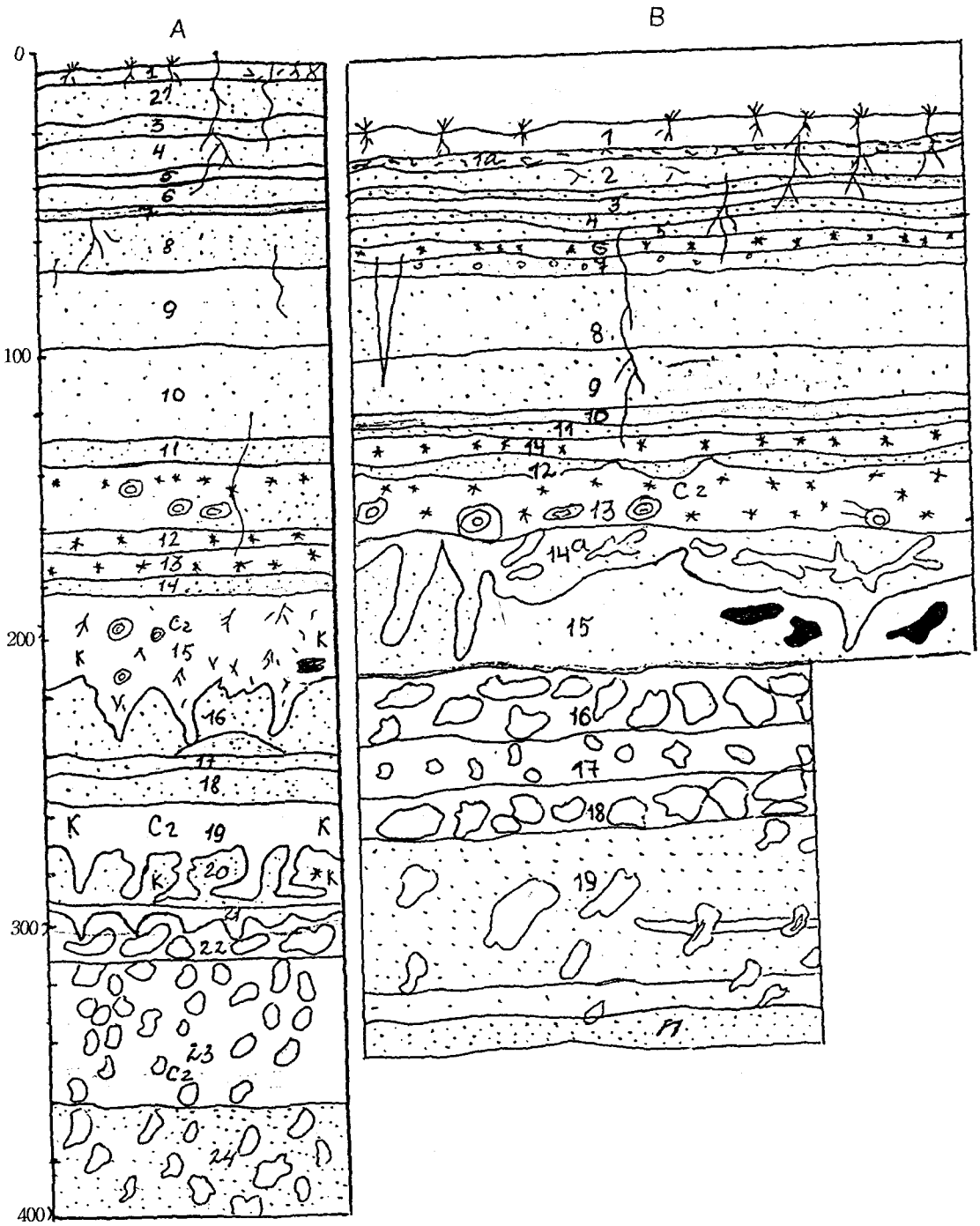

Fig.2. Stratigraphic location of paleosoils in the archaeological site Nyasha.

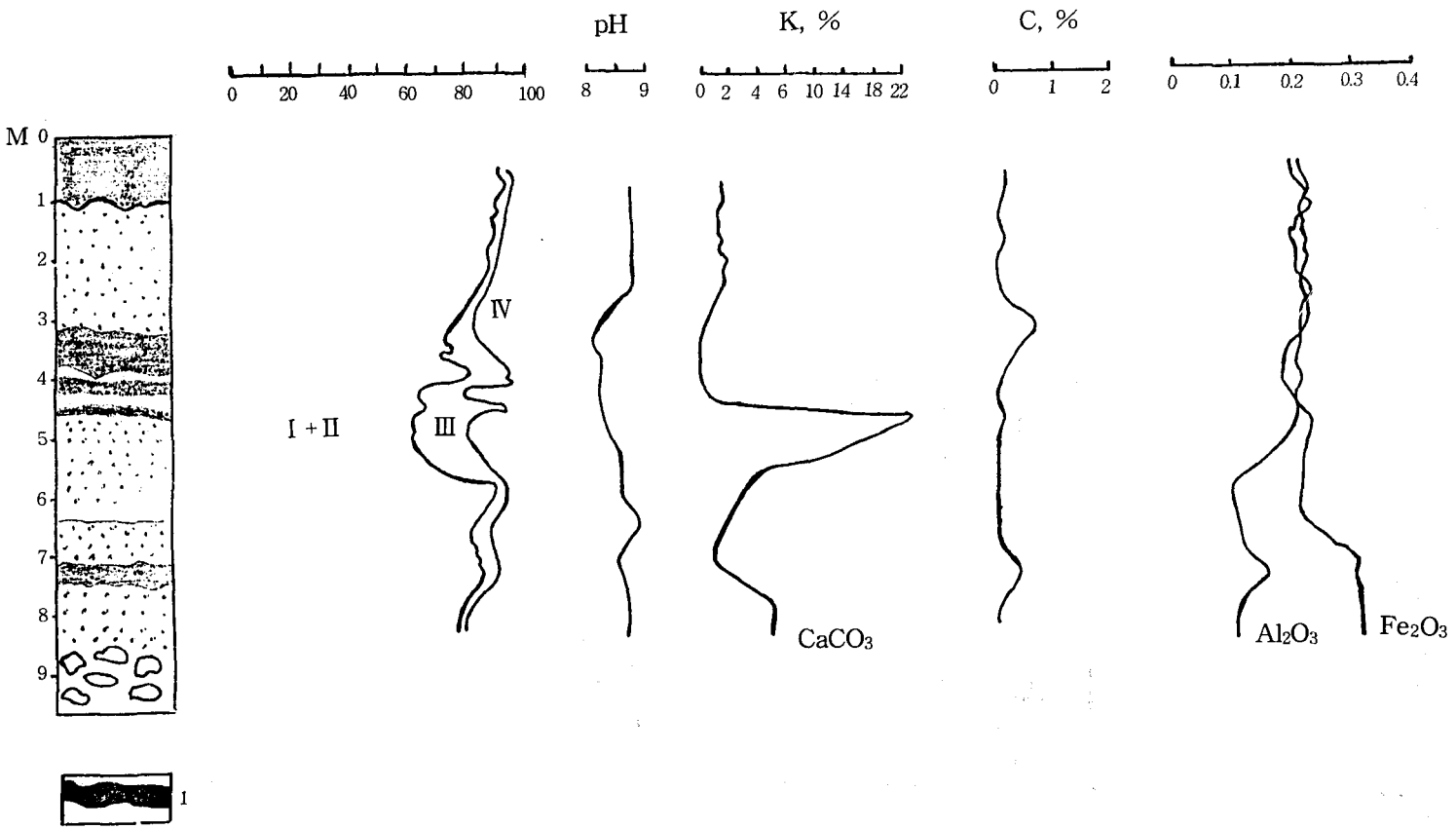

Fig.3. Data of physical and chemical analises of archaeological relict Musium of Regional Studies.

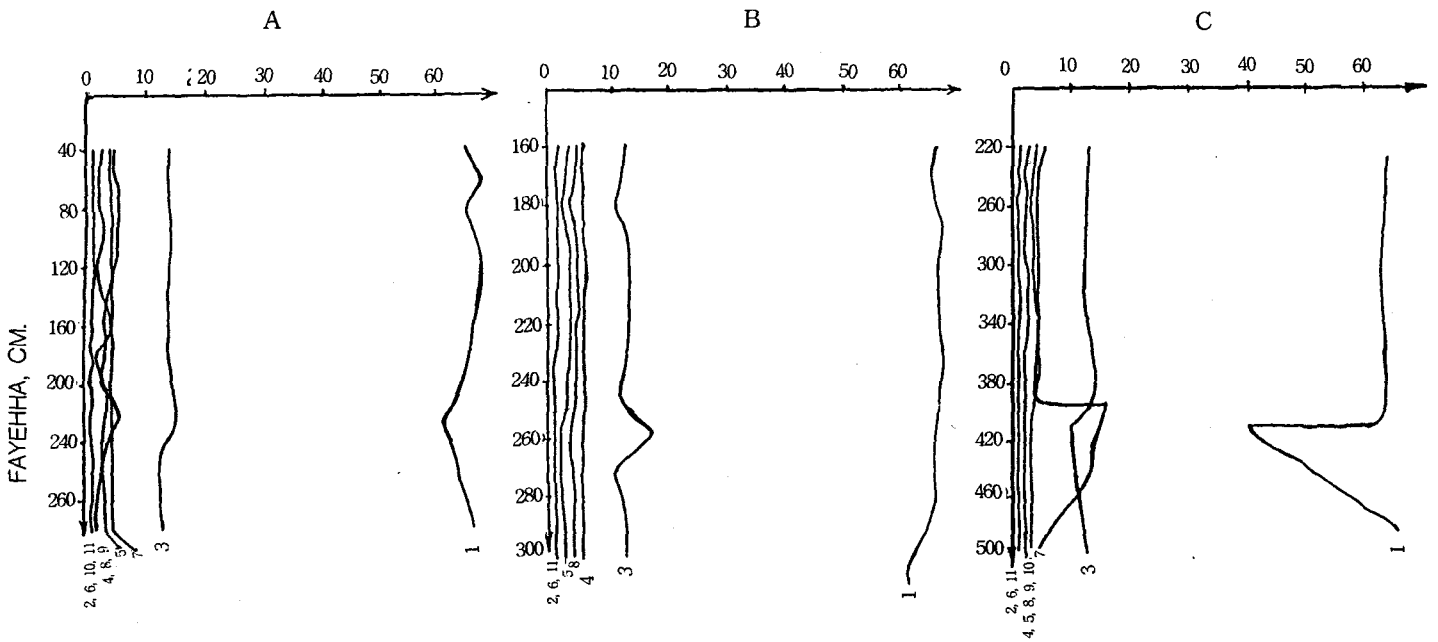

Fig.4. Data of chemecal analis of holocene archaeological relicts of Pri-Yenisei Siberia : A - Ust'Karaulnaya ; B - Nyasha ; C - Musium of Regional Studies.

Table 1. The analitic characteristic of the layers of archaeological site Niasha.

1	2	3	4	5	6	7	8
AO	0 ~ 5	8.1	2.1	2.6	0.9	0.28	0.20
A	15 ~ 20	8.1	2.1	2.6	0.7	0.26	0.16
BC	25 ~ 30	8.2	2.9	2.5	0.2	0.32	0.26
C	80 ~ 90	8.2	1.7	2.6	0.4	0.28	0.32
Ah	179 ~ 180	7.8	0.8	2.7	1.5	0.27	0.16
ABh	220 ~ 230	7.9	0.6	2.6	0.6	0.29	0.17
Ah	240 ~ 245	8.1	1.2	2.7	0.9	0.26	0.12
Bh	247 ~ 257	8.1	0.6	2.6	0.4	0.22	0.21
Ah	260 ~ 270	8.0	0.8	2.7	0.5	0.29	0.25
Bh	275 ~ 285	8.1	0.9	2.8	0.5	0.17	0.16
D	310 ~ 320	8.2	3.3	2.6	0.5	0.21	0.13

1 - horizon; 2 - depth of model, cm; 3 - PH_2O; 4 - $CaCO_3$, %; 5 - specific weight, g/㎤, 6 - C, % to the soil; 7 - the Tamm's extract, Al_2O_3; 8 - the Tamm's exstract, Fe_2O_3

Table 2. Group and fractional humus composition of the archaeological site's (% to the common organic C content of soil)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Niasha													
Ah1	1.5	7.9	23.0	9.2	40.1	7.9	8.5	9.9	5.3	31.6	71.7	1.3	28.3
ABh	0.6	2.3	7.7	7.3	17.3	6.4	1.8	9.1	4.0	21.3	38.6	0.8	61.4
Ah2	0.7	2.3	11.4	7.2	20.9	6.9	0.6	15.3	5.0	27.8	48.7	0.6	51.3
Bh2	0.4	3.5	9.4	6.7	19.2	5.0	1.5	8.5	5.7	20.7	39.9	0.9	60.1
Ah3	1.3	5.2	31.2	8.2	44.6	5.3	2.8	13.9	5.1	27.1	71.7	1.6	28.3
Bh3	0.5	5.8	5.8	6.9	18.4	5.3	2.5	10.0	4.6	22.5	40.9	0.8	59.1
Dh3	0.4	4.4	8.9	6.7	20.0	3.6	1.1	14.5	4.4	23.6	43.6	0.9	56.4
Ust-Karaulnaya													
Ah1	1.2	10.3	29.9	12.2	52.2	5.1	1.7	11.9	5.7	23.8	76.0	2.2	24.0
Ah2	1.0	9.5	37.8	10.5	57.8	4.2	3.1	13.8	2.1	23.2	81.0	2.5	19.0
Ah3	0.4	2.7	27.0	8.1	37.8	8.1	0.0	16.2	2.7	27.0	64.8	1.4	35.2
Ah4	0.4	0.0	2.2	2.8	5.0	8.3	0.0	25.6	11.1	45.0	50.0	0.1	50.0

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Museum													
Ah1	0.8	8.6	7.7	26.9	43.2	6.2	2.4	6.2	8.6	23.4	66.4	0.5	33.4
Bh1	0.5	1.3	15.0	8.7	25.0	6.5	0.9	13.2	13.0	33.6	58.6	0.7	41.4
Ah2	0.3	0.0	9.7	6.4	16.1	9.7	0.0	12.9	9.7	32.3	48.4	0.5	51.6
BCh	0.1	0.0	0.0	4.3	4.3	14.3	0.0	21.4	10.0	45.7	43.2	0.1	56.8
Ah3	0.6	0.0	3.2	8.1	11.3	6.4	0.0	24.2	11.2	41.8	53.1	0.3	46.9

1 - horizon; 2 - C, % to the soil; 3 - gumin.acids, 1; 4 - gumin. acids, 2; 5 - gumin.acids, 3; 6 - gumin.asids, sum; 7 - fulvate acids, 1a; 8 - fulvate acids, 1; 9 - fulvate acids, 2; 10 - ful - vate acids, 3; 11 - fulvate acids, sum; 12 - C gumin.acids+C fulvate acids; 13 - C gumin acids:C fulvate acids; 14 - un- hydrolysing remains.

Table 3. The indices of Holocene deposit's humus state of neolithic monument Niasha

1	2	3	4	5	6	7	8
1	AO. A	24.7	0.73	24.7	33.3	44.4	50.7
	C	20.7	0.29	33.5	16.7	50.0	44.9
	Ah	40.1	1.52	19.7	57.4	23.0	28.3
	ACh	17.3	0.62	13.3	44.5	42.2	61.4
	Ah	20.9	0.86	11.0	54.5	34.4	51.3
	Bh	19.2	0.40	18.2	46.9	34.9	60.1
	Ah	44.6	1.28	11.7	70.0	18.4	28.3
	Bh	18.5	0.52	31.4	31.4	37.3	59.1
	D	5.5	0.11	49.1	00.0	00.0	84.2

1 - number of section; 2 - horizon; 3 - degree of humification; 4 - C-common, %; 5 - free huminus acids; content, % to sum; 6 - huminus acids connected with Ca; content, %; 7 - stable huminus acids; content, %; 8 - unhydrolysing remaint, % to common C

In holocene (the modern warming) the bioclimatic si- tuation was a process of several periods's changing. These periods were:preboreal (PB), boreal (BO), atlantic (AT), subboreal (SB), subatlantic (SA) (Kind, 1974).

RECONSTRUCTION OF BIOCLIMATIC CONDITIONS OF HOLOCENE PERIOD

The holocene's beginning - preboreal period - can be sharacterized as a period with fresh and continental climatic conditions. The landscape of forest tundra-northern taiga was typical for the zone of southern taiga. The soil cover consisted of undifferentiated soil, tundra-frozen, tundra-gley, podzol-gley ones and etc. During that period the landscape of northern and middle taiga with the formation of taiga-frozen soil, gley and podzolic-gley ones was tyical for the conditions of subtaiga and forest-steppe's zone. For the steppe's zone the landscape of middle and southern taiga with the soil cover, consisting of the frozen-podzol and sodtaiga soil, was usual that tim (fig.5, 6).

The artefacts, situated within the sediments of prebo-real period, corresponded to the late paleolithic-early mesolithic culture. The finds of developed mesolit had place too.

During the following (boreal period) the bioclimatic situation was warmer, then the modern one. Subtaiga was typical for the zone of southern taiga. This situation was being reflected is soilformation (the different podzolic soils, sod-forest, sod-meadow, sod-carbonate, sod-gley ones and so on). For the subtaiga's and forest-steppe's zones the landscape of aspen birch subtaiga with the soileover, consisting of grey forest soil, brown, podzolic, sod-gley, sod- carbonate, meadow-forest ones and ets, was ordinary too. The forest-steppe's landscape was typical for the steppe zone (its soil cover was consisting of the grey forest soil, sod-forest and chernozem ones). The culture-containing accumulations of holocene boreal period corres-ponded to middle and late mesolithic complexes.

The atlantic period (the optimum of warming) was divided into two pasts, distinguished from one another with bioclimatic situation (fig.5, 6)

At the beginning of the forest half of atlantic period the certain coding was marked. It was changing with the long steady warming and humidity's growing. The landscape of the southern taiga with the soil cover, consisted of sod-forest soil, sod-podzolic, sod-gley and meadow-forest ones, was typical for subzone of this region. The birch forest-steppe with the soil cover, consisted of forest dark-grey soil, sod-podzolic and sod-gley ones, was vay be typical for the subzonesof subtaiga and forest-steppe. The steppe landscapes (with the combination of forest grey and chernozem soil) were characteristic for the steppe zone.

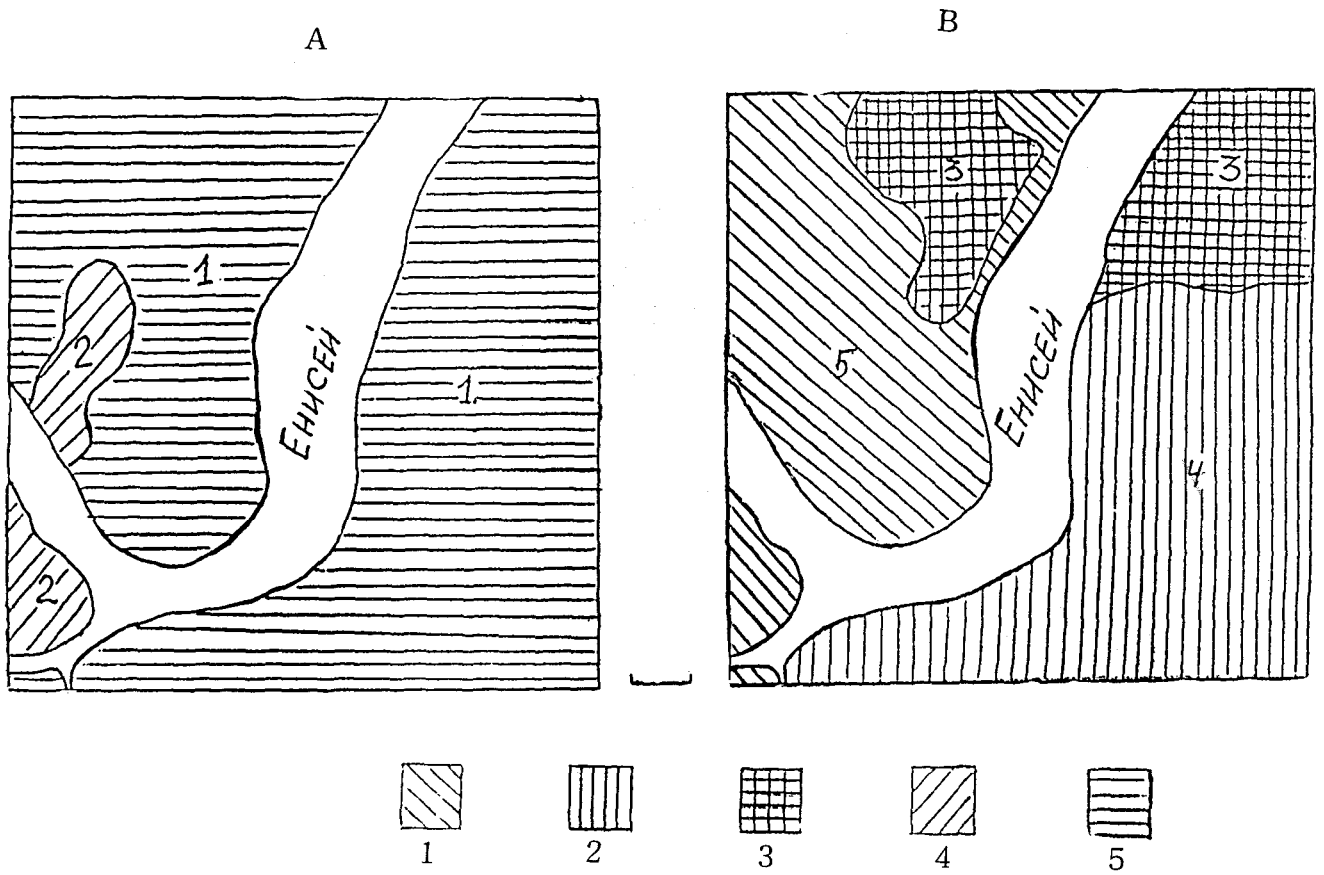

Fig.5. The soil cover the Pri-Yenisei basin during the preboreal period (A) and the atlantic period (B). The attempt of reconstruction.

1 - podsolic soils ; 2 - medow-bog soils; 3 - chernosem soils ;
4 - grey-forest soils ; 5 - bod-podsolic soils.

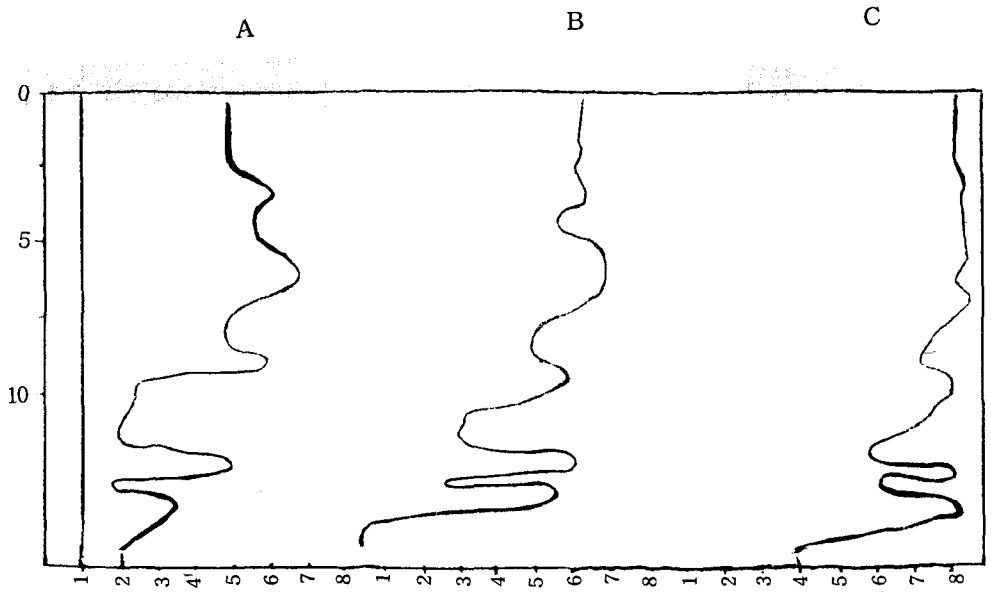

Fig.6. Paleoclimatic curves of the Middle Yenisei valley's regions A - the Pri-Angara plateau B - the Yenisei valley in the East Sayany spurs; C - the Chulym-Yenisei plateau, the Pri-Yenisei areas of the Chulum-Yenisei basin.

1 - tundra ; 2 - forest-tundra ; 3 - northern taiga ; 4 - middle taiga ; 5 - souhtern taiga ; 6 - subtaiga ; 7 - forest-steppe ; 8 - steppes.

Durung the second half of atlantic climatic period there were the dry and warm climatic cjnditions, which became cooler and humider in the end of the period. The foandscape with sod-forest, sod-gley and meadow-cherno- zev soil was typical in the southern taiga zone.

The forest-steppe and steppe landscapes with the chernjzem-like soil, forest dark-grey, sod-forest ones were usual for the forest-steppe zone. Steppe's landscape with the chernozem-lake and chestnut's soil cover was typical for steppe zone too.

The cultural relics of ancient men's inhabitation concerned to the late mesolitic and neolithic complexes.

During the subboreal holocene period the bioclimatic situation was characterized with the fall of temperature, climat's cooling, interrupted with short warming. The sub-taiga's landscape had dominion in the region of subzone of southern taiga. Soilformation (during this period) was driving to the forming f sod-forest, grey-podzolic and sod-gley soil. For subtaiga's and forest-steppe's zone the landscape was analogous and climatic situation was dryer and continental. At fall of temperature a vegetation was acquiring taiga appearance. The soil cover was a combination of sod-gley, chernozem-lake and meadow-forest soil. The landcape of atlantic period was the same one of the modern steppe zone. The soil cover consisted of grey forest, sod-forest, meadow-forest, meadow-chernozem and chernozem soil.

Artefacts, situated in the sediments of subboreal period, corresponde to final neolith and the bronze age.

Holocene subatlantic period reflected modern bioclimatic conditions, driving to the formation of existing soil cover.

The culturecontaining sediments of subatlantic period conformed to the iron age.

Undoubtedly, the paleobioclimatic reconstruction, produced above, is sufficiently summarized. The extent of Siberia brings considerable azone and region features. (Archaeology, geology ..., 1992; Vasilevsky, Burilov, et al., 1988; Chronostratigraphe ..., 1990).

Conclusions

1. Paleosoil genesis of Holocene archaeological monuments shows the zone regularities of soil and vegetable zones as a result of climat change at the territory of Pri-Yenisei Siberia.

2. During the colder periods soil and vegetable zones were displacing in the direction of south, and in warmer period - towards to north (relatively to modern postion).
3. Man was migratind in accordance with soil and vegetable replacement; the cultural relecs of mesolit, neolit, the Bronze Age and the Iron Age are limed to paleosoil horizons.

Literature

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