

Coloring white spots in Siberian paleontology

In the vivid imagination of people around the world, Siberia (the geographical region traditionally understood as the Asian part of Russia — from the Ural Mountains in the west to the Northwestern Pacific in the east) is consistently perceived as an endless space covered with a white carpet of snow for a significant part of the year. Today, as many believe, only bears appear to roam these lands, barely inhabited by man, and it seems that until relatively recently the woolly mammoth was the true master of this territory. But Siberia is not only a vast snow patch on the world map; until recently, it also remained practically a blank spot from the point of view of vertebrate paleontology, a discipline which deals with fossil diversity of various vertebrate animals (from fishes to mammals). Of course, the late Quaternary fauna of Siberia is quite well known — with such outstanding representatives as the woolly mammoth, woolly rhinoceros, bison, cave lion and cave hyena — however, the more ancient stages of the evolution of the biota of this vast region remained very poorly studied up to the present time. This contrast is especially pronounced when comparing our knowledge of fossil vertebrates (amphibians and reptiles, birds and mammals) of the Cretaceous and Cenozoic (up to the Early Pleistocene) of Siberia with that of neighboring regions of Asia — Mongolia, Kazakhstan and China, which have been studied so intensively for almost over the last hundred years, providing knowledge that largely determines the general level of progress achieved in this field of paleontology.

The historical development of the vertebrate fauna of Siberia in the Mesozoic is interesting not only from the position of filling in the blank spots in the great book of the Earth's fossil record. During this chronological interval, most of Siberia represented the northern part of the vast Asian continent, which, like all large land areas, served as an arena in which various groups of organisms developed and honed their adaptations. Vast continental masses are believed to have played a significant role in the evolution of many groups of animals and plants, as they are able to support very large effective population size required for the origin of adaptations, survival and competing potential of species. Arrays of environmental conditions, which are often present on large continents, promote adaptive radiations leading to the formation of diversified and taxonomically important taxa, often surviving to the present. At various periods of its history, Northern Asia connected Europe and North America on one hand, and Southern and Central Asia with the Arctic on another. Epochs, climate and landscapes changed, and along with them, entire complexes of vertebrates passed their evolutionary pathways. Routes of intercontinental dispersals of various groups of organisms ran through Siberia and North Asia, while autochthonous Asian groups, having matured in the bowels of the continent, began from here their path of exploration of other landmasses. All this determines that special role that data on fossil animals of Siberia plays in paleozoogeographic reconstructions and, ultimately, in the restoration of the general history of life on Earth.

Vast spaces of Siberia, largely covered with forests and poorly inhabited by humans, for a long time remained very poorly studied in terms of pre-Quaternary vertebrate paleontology. However, in recent decades, the situation has changed dramatically — new localities of Mesozoic vertebrate faunas have been discovered, and research has significantly intensified at previously known sites, from which vertebrate remains were either unknown or remained virtually unstudied. And as a result, it turned out that Siberia is the homeland not only for mammoths and woolly rhinoceroses, but also for a variety of Jurassic and Cretaceous dinosaurs (such as

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the unusual feathered ornithopods *Kulindadromeus*, the remarkable hadrosaurs *Olorotitan*, the sauropods *Sibirorotitan*, Siberian psittacosaur and a number of others), a number of prominent representatives of the Mesozoic mammaliforms (one of the oldest placental *Murtoilestes*, the tegotheriid docodont *Sibirotherium*, the peramurid eupantotherium *Kiyatherium*, the arboreal shenshouid *Sharypovoia* and others), amphibians (stem salamanders *Kulgeriherpeton*, *Urupia* and *Egoria*), unusual birds (the confuciusornithid *Evgenavis*, the mysterious *Mystiornis*). Important and unexpected discoveries were also made in Cenozoic faunas — here we can mention the discovery of tropical birds (Capitonidae) and parrots (Psittacidae) in the Miocene of the Baikal region.

This special issue of Biological Communications presents a series of articles describing and systematically investigating new fossil finds of Mesozoic and Cenozoic vertebrates from Siberia, thus adding significantly to the evolving picture of vertebrate paleodiversity in the region. The papers in this issue are devoted to all groups of vertebrates: amphibians, reptiles (dinosaurs and turtles), birds, as well as large (mammoth) and small (rodents) mammals. The ages of the studied finds are also represented very widely: Middle Jurassic (turtles of the Krasnoyarsk Territory, Cherepanov et al.), Early (sauropods and salamanders from Western Siberia; Averianov et al. A; Skutschas et al.) and Late (ornithomimid dinosaur

from the Russian Far East, Averianov et al. B) Cretaceous, Early Miocene (rodents of Baikal region, Sinitisa and Tesakov), as well as Early (birds of the Baikal region, Zelenkov et al.) and Late (the mammoth of Yakutia, Garmaeva et al.) Pleistocene. New taxa (a salamander) and even faunas (birds) are established in two papers (Skutschas et al.; Zelenkov et al.), whereas others present either first evidence of the presence of particular animal lineages in Siberia (ornithomimid, some squirrel taxa; Averianov et al. B; Sinitisa, Tesakov) or new information on histology, morphology, variation or/and phylogenetic position of previously documented Siberian taxa (sauropod, squirrels, mammoth: see Averianov et al. A; Garmaeva et al.; Sinitisa and Tesakov).

Thus, Siberia represents a natural link between the temperate and the Arctic biota, with which it interacts over vast areas in the north. Therefore, we considered it logical to supplement this series of articles with works on the biota of the Arctic region, dedicated to the Paleogene floras of Spitsbergen and Greenland (Golovneva and Zolina; Zolina and Golovneva). All these publications present original new information about the history of life in the northern regions of the Northern Hemisphere and piece by piece unveil the mosaic pattern of the history of life on Earth, methodically coloring the blank spots on the multidimensional natural canvas metaphorically called “the fossil record”.

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