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Mammal faunas in Europe at the end of the Early – Beginning of the Middle Pleistocene

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ABSTRACT

Problems of mammal evolution in the Early and Middle Pleistocene are widely discussed in the literature. The stages of mammal evolution considered in their relation to other paleontological data, geological units and the paleomagnetic scale provide a solid basis for correlation of natural events within this time interval. The analysis of the data on the European mammal fauna makes it possible to compare the evolutionary stages of large and small mammal faunas and the evolutionary changes in indicator phyletic lineages between different regions and to find regional features of similarity or distinction. In this paper the authors made an attempt to analyze data on large and small mammal faunas in Eastern Europe within the interval from the Jaramillo paleomagnetic event to the beginning of the early Middle Pleistocene (1.07–~0.7 Ma BP) and to compare them with analogous data from Western Europe. Main trends in evolution and distribution of large and small mammals (primarily Arvicolidae) during the studied time interval are revealed. The characteristics of the established principal stages in small mammal faunal sequences are given. The position of these stages with reference to the paleomagnetic and climatic-chronological scales are proposed.

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1. Introduction

The mammal faunas to be discussed in this paper are dated to the interval between the Jaramillo paleomagnetic event (the second half of the Early Pleistocene, 1.07–0.99 Ma, approximately MIS 30–26) and the beginning of the Middle Pleistocene (the first half of the Ilyinka Interglacial, Cromerian I, ~ 0.7 Ma). The Jaramillo normal polarity event of the reversed polarity Matuyama Chron and the Matuyama-Brunhes reversal (0.780 Ma, MIS 19) are the main chronological datum points within the considered time interval. The Matuyama-Brunhes reversal is taken as Early/Middle Pleistocene boundary in the internationally accepted stratigraphic scales. The first half of the Middle Pleistocene (up to the Likhvin Interglacial) corresponds in the Russian stratigraphical terminology to the Early Neopleistocene (Shik, 2003, 2011).

In spite of still existing difficulties in the interregional correlation of Pleistocene faunas and a non-synchronous dispersal of some species in different regions, there are some circumstances that facilitate the attribution of faunal localities to the late Early Pleistocene – early Middle Pleistocene. Among them, there are a well pronounced stages in the evolution of the faunas, availability of data on the evolution of a series of phyletic lineages, on first occurrence (FO) and expansion of the index form, as well as on the distribution of dominant species communities and dispersal events. Large bio-chronological units (mammal assemblages, mammal ages, faunal units) identified within the considered interval are based on data on the evolution and occurrence of elephantids of the lineage *Archidiskodon–Mammuthus*, rhinoceroses of the genus *Stephanorhinus*, large carnivores, horses of the genus *Equus*, as well as some cervids and bovids and other large mammals. In Eastern Europe, large mammals faunas dated to that interval belong to two mammal assemblages, or mammal ages: Tamanian (1.2–0.8 Ma) and Tiraspolian (0.8–0.4 Ma). In Western Europe, the large mammal faunas of the regarded interval are referred to the Epivillafranchian and the very beginning of Middle Pleistocene, mammal zones MNQ 20 and MNQ 21. In Italy faunas dated to that interval belong to the Early Galerian – beginning of Middle Galerian.

The data on small mammals provide a means for recognizing phases within large biochronological stages which are based on large mammals and permit a more precise positioning of faunas

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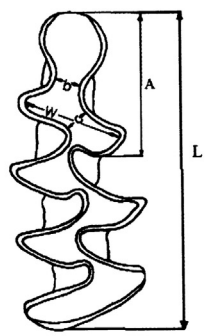
and bio-chronological units with reference to the paleomagnetic and climatic-chronological scales.

Among the small mammals, the most promising diagnostically for the locality dating are voles of the *Allophaiomys–Microtus* lineage. To determine their evolutionary level, we used the conventional procedure of measurements and determination of indexes for the first lower molar (van der Meulen, 1973) (Fig. 1). The most indicative indexes commonly used when establishing the evolutionary level of voles belonging to that lineage are A/L, B/W and C/W; they show a degree of separation between the elements of M/1 anteroconid complex which is most indicative of the species status. In case when those indexes had not been given by the authors we don't cite them in the text. Specific features of the tooth enamel differentiation are also important.

Extremely important for diagnostics are steppe and yellow lemmings belonging to *Prolagurus–Lagurus* and *Eolagurus* phyletic lineages. When studying their remains, dominant tooth morphotypes were identified along with the routine measurements (Markova, 1982; Agadjanian and Markova, 1983). The attribution to a species was based upon the dominant tooth morphotypes in the particular assemblage.

In the past, when carrying out an analysis of the East European small mammal faunas broadly correlated with the Tamanian mammal age, three phases were identified in the small mammal fauna evolution based on the first occurrence of the Arvicolidae index species: Nogayskian, Kairian and Morozovkian faunas. Besides, the Petropavlovkian small mammal faunas were recognized in the uppermost reversed part of the Matuyama epoch (Markova,



Localities	A/L				B/W				C/W			
	N	min	mean	max	N	min	mean	max	N	min	mean	max
Nagornoe 1	5	40,82	44,31	49,02	5	11,67	21,16	31,25	5	15,79	20,83	25,00
Shamin	1		44,16		1		22,58		1		16,66	
Karai-Dubina	7	41,82	43,65	46,00	7	11,76	17,38	37,50	7	11,11	18,92	30,00
Untermassfeld	31	44,02	48,68	52,38	53	2,44	6,65	17,95	53	5,00	21,13	32,43
Morozovka 1	7	46,90	48,6	51,6								
Port-Katon	7	40,00	44,59	47,00	7	13,33	19,56	26,67	7	21,43	25,97	28,57
Castagnone	6	42,10	44,31	44,89	8	5,13	14,67	25,76	10	15,94	27,66	30,00
Monte Peglia (terra rossa)	101	42,00	46,00	51,00	148	<5	13,90	33,00	147	6,00	22,40	37,00
Monte Peglia (breccia)	81	41,00	45,70	49,00	48	13,00	22,80	32,00	40	6,00	19,60	28,00
Vallonnet	8	43,8	45,6	47,7								
Les Valerots (A. nutiensis)			47,21				6,88					
Les Valerots (A. burgundiae)			45,80				14,78					
Ushkalka	7	40,00	45,33	46,00	7	12,50	19,88	22,50	7	11,76	18,62	25,00
Zapadnye Kairy	4	43,40	45,07	46,00	4	16,67	21,68	28,89	4	16,67	21,02	26,32
Korotoyak (ostrogozhsk suite)	6	42,11	44,73	47,56	7	16,13	20,34	26,88	7	12,90	20,83	25,92
Colle Curti	2	41,22	41,57	41,92	2	26,88	28,23	29,41	2	18,18	19,79	22,58
Roksolany	6	37,50	40,48	42,86	6	18,95	23,54	31,25	6	13,68	19,43	25,00
Sima del Elefante	301	43,55	48,74	54,54								

Fig. 1. The indexes of the *Allophaiomys* and *Microtus thenii* first lower tooth.

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