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ABSTRACT BOOK

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Biodiversity and stratigraphic distribution of Gomphotheriidae in Eurasia (Kazakhstan)

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Kazakhstan represents a unique scientific ground for the study of animal world diversity of past epochs. This is related with the geographic position of Kazakhstan in the center of Eurasia. Kazakhstan is a key geographic area for the interpretation of Palearctic evolution of mammals. Until now, finds of Gomphotheres in Asia and Kazakhstan, in particular, are known from the Early Miocene to Early Pleistocene are present a wide geographic range. In Early Miocene of Kazakhstan, Gomphotheriidae were well represented by the "*angustidens*" group. They are known from Kushuk deposits of Tersek suite in precipices of Ulu-Zhilanchik River (right bank), near winter stay Kushuk of Turgai bending flexure. The Kushuk layers have provided a fossil fauna as well as a fossil flora. The fauna is composed by remains of the so called "*Gomphotherium* fauna" with *Serridentinus inopinatus* Boriss., *G. atavus* Boriss., *Aceratherium depereti* Boriss., *Diaceratherium* (= *Brachipotherium*) *aurelianense gailiti* Boriss., *Testudo turgaica* Rjab. According to Borissiak, this fauna is characteristic of the Early Miocene (Borissiak, Beliajeva, 1928). In Zhilanchik fauna two forms are presented: forms, representing *Trilophodon angustidens* in its primitive stage and very large forms with rather complex teeth. Gomphotheres with trilophodont intermediate teeth were widely distributed form in Burdigalian. They are known from many localities of Europe and Asia, at the beginning of Miocene. It must be noted, that the appearance of first *Gomphotherium*, *Aceratherium* and *Brachypotherium* in Europe, Asia and North America is connected with MN 3-4, what is corresponded to the second half of Early Miocene or Burdigalian. From the bone-bearing lens of Kushuk a xerophitic ancient Mediterranean flora is known, consisted mainly by deciduous forms (about 50 species). On the basis of these finds, the age of Kushuk layers is Burdigalian and corresponds well with the age of the *Gomphotherium* fauna from the same layers. On the South-East of Kazakhstan, *Gomphotherium* is known from deposits of the upper Aktau suite in Aktau Mountain (foothills of Northern Tien-Shan). Jointly with *Gomphotherium* remains the following mammals are found: *Gomphotherium angustidens* (Cuvier), *Brachypotherium aurelianense* (Nouel), *Stephanocemas aralensis* Beliajeva, *Procervulus gracilis* Visl., *Lagomeryx triacuminatus* Colbert, *Prepalaeotragus aktauensis* Godina, Vislobokova, & Abdrakhmanova (Tleuberdina, Abdrakhmanova, Baishashov, 1993).

The presence of *Gomphotherium* and *Diaceratherium* (*Brachypotherium*) in the Aktau fauna reveals its similarity with the Kushuk one. However, the Aktau fauna is more similar in its artiodactyls composition to Mongolian faunas, what is indicated to close paleozoogeographical relations of the South-Eastern Kazakhstan territory with that of Mongolia during the Miocene. The prevalence in the Aktau fauna of some archaic elements, such as

Gomphotherium angustidens, *Brachypotherium aralense*, *Stephanocemas aralensis* and *Prepalaeotragus actauensis* correlates this fauna to the second half of the Early Miocene, corresponding to MN 3-4 zones (Tleuberdina, Abdrakhmanova, Baishashov, 1993). Lenses of aleurite clays have preserved the imprints of a deciduous flora, consisting of 56 species. Gomphotheres are also found in deposits of Bestobe suite, in Ustyurt chinks (small plateau) in Bestobe locality (Western Priaralie). Bestobe represents the easternmost occurrence of the Neogene deposits of Eastern Paratethys. The Bestobe vertebrates fauna is included *Migalea* sp., *Talpidae*, *Heteroxerus*, *Crocodylidae* gen.?, *Buteo* sp., *Mustelidae* gen., *Ursidae* gen., *Gomphotherium* sp., *Serridentinus inopinatus*, *Rhinocerotidae* gen.?, *Stephanocemas aralensis*, *Amphitragulus* sp., *Lagomeryx* sp., *Atlantoxerus* sp. All this complex of vertebrates was found in the layer of micaceous grey sandstones, corresponding to the middle part of the section, jointly with accumulation of *Rzehakia nuclei*. On Ustyurt plateau, the same thickness of deposits is overlapped by green montmorillonite clays of Kyzylbulak suite (layers with *Grossostrea griptoides*). The Bestobe mammalian fauna, which is deposited in Kotsachurian onkoforic layers (i.e. in marine deposits of upper Lower Miocene of Eastern Paratethys), was very important for the stratigraphy of the Neogene deposits, since it gave the real chance of direct correlation of Ustyurt Bestobe suite with the Neogene Scale of Central and Western Paratethys (Kotsachurian=Ottungian=Late Burdigalian). Thus, the stratigraphic distribution of Kazakhstan "*angustidens*" group is regarded within the interval of MN 3-6 (Tleuberdina, Bendukidze, 2005). In Asia, this group has appeared earlier than in Europe and was characterized by considerable diversity. Remains of *G. angustidens* are common in Lower and Middle Miocene deposits of Western and Central Europe. Appeared there first in Burdigalian, roughly at Arthene level (MN 4), Gomphotheres have existed in composition of Miocene complexes mammals up to Tortonian. In Asia, they appeared apparently earlier than in Europe and were represented by various species: *G. atavus*, *G. inopinatus*, *G. cooperi*, *G. palaeoindicus*, *G. connexus*, *G. chijiensis*, *G. annectens*, *G. spectabilis* and others. Borissiak (1936), on the basis of *Gomphotherium angustidens* from the Lower Miocene of Kazakhstan, has suggested that Asia was a secondary centre of mastodons evolution. Although, the validity of many Asiatic forms needs further investigation, it is possible that all of them belongs to a particular Asiatic branch, not excepting that many of them were actually attributed to 'serridentoid' Gomphotheres. *Gomphotherium* penetrated into America relatively later: according to Osborn (1936) not earlier than in Middle Miocene and according to Tobien (1973), only in Mio-Pliocene times. In Late Cenozoic of Kazakhstan,

wide distribution are received the representatives of subfam. Anancinae. The most archaic species out of them is *Anancus kazakhstanensis* Aubek., 1974 (Aubekerova, 1972; Tleuberdina, 1982). Its skeleton remains are known from the deposits of Esekartkan and Adyrgan mountains of Tekess depression (Northern Tien-Shan). It differs from earlier and later representatives of *Anancus arvernensis* by the narrow tooth crown, the absence of cement in teeth, the more deep valleys, the location and ratio of main, intermediate and additional tubercles. On the basis of paleomagnetic researches, the bone-bearing horizon in Esekartkan section is situated below the boundary of Gilbert-Gauss epoch, i.e. 3,4 Ma. In the zonal scale of Western Europe, Esekartkan complex corresponds to the uppermost part of MN 15 (Tleuberdina, 2005). According to the late data of International Stratigraphic Scale, the Esekartkan fauna is correlated to Piacenzian level and Adyrgan fauna may be regarded as Gelassian. Later, in Kazakhstan has received distribution *Anancus arvernensis*. The areal of this species has occupied Western and Eastern Europe, Transcaucasian and Kazakhstan. The stratigraphic distribution of Kazakhstan 'arvernensis' group is considered within the interval of MN 16-17. In Kazakhstan, its remains are known from the deposits of Late Pliocene (Akchagyl-Apsheron) age: at the foot of Northern Tien-Shan hills, in Ili depression, in the southern hills of Dzhungar mountain system, on the bank of Caspian Sea, near Shevchenko town, in Central Kazakhstan, in the basin of Tasty R. (Torgai depression). Thus, Gomphotheriidae in Kazakhstan were distributed from west to east covered the epoch of early Miocene (MN 3-5); representatives of Anancinae flourished in the second half of Pliocene and during the beginning of the Early Pleistocene (MN 15-17).

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