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## Biostratigraphy of the early Middle Pleistocene of the Southern Fore-Urals

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### ABSTRACT

A summary of published and unpublished data on the stratigraphy of the early Middle Pleistocene of the Southern Urals region is presented in this paper. It follows previous reviews about the characteristics of the Pleistocene deposits of the easternmost part of Europe. Deposits of different origin, which constitute the regional stratigraphic units, are characterized. Mammalian data form the base for the (bio)stratigraphical subdivision. Fossil mollusca, ostracoda, mammals and pollen are used for the reconstruction of the palaeoenvironmental conditions and the stratigraphical position of the main localities is discussed.

The beginning of the early Middle Pleistocene (Minzitarovo time) coincides with a stabilization of the hydrographic network. Palaeontological remains from that period are rare. *Pinus–Picea* forests with small admixture of broad-leaved species were spread at the beginning of this interval. Later, the role of forests decreased and the role of herbs and Chenopodiaceae increased. Palynological data indicate that the climate was cool during that time. The landscapes of the Baza time were dominated by herbaceous–*Artemisia* associations and small birch forests with an admixture of broadleaved and coniferous trees and the terminal time was characterized by the wide development of taiga. Ostracods and molluscs are known from those deposits. Ecological composition of the small mammalian faunas indicates forest-steppe conditions for the southern part of this natural zone. Small mammals of that time belong to the Tiraspol faunal assemblage. The climate was warm and dry. The initial Tanyp time was characterized by the development of herbaceous–*Artemisia*–Chenopodiaceae steppes and broadleaved birch forests, which were subsequently replaced by a dominance of taiga associations, which tolerate cold climatic conditions. Molluscs are represented by rare terrestrial and freshwater species. The assemblage of freshwater ostracods includes cold-resistant species. In the Atasevo time, broadleaved birch forests and meadow-steppes characterized the landscape. The presence of stenothermic–thermophilic ostracods species indicates warm climatic conditions. Molluscs are represented by terrestrial and numerous freshwater species. The small mammalian fauna is characterized by the smaller percentage of *Mimomys* voles; it post-dates the Baza fauna. The Atasevo fauna is unique because of the occurrence of *Arvicola mosbachensis* Schmidtgen among the typical early Middle Pleistocene species.

At the end of this period during the Chusovskoi timespan, the herbaceous–*Artemisia*–Chenopodiaceae steppes, which covered spacious open areas, were subsequently replaced by coniferous–birch forests with an admixture of broadleaved trees. Fossil remains are rare. Ostracods represent cold-resistant species indicating that the climate was cold.

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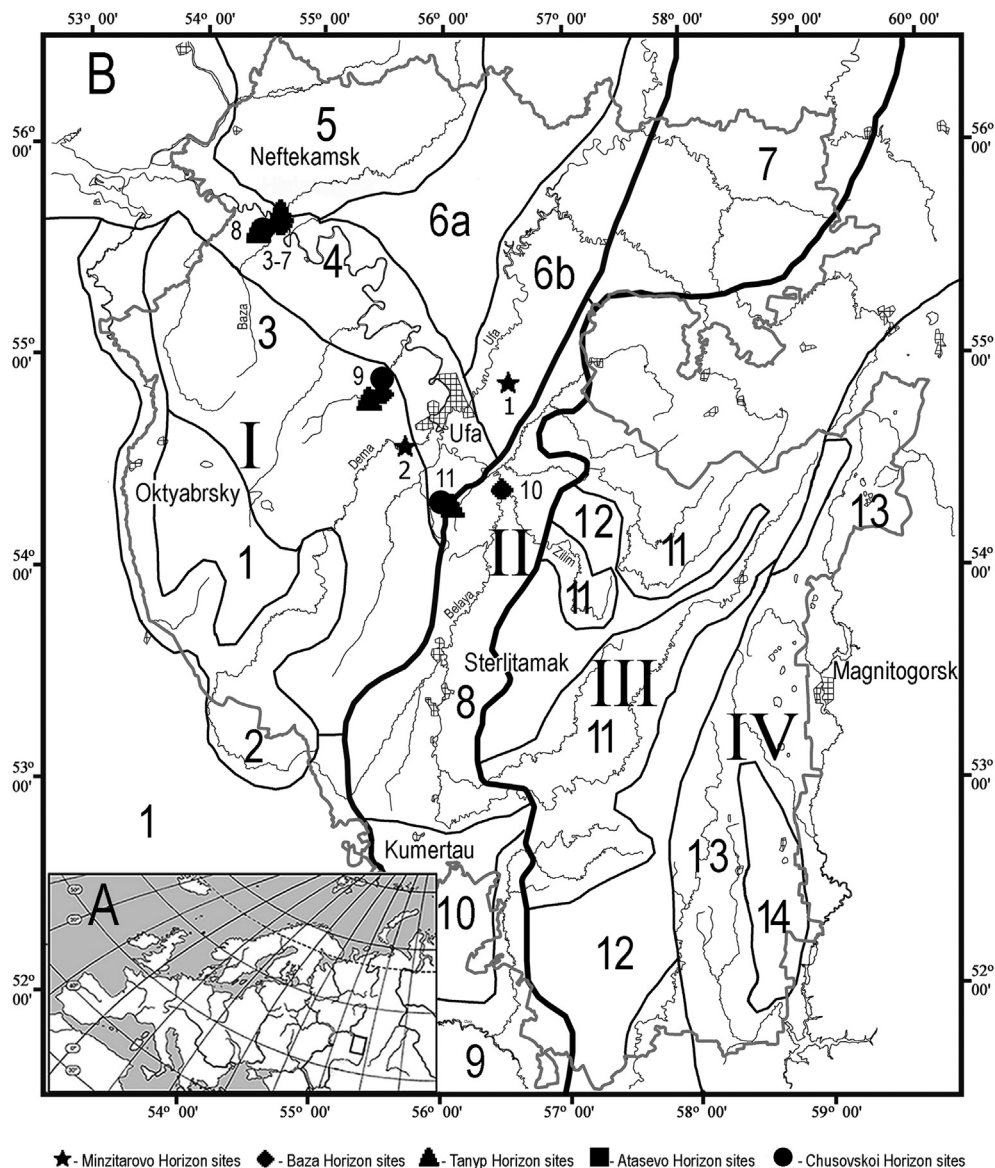
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## 1. Introduction

The Southern Urals region includes the south-eastern part of the Russian Platform, the Fore-Ural depression, the mountainous part of the Southern Urals and the Southern Trans-Urals area. The structural–geological subdivision of these zones into smaller regions which are all characterized by their own specific deposits and features is shown in Fig. 1.

During the early Middle Pleistocene, the Southern Urals region was characterized by continental climate conditions and tectonically stable. During the periods of cold climate, the region was a non-glacial area. Fluvial deposits containing organic remains form the base of the palaeogeographical reconstructions and the correlation of the different sediment units.

In the early Middle Pleistocene, the South Urals was a mountainous domain with individual summits up to 1600 m high, low ranges, plateau-like uplifts, and intermontane depressions. The Belaya, Ufa, Dema, Sakmara, and Ural (Trans-Uralian part) river valleys were close to their present day position. In the Fore-Urals region, the central part of the Bugul'ma–Belebei Uplift and eastern margin of the Obzhyi Syrt with Mount Nakas were subject to denudation. The eastern slope of the South Urals hosted the Irendyk and Krykty ranges with altitudes up to 800 m, which were neighbored by the high Tanalyk and East Uralian plains. The eastern Trans-Uralian region encompassed a denudation plateau and its southern part, high plains. The river valleys and depressions accumulated sediments. During cold epochs (Minzitarovo, Tanyp, and Chusovskoi time), the snow cover was clearly developed in the



**Fig. 1.** General map (A) and location of the studied area showing the key Lower Neopleistocene sites (B). Legend: I–IV –s: I – South-East of the Russian platform; II – Fore-Uralian; III – Uralian; IV – Trans-Uraltau; 1–11 – regions: 1 – Bugul'ma–Belebei Highland, Obzhyi Syrt Highland (eastern part); 2 – Ik and Dema (upstreams) Rivers Basin; 3 – High left bank of the Belaya River (Syun' and Baza Rivers); 4 – Belaya River Basin between Ufa town and the river mouth; 5 – High right bank of the Belaya River (Bui and Bystryi Tanyp Rivers); 6a – Ufa River Basin (between Krasnoufimsk city and the river mouth); 6b – western slope of the Ufimian Plateau; 7 – Yuryuzan and Ai Rivers Basin (56°–55° N); 8 – Belaya River Basin (including high right and left banks of the river) (55°–53° N); 9 – Sakmara and Ural Rivers Basin (53°–52° 30' N); 10 – Interfluves; 11 – Belaya River Basin with tributaries (between the upstream of the Belaya River and the Nizhnebikkuzino village); 12 – Interfluves; 13 – Uf, Sakmara, Ural Rivers Basin (from the upstream of these rivers to Kuvandyk town); 14 – Interfluves. Key Lower Neopleistocene sites (small Arabic numbers): 1 – Minzitarovo; 2 – Yulushevo; 3 – Chui-Atasevo I; 4 – Chui-Atasevo II; 5 – Chui-Atasevo III; 6 – Chui-Atasevo IV; 7 – Chui-Atasevo V; 8 – Bazitamak; 9 – Sultanaevo; 10 – Krasnyi Yar; 11 – Karmaskaly.

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