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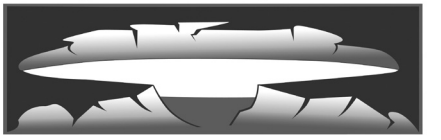
THE QUATERNARY OF THE URALS: global trends and Pan-European Quaternary records

International conference
INQUA-SEQS 2014



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The book presents the proceedings of the International Conference INQUA-SEQS 2014 held in Ekaterinburg, Russia. Reports concern a wide spectrum of issues connected to the study of the Quaternary Epoch (2.6 Ma) in Europe and Asia. Based on the results of local and regional Quaternary studies the authors focus on Quaternary stratigraphy and correlations across the Ural region and Europe and discuss the integration of pan-European and pan-Eurasian stratigraphical frameworks. The special attention is given to palaeontological, palaeoclimatological and palaeoenvironmental issues from the Quaternary of Europe and Asia.

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имени первого Президента России Б. Н. Ельцина
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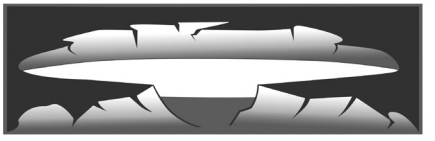
ЧЕТВЕРТИЧНЫЙ ПЕРИОД УРАЛА: глобальные тенденции и их отражение в общеевропейской четвертичной летописи

Материалы международной конференции INQUA-SEQS



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Четвертичный период Урала: глобальные тенденции и их отражение в общеевропейской четвертичной летописи : материалы международной конференции INQUA-SEQS (Екатеринбург, Россия, 10–16 сентября 2014 г.). – Екатеринбург : УрФУ, 2014. – 228 с.

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В книге представлены материалы международной конференции INQUA-SEQS 2014, проводившейся в Екатеринбурге (Россия). Сообщения касаются широкого спектра вопросов, связанных с исследованиями четвертичного периода (2,6 млн лет) в Европе и Азии. На основании результатов локальных и региональных исследований авторы рассматривают проблемы стратиграфии и корреляции четвертичных отложений Уральского региона и Европы и обсуждают вопросы интеграции общеевропейских и евразийских стратиграфических схем. Особое внимание уделено вопросам палеонтологии, палеоклимата и палеосреды четвертичного периода Европы и Азии.

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Velichko, A. and Timireva, S., 1995. Morphoscopy and morphometry of quartz grains from loess and buried soil layers. GeoJournal 36 (2/3), 143–149.
Zykina, V.S. and Zykin, V.S., 2008. The loess-soil sequence of the Brunhes Chron from West Siberia and its correlation to global and climate records. Quaternary International 106–107, 233–243.
Zykina, V.S. and Zykin, V.S., 2012. Loess-soil Sequence and Environment and Climate Evolution of West Siberia in Pleistocene. Academic Publishing House "Geo", Novosibirsk (in Russian, with English Abstract).

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STEPPE SPECIES OF SMALL MAMMALS IN PLEISTOCENE AND HOLOCENE COMMUNITIES OF NORTH EURASIA

Key words: small mammals, Northern Eurasia, steppe

Finds of steppe mammal fossils in the Pleistocene-dated sediments situated significantly northward and westward from their modern areas are used as markers indicating to certain events in climate and landscape dynamics. Spreading of these mammals northwards is of special interest as regarded to be in relation with the idea that cold sandy deserts showed wide distribution in northern Eurasia during the Pleistocene terminal (Velichko et al., 2011). Information is also important to understand the directions and rates of dynamics of ecological niches the species at study.

Material. Data for the North Ural region were generalized from both private collections of authors and previous publications (Teterina, 2009); they include 17 sites with total of 43000 small mammal molars identified. From the Middle Urals, 36 of sites and 200000 molars were examined (Smirnov et al., 2014). For the South Trans-Urals, the figures made 5 sites and 23000 molars (Kuzmina, 2009). At the Irtysh-river low reaches, 10 sites were examined and 8000 small mammal molars had been identified (Smirnov et al., 1986).

The steppe haymaker and the narrow-skulled vole are members of steppe complex. However, species identifications of haymaker fossils found in the Northern and especially Pre-Polar Ural regions need special attention and justification, as another species, *Ochotona hyperborea*, is more probable to be found there. To distinguish the two species, one needs to analyze at least good-preserved low jaws.

The narrow-skulled vole is a species now inhabiting both steppes and tundra zone. While analyzing fossil communities found beyond modern area limits it is impossible to estimate their habitats accurately enough, only as "open" or "non-forested" areas. It is known, that the species is quite variable in concern to meso- or xerophilic demands. In the studies of "mixed" — hyperboreal late-Pleistocene fauna communities, when animal species are grouped according to certain zonal complexes, the narrow-skulled vole was isolated as a personal category. The analysis also included the species which are without questions concerned as members of steppe complex: *Allactaga major, Spermophilus major, Lagurus lagurus, Eolagurus luteus, Cricetulus migratorius, Allocricetulus eversmanni, Ellobius talpinus, Ochotona pusilla*.

Results. Dated to the Late Pleistocene time, the northernmost sites (North Ural) were registered for *L. lagurus* (60°30'N), *Cr.migratorius* (60°30'N), *Spermophilus* sp. (59°40'N). These remains were found in 2–3 sites, rare or very rare in proportions. Of all steppe species, only *O. pusilla* was marked even farther to the north (62°N); these animals store up dry grasses kept in relief depressions, thus deep burrows are not needed.

At latitude 59–61° N, at the Irtysh-river down-streams and its affluent Dem'yanka-river, 10 sites have been excavated containing Late-Pleistocene small mammal remains. *Ochotona* molars were marked in all collections, souslik fossils — in 4 sites, and sagebrush vole remains — in 6 sites, with their proportions low enough. The major part of remains was identified to the narrow-skulled voles, Siberian and hoofed lemmings.

Middle Urals (extended between 59–56° N) is a piece of southern part of fluctuating Pleistocene areas characteristic of many steppe species. Combined to the tundra elements, fossil communities there included all steppe complex species found farther to the north, and also molars of *Eolagurus luteus, Allactaga major, Allocricetulus eversmanni*. Thus, practically all the species now inhabiting the Trans-Urals steppes, during the Late Pleistocene time were spread significantly northerner, being registered in the Middle Urals and even in the North Urals. Only *Ellobius talpinus* revealed no northward shifting in the Urals, practically not changing its resident area part, obviously due to intimate adaptations to life within soil layer rich with plant roots.

Examination of by-pair correlations between frequency figures marked for small mammal remains in 61 Holocene and Late-Pleistocene sites in the Middle Urals showed that 6 species of open habitats form a correlation pleiad. *M. gregalis* reveals significant positive correlarion to all other species, *Dicrostonyx torquatus* — with all species except *Ochotona*. *Cr. migratorius* showed correlation with 3 species: narrow-skulled vole, sagebrush vole and hoofed lemming; *Lagurus lagurus* — with narrow-skulled vole, *Dicrostonyx sp*. and grey hamster. *Lemmus sibiricus* was positively correlated only with *Dicrostonyx* sp. and *M. gregalis*; *O. pusilla* — only with *M. gregalis*. These relations are in correspond to spatial niches occupied by the species during

Late Pleistocene time. Distribution of the steppe complex species according to the level of their Pleistocene shifting northwards differs from the Holocene pattern and from the modern one.

In the South Trans-Urals, within the territory of residential distribution of steppe fauna, the fauna taxa lists remained practically constant, but proportions between species and species groups were marked to vary. During the Late-Pleistocene time, sagebrush voles dominated in numbers, while *M. gregalis* turned dominant in Holocene. That is, when the narrow-skulled vole possessed maximal by area fluctuating part of its range in the north and west, its percentages in the range resident part were lower than those of other species. *Lagurus* numbers demonstrated just the opposite pattern. Interval of its domination in communities of residential steppes coincides in time with its most northward expansion. In the Trans-Urals, late-Pleistocene time was marked for climate aridity and occurrence of some semi-desert animal species.

The obtained data on small mammal fossils from the North Urals or West Siberia revealed not a single species concerned to sandy habitats. Such species were not registered in the adjacent regions, too. The nearest finds of Pleistocene rodent remains associated to deserts are located in the South Trans-Urals and in Mugodzhar mountains.

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REFERENCES

Smirnov N.G., Bolshakov V.N., Borodin A.V., 1986. Pleistocene rodents of north West Siberia. Moscow: Nauka. 145 p. (in Russian).

Smirnov N.G., Kosintsev P.A., Kuzmina E.A., Izvarin E.P., Kropacheva Yu.E., 2014. Ecology of Quaternary mammals in the Urals. Russian Journal of Ecology, N 6 (in press).

Kuzmina E.A., 2009. Late Pleistocene and Holocene small mammal faunas from the South Trans-Urals // Quaternary International. 201, 25–30.

Teterina A., 2009. Rodents of the North Urals in the Late Pleistocene and Holocene // Quaternary International. 201, 31–36.

Velichko A.A., Timireva S.N., Kremenetski K.V., MacDonald G.M., Smith L.C., 2011. West Siberian Plain as a late glacial desert. Quaternary International. 237, 45–53.