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AN OCCURRENCE OF TIRASPOLIAN FAUNA AT THE VILYUY RIVER (EASTERN SIBERIA)

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SUMMARY

Remains of Tiraspol fauna *Dicerorhinus mercki* (JAEGER), *Mammuthus trogontherii* (POHL)—early type—and *Equus* cf. *mosbachensis* WÜST. were found in terrasic alluvium of the Vilyuy River in northeastern Siberia. The character of the sedimentation of alluvium, palynological data and the study of macroflora fossils, enable us to come to the conclusion that this fauna in the area of the Vilyuy Basin had existed in a moderate and humid climate. The landscapes were most likely an alternation of open and forested (spruce–larch woods) areas. There was no evidence of permafrost.

INTRODUCTION

Fauna from the Tiraspol complex was first recognized by the author in northeastern Siberia during field work of 1953–1955 from the locality on the left bank of the Vilyuy River, up-stream from the town of Vilyuysk. Since that time this locality was inspected several times and additional data was collected. Since the Vilyuy Basin is situated in the area of continuous distribution of permafrost excellent exposures were found almost every summer season, producing some new mammalian and plant fossils.

METHOD AND MATERIAL STUDIED

To carry out the study of this location the combined method has been used. All the geological and geomorphological field study had been carried out by the author. Then the paleocarpological and palynological methods were applied. The remains of mammal fauna were identified by DUBROVO (1957). The palynological determinations were made by GITERMAN (1963), while P. I. Dorofeyev and Yu. M. Trofimov carried out the macroscopic identifications of plant remains.

RESULTS AND DISCUSSION

Finds of Tiraspolian mammal fauna are associated with the sandy–pebbly alluvial beds of the Vilyuy River terrace, 50–60 m high (Fig.1), which we consider as being terrace IV above the flood-plain level. It may be distinctly traced within a considerable length of the Vilyuy River Valley, from the mouth of the Akh-

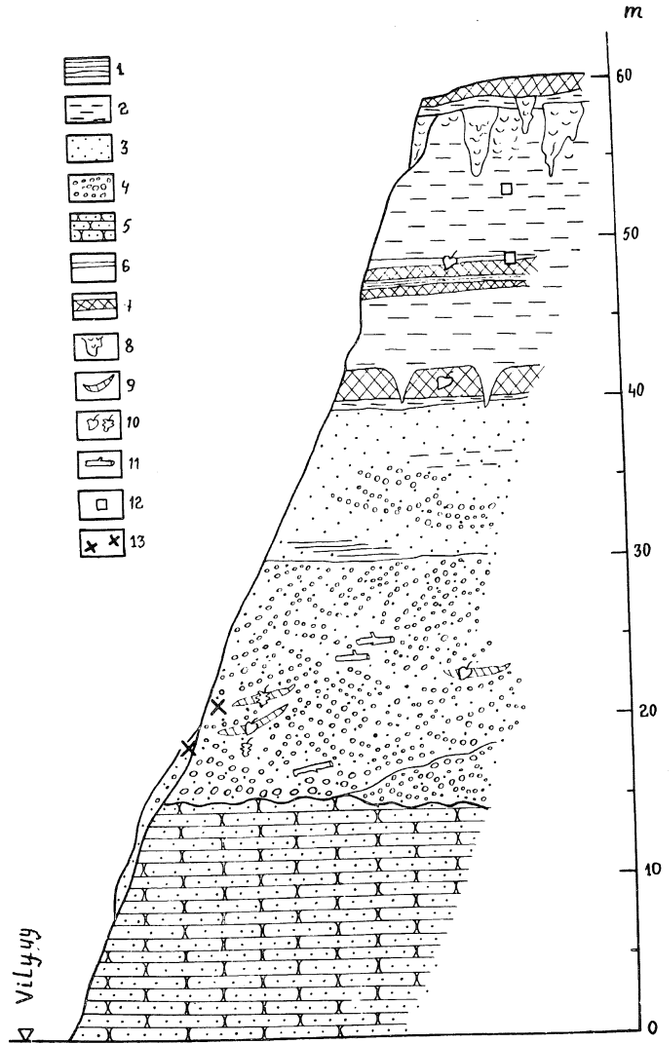

Fig.1. Outcrop on the left bank of Vilyuy River, 8 km downstream from the Tchebyda River mouth. *1* = Clay; *2* = loam; *3* = sand; *4* = sand with pebble; *5* = sandstone; *6* = gyttja; *7* = peat; *8* = ice wedges; *9* = piles plant remains; *10* = cone finds; *11* = remains of tree trunks; *12* = Upper Paleolithic fauna remains; *13* = Tiraspolian fauna remains.

taranda River up to that of the Tagnara River, and then almost to the Lena River Valley. At a somewhat higher hypsometrical level two older terraces—terraces V and VI—may be traced as well. All terrace alluvia, beginning with that of terrace II (20–28 m high), are overlaid by permanently frozen loams enclosing ice wedges and various geocryological textures. These covering loamy strata are particularly widespread down-stream in the Vilyuy River, within the central and eastern parts of the Vilyuy Basin. Unlike the peripheral parts of this same depression and certain regions in the middle Siberian upland, where the Vilyuy terraces form extended narrow belts along the river, here, in the downstream area, the Vilyuy Valley becomes some hundred, and even more, kilometres wide and presents, in fact, a large alluvial (constructional) plain. The 50–60 m high terrace, reaches, equally, a considerable width. In the vicinity of the faunal locality under discussion this terrace IV reveals a socle consisting of Upper Cretaceous sandstones, and elevated at some 12–15 m above the water level of the Vilyuy. Somewhat nearer to the inner edge of the terrace the socle increases in height up to 28–29 m, as may be seen in the outcrops of the Tyung River, which is crossing the Vilyuy terrace IV. The alluvial beds, which constitute the terrace, reveal a rather complicated geological pattern. The upper part of the alluvium, immediately underlying the cover strata, consists of interbedded fine-grained sands and sandy clays with subordinated pebble intercalations. In places, this series attains 10 m in thickness. Occasionally, its distinct contact with the underlying rocks may be seen, these being sands with pebbles, remains of tree trunks, piled plant remains and conifers cones. These sandy-argillaceous strata reveal local traces of water erosion, truncation, and wedging out, which are likely to be intraformational in nature.

On the left side of the Vilyuy River, 8 km downstream from the Tchebyda River mouth the section, summarized in Table I, was measured.

Starting from numerous finds of fossil fauna identified as Upper Paleolithic, as well as from palynological data, these sandy–loamy beds, containing intercalated peat, gyttja and fossil veined ice (units 2–7), may be attributed to the second half of the Pleistocene. To all appearance they cover a large interval of time, from the Riss Glacial up to the end of the Würm Glacial (ALEKSEEV, 1961; ALEKSEEV et al., 1962; GITERMAN, 1963; ALEKSEEV et al., 1966). Sheet deposits are separated from the underlying alluvium by a sufficiently marked break (lacuna).

The alluvial series of the 50–60 m high terrace appears to follow a normal type pattern, characteristic of common erosion-constructional terraces. The alluvium varies from 23 to 25 m in thickness. As has been shown in Fig.1, the upper part of the sequence consists chiefly of fine-grained sands and sandy clays. They appear to grade down into a coarser material, then pebbles make their appearance, which turn progressively predominant (units 8–10). At the base of the sequence the alluvium is very coarse-grained.

Spores and pollen were found but in few samples from the alluvial deposits of the 50–60 m high terrace.

TABLE I

SECTION ON THE LEFT SIDE OF THE VILYUY RIVER, 8 KM DOWNSTREAM FROM THE TCHEBYDA RIVER MOUTH

Unit	*Sedimentological features*	*Thickness (m)*
	From top to bottom	
1	vegetative layer	0.1
2	grey loam with rusty efflorescences, highly calcareous in top part, pearced through by roots of plants; in places a bed of unconsolidated peat occurs at this same level; ice wedges penetrating to a depth of 1.5–2 m are found in loam; they pertain to a higher and later (younger) generation	1.0–1.3
3	thin interbedded grey loams and sandy clays; in the upper part of unit abundant fine vegetative material; veins of fossilized ice penetrate from the top down to a depth of 5–7 m in the loam; spaces between the veins represent an icy, silty rock with laminae of vegetative detritus	10.0
4	gyttja, grading downwards into a dark-brown dense peat, containing a parting of grey clay in its median part	2.0
5	silt, grey, dense, passing downwards to lacustrine loams, tan to gray, laminated	3.5
6	peat, dark-brown, dense, crumpled through permafrost dislocations, in places with pseudomorphs after ice veins; loams from the upper unit 5 penetrate along these veins	2.0
7	loam, same as described in unit 5; forms a thin, uneven layer on sandy deposits of underlying unit 8; in places the loam wedges out and then the peat is underlaid directly by sands	up to 1.0
8	sand, grey, fine-grained, in places argillaceous, cross-bedded, essentially quartzose; argillaceous material increases to the base of unit	12.0–15.0
9	sand, grey, with tan intercalations, cross-bedded, unequigranular, with pebbles and vegetative detritus partings covered by rusty stain and lenses of drift-wood	8.0
10	sand with gravel, overfilled with pebble, small boulders, and non-rounded fragments, as well as mud rolls of grey clay rewashed from Upper Cretaceous rocks; pebble is constituted chiefly of quartz and silicon, with sandstones, quartzites, traps and granitoids present as well; heavy fraction is composed predominantly of ilmenite (47.3%), with 28.2% of pyroxene, 23.5% of garnet, 1% of amphibole and few grains of epidote and sphene	2.0
11	sand and unconsolidated Upper Cretaceous sandstone—socle of terrace; height of socle is up to 15 m above the normal summer water level of Vilyuy River	

According to GITERMAN's (1963) identifications, the samples obtained from the sandy–pebbly alluvial beds of this terrace (outcrop near the Billyakh River mouth) contain such pollen as is characteristic of open landscapes vegetation composed chiefly of cereal-herbage and wormwood associations.

The arboreals only show isolated pollen of birch. These samples, which come from the deposits of this same terrace, outcropping on the left bank of the Vilyuy River (Lonkholokh landing), reveal a similar composition. They are formed of cereal pollen, while the arboreals contain the pollen of birch, pine, larch and alder.

Similar pollen and spores were obtained from the basal sandy–pebbly accumulations in the alluvial beds of this terrace, in the immediate vicinity of the Tiraspolian faunal locality. A quantity of cones has also been gathered in this place, among which M. N. Karavayev (personal communication, 1954) and P. I. Dorofeyev (personal communication, 1960) identify *Picea obovata* LDB., *Picea* sp., *Larix dahurica* TURCZ., *Larix* sp., and cones resembling *Picea anadyrensis* KRYSCHT. In some peat samples from the lenses and thin beds intercalated in the mid-part of the alluvial series P. I. Dorofeyev and Yu. M. Trofimov (personal communication, 1962) identified the seeds of *Larix dahurica* TURCZ., *Menyanthes trifoliata* L., *Potamogeton perfoliatus* L., *P. acutifolius* LINK., *Viola* sp., *Chara* sp., *Carex rostrata*, *Carex* sp.

Dicerorhinus mercki (JAEG.) teeth, as well as fragments of a tooth belonging to an early form of *Mammuthus trogontherii* (POHL), have also been obtained from the sandy–pebbly alluvium of this terrace. These remains were found on the outcrop surface of the terrace alluvium in a scree material formed of ferruginous sands and pebbles, immediately beneath their bedrock exposure. A rather significant elevation of the bone find spot excludes the possibility of their having been carried by the river. On the tow-path (strath), at the foot of this terrace, bones of *Equus* cf. *mosbachensis* WÜST., non-rounded and highly mineralized, were found. Their characteristic feature is the same degree of mineralization as was recognized for *Dicerorhinus mercki* and *Mammuthus trogontherii*. And here again it should be noted that, according to chemical analyses by V. V. Danilova (DANILOVA and ALEKSEEV, 1958), Tiraspolian bone remains found at the Vilyuy River do show a much higher mineralization than that of Upper Paleolithic mammals bones gathered from the upper stratigraphic levels. On the strength of these facts, we may also associate the *Equus* cf. *mosbachensis* bones with the alluvial beds from the 50–60 m Vilyuy River terrace.

The deposits enclosing the Tiraspolian faunal remains may be correlated, in broad sense, with the Mindel Stage of Europe. The coarse-grained alluvium composition, as well as a quantity of trap pebbles and boulders point to an intense erosion, which proceeded synchronously with the formation of alluvium. The western flank of the Vilyuy Basin, probably the nearest source of trappean material, was subjected to strong erosion activity.

Study of plant remains origin and palynological data do show that alluvium was formed under temperate or even cold-temperate climate. Evidently the open spaces did alternate with the spruce–larch woods. It is characteristic of the alluvium forming up the 50–60 m Vilyuy terrace, that no direct indices corroborating the presence of permafrost during the deposition of these beds are found in it.

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PALEOMAGNETIC STUDIES OF PLIOCENE–QUATERNARY DEPOSITS OF PRIDNIESTROVIE

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SUMMARY

In 1968 oriented samples were selected from Pliocene and Quaternary terrace deposits of Pridniestrovie for paleomagnetic studies. Measurements were carried out in a laboratory in Moscow. It has been established that the last inversion of a geomagnetic field took place inside the Tiraspol complex, and hence the age of the lower boundary of the Tiraspol faunistic complex is older than 700,000 years.

INTRODUCTION

The paleomagnetic method used for stratigraphy and correlation purposes is based on: (*a*) the ability of mountain rocks to acquire natural remanent magnetization (In) at the moment of their formation towards an existing geomagnetic field and to retain this magnetization up to the time of measurements; and (*b*) the ability of a geomagnetic field to change its polarity into a reverse one. The planetar character of geomagnetic field inversions enables correlation of any distant section.

It has been established that the last inversion of a geomagnetic field occurred 700,000 years ago. Therefore the use of the paleomagnetic method is especially efficient when studying the deposits the age of which is close to the time of the last inversion. Such deposits may have a distinct boundary separating the rocks that are 700,000 years older than the younger ones.

TECHNIQUE, METHOD, MATERIAL STUDIED, AREAL DESCRIPTION

In 1968 oriented samples were selected from Pliocene and Quaternary terrace deposits of Pridniestrovie for paleomagnetic studies.

Alluvium of terraces that determines their age, presented itself either as a coarse fraction not suitable for paleomagnetic studies, or by thin but low-magnetic rocks (clays, loams). Therefore, when studying terrace deposits of Pridniestrovie, we investigated, first of all, cover beds composed of loams and fossil soils of a less reliable age, these beds having a considerable remanent magnetization. The