Pliocene faunas with Proboscideans of the Former Soviet Union

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SUMMARY: In the territory of the former Soviet Union, remains of proboscideans are known in Pliocene faunas from Moldova to the Transbaikal region. They belong to four genera and seven species of four families: Deinotheriidae, Mammutidae, Gomphotheriidae and Elephantidae. During the early Pliocene, mammutid and gomphothere mastodonts prevailed. The first elephantids of the *Archidiskodon – Mammuthus* lineage dispersed together with other inhabitants of open landscapes in the south of that territory in the middle Pliocene (MN 16). The members of that lineage became widespread in the south of Northern Eurasia beginning from the late Pliocene (MN17) after 2,5 Ma.

1. Introduction

Proboscideans were among the dominant groups in the Pliocene and Pleistocene mammalian faunas of Northern Eurasia. Data on their occurrences are traditionally used in the biostratigraphy of these stages.

The Pliocene was a time when the first members of the *Archidiskodon-Mammuthus* lineage dispersed into Eurasia. During a part of that epoch they co-existed there with other proboscidean groups. The evolution of proboscideans as well as of other herbivores was closely related to palaeoenvironments and coincided with the large environmental changes. The history of proboscideans in the Pliocene of Northern Eurasia reflects the increase of global cooling accompanied by the enlargement of open woodlands in the temperate latitudes.

In the territory of the former Soviet Union (FSU), remains of Pliocene proboscideans are known from the numerous well-dated localities of Moldova, Ukraine, southern Russia, Georgia, Kazakhstan, Uzbekistan, and Tadzhikistan. The data on proboscideans from the FSU offer important insights into the history of this group, its occurrences and dispersals.

2. Early Pliocene

The early Pliocene (Ruscinian) faunas of the FSU lived in a more continental climate than that of Western Europe. Despite this, the Ruscinian faunas of the European part of the FSU contained many forest inhabitants including proboscideans, cercopithecid primates (*Macaca* sp. and *Dolichopithecus* cf. *ruscinensis*), various muntiacines, pliocervines and others (Vangengeim *et al.* 1998).

Proboscideans were represented by three families: Deinotheriidae, Mammutidae and Gomphotheriidae (Fig. 1). They were found in the European part of the FSU and belonged to three genera, *Deinotherium, Zygolophodon* and *Anancus*, which appeared in the Miocene.

Remains of *Deinotherium* have been found in the northern Ciscaucasus: *D.* cf. *gigantissimum* near the Armavir town and *Deinotherium* sp. in Kosyakino near the Stavropol town (Alekseeva 1977).

In the northern Black Sea area, a mammutid *Zygolophodon borsoni* (= *Mammut borsoni*) was most abundant in the first part of the Ruscinian. The remains of this species are recorded in Ukraine (Novopetrovka and elsewhere) in the Kuchurgan Beds (MN 14 and initial part of MN 15) and in Moldova in the

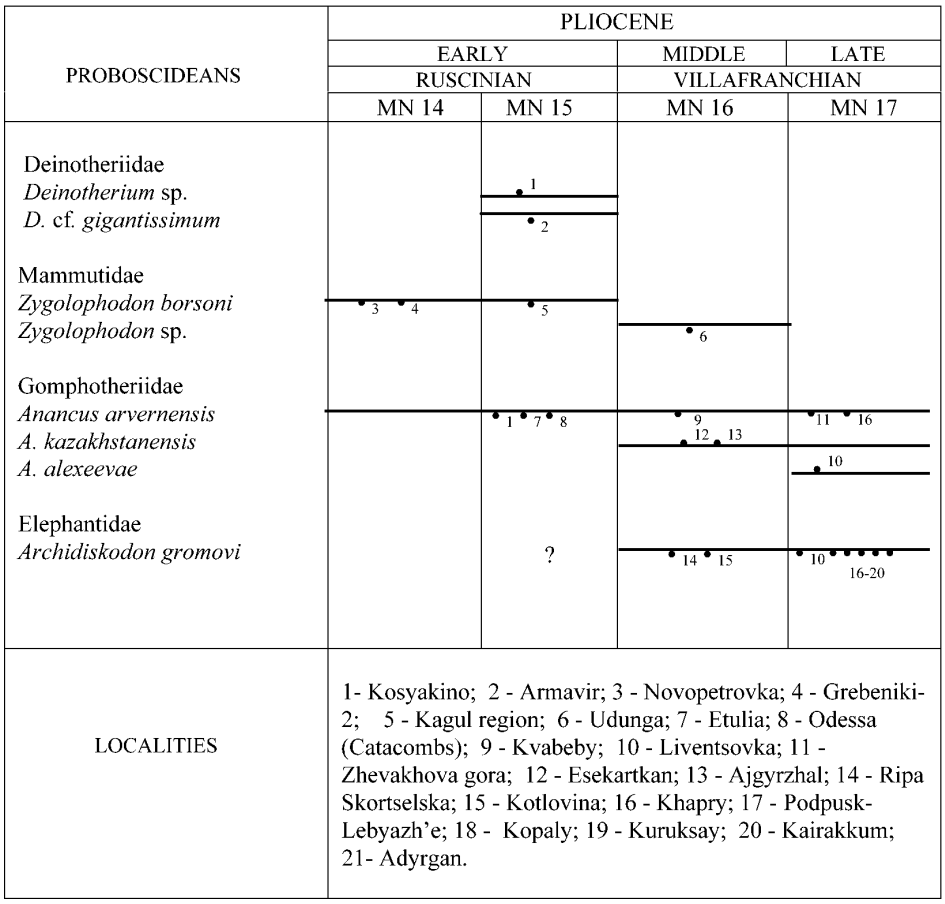

Fig.1 - The main localities and occurrences of proboscideans in the Pliocene of the FSU.

"Moldavian Russilion" (MN 15) (Vangengeim et *al.* 1998).

A gomphothere *Anancus* was more common in the south of European part of the FSU during the late Ruscinian. Its dispersal in this territory coincided with the appearance of some inhabitants of open landscapes due to more arid climatic conditions than in the first half of the Ruscinian. The remains of *Anancus arvernensis* occurred in Moldova (Etuliya, Luchesty and others) in the Karboliya Beds (late part of MN 15) and in the northern Ciscaucasus (Kosyakino) (Vangengeim *et al.* 1998). In the northern Black Sea area, that species co-existed with camels *Paracamelus*, which dispersed there again after its first appearance there in the Messinian time (Vislobokova *et al.* 2001). The appearance of a small canid *Eucyon odessanus* is also indicated at this time.

3. Middle-Late Pliocene

3.1 Early Villafranchian

At the Early/Middle Pliocene (Ruscinian/ Villafranchian) transition, the number of inhabitants of open landscapes markedly increased. During the middle and late Pliocene, mastodonts were gradually replaced by elephantids.

The early Villafranchian faunas of the FSU are characterised by the last occurrence of some warmth-requiring forest elements including *Zygolophodon*, a procyonid (*Parailurus*), a large badger (*Parameles*), and a further radiation of *Eucyon*-like canids; and by the first

appearance of a number of boreal forms.

The most north-eastern finding of *Zygolophodon* occurred in Transbaikal region in the Udunga fauna (MN 16), one of the most representative faunas of this age in the Asian part of the FSU. The Udunga fauna also contains a cercopethecid primate Parapresbytis, a small bear *Ursus* cf. *minimus*, and the first boreal forms (*Gulo, Capreolus* and others) (Kalmykov 1992, Sotnikova & Kalmykov 1991, Vislobokova *et al.* 1993, 1995; Vislobokova *et al.* 2001).

Anancus continued to exist in some refugia in the south of Northern Eurasia. The genus was represented by *A. arvernensis* in the Caucasus (Kvabeby) and by *A. kazakhstanensis* in the Tekess Depression in southern Kazakhstan (Esekartkan and Ajgyrzhal). Mastodonts occurred there together with progressive hipparions.

The first records of the *Archidiskodon–Mammuthus* lineage, of African origin, are observed in the south-western FSU in middle Akchagylian times. But *Archidiskodon* could have arrived there before that time. Alekseeva (1977) supposed that *A.* cf. *meridionalis* from Kosyakino could be *A. gromovi* but this presumption needs to be checked. In Italy, the entry of *Archidiskodon* occurred at the second half of the early Villafranchian (Montopoli) (Azzaroli *et al.* 1988). In Roumania, *Anancus arvernensis* and a primitive *Archidiskodon* are reported from the Dacic Bassin (MN 16b) (Tersea *et al.* 1997). In China, a record of *Archidiskodon-Mammuthus* lineage in the Yushe Basin is referred to MN 15 zone (Tedford 1995).

3.2 Middle Villafranchian

The middle Villafranchian faunas of the FSU are characterized by the diversity and last occurrence of *Anancus*, and a wide distribution of elephantids. *A. arvernensis* is reported from Ukraine (Zhevakhova gora) (Alekseeva 1977). A progressive *A. alexeevae* was discovered in the south of European Russia (Liventsovka) (Baigusheva 1971). *A. kazakhstanensis* is present in Kazakhstan (Adyrgan) (Tleuberdina 1988). In Europe, *Anancus* persisted until the early Pleistocene (Göhlich 1999).

The elephantids of the *Archidiskodon-Mammuthus* lineage became widespread together with other animals adapted to savanna-like conditions: *Canis etruscus* group, *Pliocrocuta, Homotherium, Acinonyx, Equus, Paracamelus, Elasmotherium* and others. *A. gromovi* was found in a number of localities in the south of European Russia (Khapry, Liventzovka and others), in Kazakhstan (Podpusk-Lebyazh'e, Kopaly, Tadzhikistan (Kuruksay) and in Uzbekistan (Kairakkum)) (Baigusheva 1971; Sotnikova *et al.* 1997; Vangengeim *et al.* 1988; Vislobokova 1996).

In the faunas of the terminal Pliocene of the FSU, mastodonts are unknown and *A. gromovi* is replaced by *A. meridionalis.*

4. Final Remarks

A large diversity of proboscideans was typical of late Ruscinian faunas in the territory of the FSU, characterized by the presence of deinotheres, gomphotheres and mammutid mastodonts and, possibly, by the first appearance of the *Archidiskodon-Mammuthus* lineage.

The main turnovers of proboscideans in this territory coincided with a wide spread of open landscapes at the early Pliocene/middle Pliocene transition (about 3,5 Ma) and at the middle Pliocene/late Pliocene transition (about 2,5 Ma). In the middle Villafranchian a primitive *Archidiskodon - A .gromovi* - became dominant; in some regions these elephants coexisted with *Anancus*.

At the end of Pliocene proboscideans in the FSU were represented by the single family Elephantidae (*A. meridionalis*).

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