JURIJ ALEXANDROVICH ORLOV MEMORIAL NUMBER
JOURNAL OF THE PALAEONTOLOGICAL SOCIETY OF INDIA
VOL. 20, 1977 pp. 4—9. (*For* 1975).

ON THE OLDEST ARCHIDISKODON ELEPHANT FROM THE ANTHROPOGENE OF THE USSR

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ABSTRACT

A. gromovi is one of the most primitive species among the elephants of the genus *Archidiskodon* which lived on the territory of Eurasia in the Villafranchian time. In the teeth structure of this elephant constant premolar p^4 is preserved. The last true molar M3 consists, on the average, of 13 laminas (optimal number). Remains of *A. gromovi* occur in the southern part of the USSR (from Moldavia to West Siberia and South of the Middle Asia). Geological age of the species: Upper Akchagyl (=Middle Villafranchian of the Western Europe).

Almost half a century ago remains of the ancient elephant were found in the sand-pit near Khapry station (suburb of the Rostov-on Don city) and preliminary referred to the *Elephas meridionalis* (Bogachev, 1924). Later on the Khapry sand formation and mammals fauna confined to it was studied by V. I. Gromov (1933, 1948). This scientist spoke out the assumption that the remains belong to two species, to the very archaic *Elephas planifrons* and to more progressive *E. meridionalis*. The skull of a young elephant found in Khapry sand-pit in 1934 is extremely interesting (Fig. 1, 2). Presence in this skull of a constant premolar P^4 reasoned V. I. Gromov's assumption that the archaic elephant from Khapry sands is close to or identical with the *Protelephas planifrons* known from the Siwalik deposits of India.

The study of the following finds from Khapry and adjacent Liventsovka sand-pits proved the remains from Khapry sands to belong to one and the same species (Yan'kova, 1959). This elephant cannot be identical with the Indian *Protelephas planifrons* (Garutt, 1957). The elephant from Khapry sand-pit is in the skull structure a typical archidiskodont (its forehead is lengthwise strongly concave). Structural peculiarities of the skull and teeth allowed to consider the Khapry elephant an independent species which was named after the well-known Soviet geologist and paleontologist V. I. Gromov.

SYSTEMATIC DESCRIPTION

Genus Archidiskodon Pohlig, 1885
Archidiskodon gromovi Garutt et Alexejeva, 1964

Elephas meridionalis Bogachev, 1923-1924. p. 108. Fig. 3-5; Gromov. 1933, p. 46; Gromov and Mirchink, 1936, p. 639. Fig. 174-K; Gromov, 1948, p. 44, 451-453, Fig. 214-C.

Elephas planifrons Gromov, 1933, p. 46; Gromov and Mirchink, 1936, p. 639, Fig. 174-I; Gromov, 1948, p. 44. 451-453, Fig. 214-B.

Archidiskodon planifrons Nikiforova and Alexejeva, 1959, p. 15, Table I.

Archidiskodon meridionalis Nikiforova and Alexejeva, 1959, p. 15, Table I; Dubrovo and Baigusheva, 1964, pp 133-136; Dubrovo 1964, pp. 86-88.

Archidiskodon aff. meridionaais Baigusheva, 1964, pp. 44-50.

Archidiskodon gromovi Garutt and Alexejeva, 1964, p. 78; Alexejeva and Garutt, 1965, pp. 171-175, Fig. I; Alexejeva, 1965, pp. 73-75, Table III-IV; 1970, pp. 124-125, Fig. 3; Baigusheva, 1968, pp. 5-29, b, Table III, Fig. 3-5; Vislobokova, 1974, pp. 173-175.

Holotype: (Pl. I). The skull of an old male (?) (without lower jaw and tusks) with last strongly worn out molar M^3 from Khapry sands of the Liventsovka pit (Rostov-on Don city). Late Pliocene (early Eopleistocene according to V. I. Gromov's scheme of 1957). Museum of Regional Study in Rostov-on Don, N 113.

Diagnosis: The skull relatively low, longitudinally (sagittally) elongated: the ratio of its length (distance from the most protruding point on the face in its orbital area to Condyli occipitales inclusively) to the height (distance from molars' masticatory surface to the skull top) makes up 86 per cent. Occipital tubers (paired symmetrical protuberances on the occipital surface located slightly above Foramen occipitale magnum) are feebly prominent. Occipital surface lies at a right angle to the length axis of the skull (line running across the middle of the orbit and lower margin of Porus acusticus externus). Forehead is narrow: the ratio of minimal forehead width to the skull width in its occipital region makes up 29 per cent. The lower jaw, mandibula, is rather low, for-

wards—backwards elongated. There is a strongly developed restrum. Teeth ontogenesis is characterized by the presence of a constant premolar P^4. The last molar, M^3, has the following (more frequently observed) characteristics: number of crown laminas—13; average length of one lamina—20 mm (on the upper teeth) and 22 mm (on the lower teeth); Laminas frequency in 10 cm of the crown—5.0 (on the upper teeth) and 4,5—4,8 (on the lower teeth); enamel thickness—2,9—3,9 mm.

Description and comparison: The skull of Gromov's elephant, when compared with that of *A. meridionalis*, shows well marked tendency to gradual increasing the height and simultaneous reducing its length (Fig. 1). In the holotype A. gromovi this ratio makes up 86 per cent, and in *A. meridionalis* it is slightly different; in the skull from Georgievka pit in the Northern Caucasus (museum of Regional Study in Pyatigorsk) the pointed index constitutes 79,9 per cent; in the specimen from Alexandria pit, Northern Caucasus, (Zoological Museum, Ac. Sci. USSR, N 31065) it makes up 71,2 per cent and in the elephant skull from Taribana, Georgia, (Institute of Palaeobiology, Ac. Sci. of Georgian SSR, N k/31) —78, 0 per cent.

Occipital tubers are in A. gromovy of negligible prominence, the occipital region lying, therefore, at an almost right angle to the length axis of the skull. Occipital plane in *A. meridionalis* forms with the length axis of the skull an obtuse angle. In virtue of the latter the skull dome is strongly bent backwards (Weithofer, 1890, Table II, Fig. I); Maccagno, 1962, Fig. 5, Table II, Fig. 2; Gabunia and Vekua, 1963, Table II, Fig. 7. This peculiar skull structure in southern elephants seems to be connected with their more strongly developed occipital tubers.

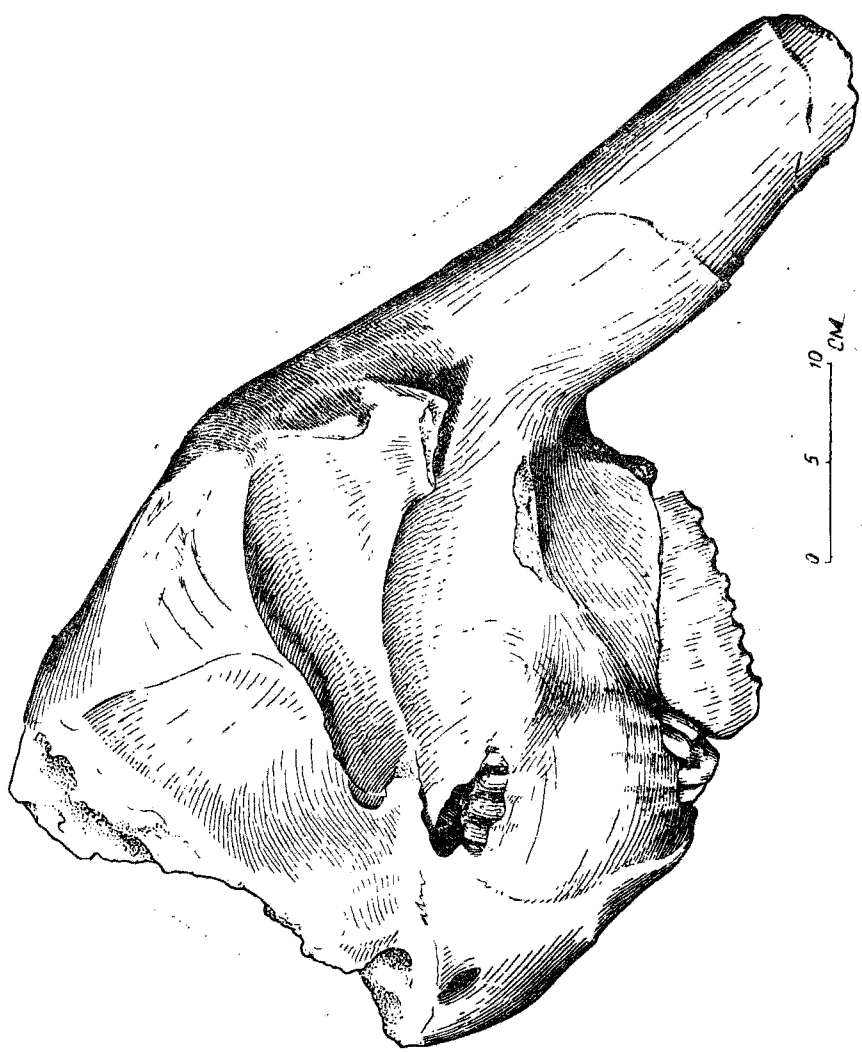

Fig. 1. Skull of a young elephant of *Archidiskodon gromovi* from Khapry, side view. Coll. GIN, N 300—122.

TABLE 1

Skull measurements in *Archidiskodon gromovi*

NN	Measuring (in mm)	Liventsovka sandpit (c. Rostov- on Don), Rostov Museum of Regional Study, N 113
1.	Distance from the skull top to anterior ends of intermaxillare	Ca 1370
2.	Distance from condyli occipitales to anterior ends of intermaxillare	1145
3.	Length of skull (distance from the front of the orbit to condyli occipitales)	805
4.	Height of skull (distance from molars' masticatory surface to the skull top)	Ca 934
5.	Occipital width of skull	895
6.	Width of skull at processus zygomaticus squamosum	835
7.	Height of occiput (from the skull top to condyli occipitales inclusively)	704
8.	Distance between the outer margins of condyli occipitales	228
9.	Size of foramen occipitales magnum (height ×width)	81×80
10.	Length of forehead (from the skull top to the upper margin of intermaxillare)	540
11.	Minimal width of forehead	260
12.	Width of nasal hole	500
13.	Maximum height of nasal hole	135
14.	Length of intermaxillare	845
15.	Width of intermaxillare at the level of foramen infraorbitale	486
16.	Width of intermaxillare in the mid part ..	410
17.	Width of intermaxillare at alveolar margins of tusks	490
18.	Diameter of tusks	218×163
19.	Length of zygomatic arch	501
20.	Distance between the molars:	
	(*a*) from the front	135
	(*b*) from behind	204

In Gromov's elephant the forehead is sharply narrowed in its middle part, this narrowing being much more prominent than in *A. meridionalis*. Thus, in the holotype A. gromovi from Liventsovka sand-pit the ratio of the minimal forehead width to the skull width in its occipital portion makes up 29.0 per cent; in *A. meridionalis* from Seneze (Basel Museum) —45.4 per cent, in that from Georgievka pit—45.3, from Alexandria—40.3 and from Taribans—47.5 per cent.

A. gromovi differs from the other species of the *Archidiskodon* genus also in the structure of its teeth row. The most essential feature proving the primitive level of Gromov's elephant is the presence of a constant premolar in its ontogenesis (Fig. 2). The study of mandibules in *A. meridionalis* specimens has shown that the constant premolars were absent in these elephants (Friant, 1959; Schaub, 1948 and others). The complete teeth series of A. gromovi could be designated as follows: 12, dP2, dP3, dP4, P4, M1, M2, M3.

Constant premolar tooth found in the skull of a young specimen of *A. gromovi* from Khapry (Gromov, 1948, Vĕrescagin, 1959, Garutt and Alexejeva 1964, Alexejeva and Garutt 1965, etc.)[1] is the last premolar P4. It sits directly before the functioning M^1 whose attachment to this succession is confirmed by the forming M^2 present in the mandibula.

P4 (Fig. 2) is similar in its crown structure to the constant premolars of mastodons. The crown is formed of some mammiform tubercles grouped in two indistinct rows. Both ends of the crown the tubercles are smaller and form the anterior and posterior talons. The enamel is vertically folded. Masticatory surface is covered with a dense cement layer. The tooth is not worn out. It seems not to be involved in masticatory process (first molar sitting behind P^4 is distinctly worn out). The described tooth (collection GIN, Ac. Sci. USSR, N 300-122) has the following size characteristics: length of crown—28 mm, width—32 mm, height—22 mm.

Molars of *A. gromovi* (in particular fragmentary molars) are very similar to those of *A. meridionalis*. To a certain degree they differ only in the last molars. M3 consists of 12-(13)-14 complete laminae. It should be noted that in the last molars found in Khapry and Liventsovka pits the number of complete laminas equals to 12-13 (not more). In *A. meridionalis* the number of laminas forming the crown is usually larger. It even amounts 16-17 laminas (Dubrovo, 1964).

The teeth of A. gromovi and those of A. meridionalis are almost of the same size. In *A. gromovi* the length of M3 crown is limited to the range of 200-320 mm; its width—to 80-120 mm and height—to 105-150 mm. In A. meridionalis, however, average height indices of the crown of M3 are slightly higher (sometimes they approach to 180-190 mm). In *A. gromovi* maximum width of the crown is at its base. Laminas are far removed from each other (there are 3,5—5,0) laminas in every

[1]Detailed description of this unique find presented by Prof. V. I. Gromov is now in press.

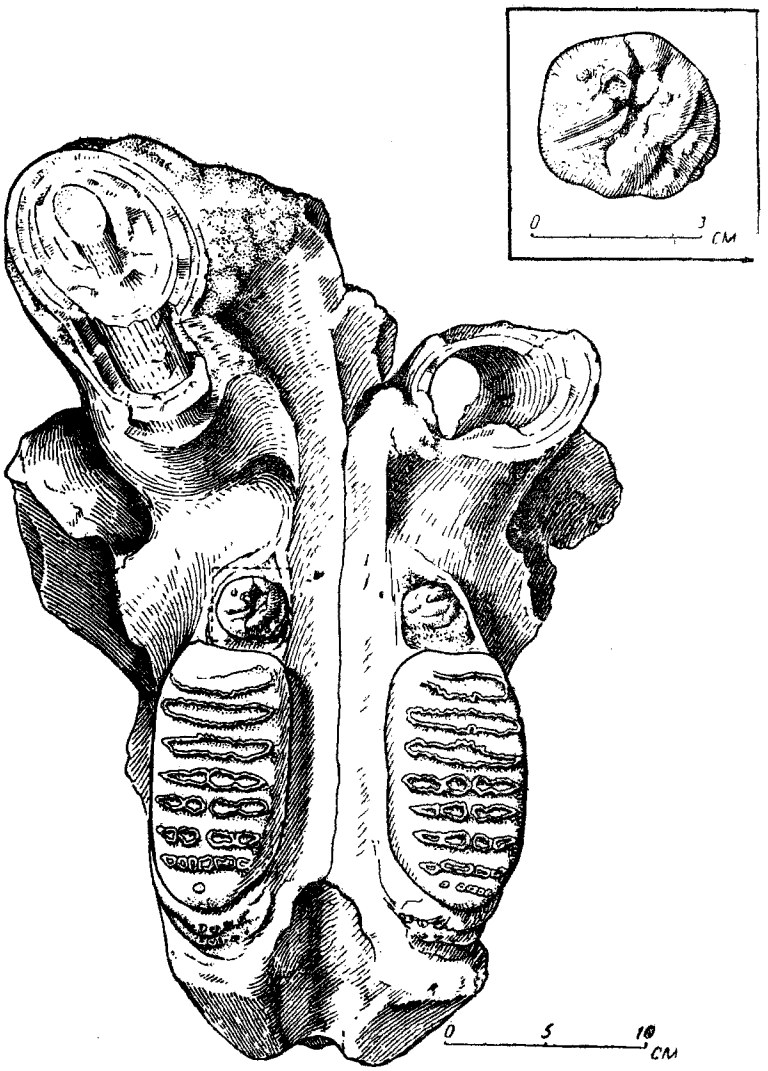

Fig. 2. Skull of a young elephant of *Archidiskodon gromovi* from Khapry, view from below.

100 mm of the crown length). In some cases there is a mid expansion on the upper teeth (especially on strongly worn out teeth). The pattern of laminas' abrasion is of mixed type. In the early stages of abrasion the antiquoid type was prevailing (side figures are rounded and the middle figure, elongated). In the middle stage of abrasion the meridianoloid type is more frequently observed (side figures are oval and the middle figure, rounded). Sometimes figures both of the first and second types of abrasion are observed on one and the same tooth. The partition of tooth laminas into separate conelets proceeds rather deep (almost as deep as 1/3 of the lamina height). It is worth noting that the cement layer on the teeth of *A. gromovi* is developed to a lesser degree than on those of *A. meridionalis*. In certain places it does not completely fill the intervals between laminas (Plate II—1, 2).

A. gromovi is well distinguished from more late representatives of the Archidiskodon genus known from Europe by a number of structural peculiarities of the last molar. Thus, the crown of M3 in the elephants of the trogontherii species bears 18-20 complete laminas. In addition, these late elephant specimens always have teeth with more thin enamel (2-3 mm) and more closely set laminas (usually 5,5—6,5 in 100 mm of the crown length).

Gromov's elephant differs from *A. africanavus* described from the Lower Villa-franchian of North Africa (Arambourg, 1952, 1970) in a large number of laminas on M3. In *A. africanavus* the crown of a last molar bears 10 complete laminas (3,5 laminas in 100 mm).

From the North-American elephant specimens, which H. F. Osborn (1942) referred to the *Archidiskodon* genus, A. gromovi is well distinguished by the number of laminas

on M3 (in the North-American forms it is not known to be less than 17).

Occurrence, age and habitat: Archidiskodon gromovi was first identified by the remains digged out from Khapry sands (Gromov, 1933, 1948; Khokhlovkina, 1940). Their stratotype section is in Khapry sand-pit, near the city Rostov-on Don. At present this pit is not working. The Khapry formation is made up of alluvial deposits of one sedimentation cycle (Rodzianko, 1970). They occur along the northern coast of the Sea of Azov and at the Lower Don. This area was a field of acting of a river stream which ran along the Don valley. At present the Khapry sand formation is well exposed in Liventsovka pit (suburb of the city Rostov-on Don) whose section is considered to be the parastratotype of the Khapry formation. Khapry formation is 18 m thick. The floor of this old terrace is composed of marine deposits of Sarmatian, Meotian and Pontian age. Khapry formation is overlain by the thick series of Scyphian clays (Rodzianko, 1967). Bones accumulations of large mammals are confined to the lower 1/3 of this formation. Besides numerous elephant remains, the bones of *Equus livenzovensis* (=*E. cf. bressanus*), *E. ex gr. stenonis*, *Dicerorhinus etruscus*, *Elasmotherium caucasicum*, *Paracamelus alutensis* (=*P. kujalnensis*) *Eucladoceros dicranios*, *Gazellospira torticornis*, etc. have been found there too. Ostrich bones often occur in these bone-bearing lenses.

Fauna obtained from the Khapry and Liventsovka pits belongs to the Khaprovian faunistic complex and represents its early evolutionary stage (Alexejeva, 1968; Alexejeva, 1970). This part of the complex is correlating with the Middle Village-franchian of Europe (Alexejeva, 1974).

Fairly many localities of *A. gromovi* are known on the European territory of the USSR: in Moldavia—loc. Farladany, in Ukraine-Kotlovina; in the Rostov area —Khapry, Liventsovka, Marine, Valovaya Balka, Gunyushki, Chernorechye, Sablinskoe, etc. The tooth found in the Kosiakian pit (Gabunia, 1961) containing fauna of the Moldavian complex seems also probable to belong to that same elephant species. It is not excluded that the part of remains found on the territory of Azerbaijan SSR and identified as *Elephas planifrons* (Burchak-Abramovich and Djafarov, 1950) belongs to *A. gromovi*. It appears quite possible on account of the remains of *A. cf. gromovi* unearthed in the middle—Akchagyl part of the locality Kushkuna, Azerbaijan SSR (Lebedeva 1972). On the East the areal distribution of *A. gromovi* extends to the South of West Siberia (Vislobokova, 1974) and on the South its boundary approaches to South Tajikistan (Nikonov, Penkov *et al.*, 1971). The western boundary of its expansion is still not finaly traced. In Western Europe teeth of primitive elephants were found at some localities in the Lower Villafranchian deposits (Azzaroli, 1970). Their definite specific affinity so, as that of a tooth from the Kosiakian pit, is not determined yet. It seems not excluded that these remains belong to another even more ancient elephant specimen of the *Archidiskodon* genus.

A. gromovi, apparently, lived under conditions of the forest-shaped landscape, similar to savanna, and was mainly feeded on foliage, branches and tree bark. Eminent height of this elephant is due to adaptation for picking up food items from the large trees. Judging on the associating fauna composition, the climate was at that time rather warm, with hot summer and not heavy low-snow or snowless winter periods.

CONCLUSION

Recent data available on the occurrence of the remains of ancient *Archidiskodon* elephants permit the assertion that in the time of existance of fauna of early Khaprovian complex (upper part of the Akchagyl stage) *A. gromovi* was widely spread in warm latitudes of the North Eurasia. Its teeth structure is characterized by the presence of a last constant premolar. It makes us to assume that the above species could be a contemporary of the Indian *Protelephas planifrons*, in whose ontogenesis presence of the last constant premolars is also known. *A. gromovi* appears to be the direct ancestor of *A. meridionalis* (Garutt, 1964). Elephantine teeth found in the deposits somewhat older than that of the Khapry locality indicate that the *Archidiskodon* elephants appeared in Europe as a component of the Moldavian faunal complex which is correlating with the Rousilion or Villafranchian of the Western Europe (Alexejeva, 1974).

According to the wish of Acad. Yu. A. Orlov the skull of a young elephant of *A. gromovi* from Khapry (as well as that of an adult elephant from Liventsovka) will be given over to the Palaeontological Institute, Ac. Sci. USSR, for exhibition in the new Palaeontological Museum named after Yu. A. Orlov.

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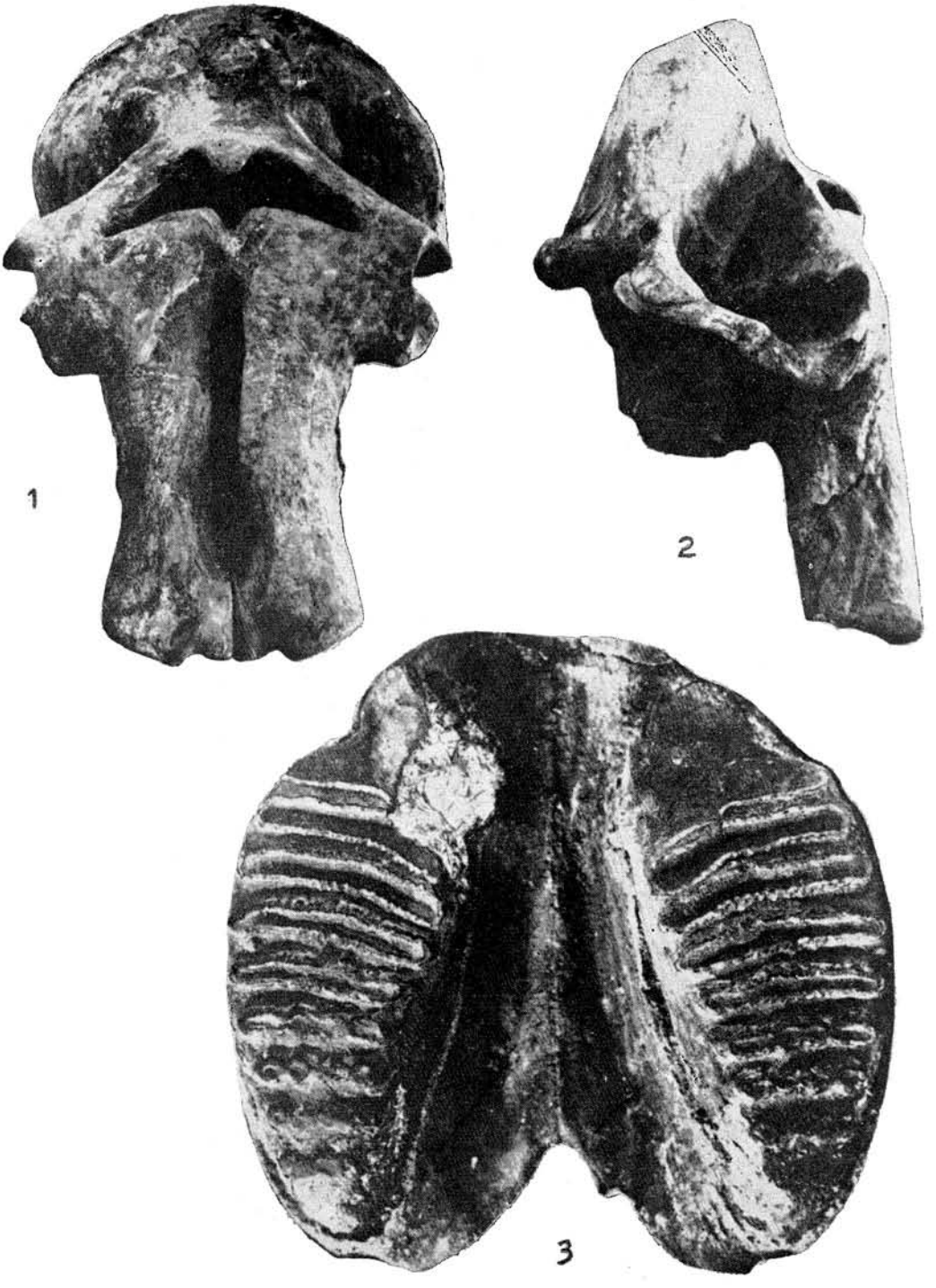
EXPLANATION OF PLATES

PLATE I

1. Skull of *A. gromovi* from Liventsovka, holotype. Coll. Rostov-on Don Museum of Regional Study, N 113; front view 1/5 natur. size.
2. Ditto, sid view, 1/5 natur. size.
3. Ditto, view from below. 1/2 nature. size.

PLATE II

1. Last upper molar M^3 of *A. gromovi* from Liventsovka; view from above. Coll. GIN, N 270-10. 1/2 natur. size.
2. Ditto, side view, 1/2 natur. size.
3. First upper milk premolar dP^2 of *A. gromovi* from Khapry. Coll. GIN, N 300-125. Natur. size. View from above.
4. Ditto, side view, natur. size.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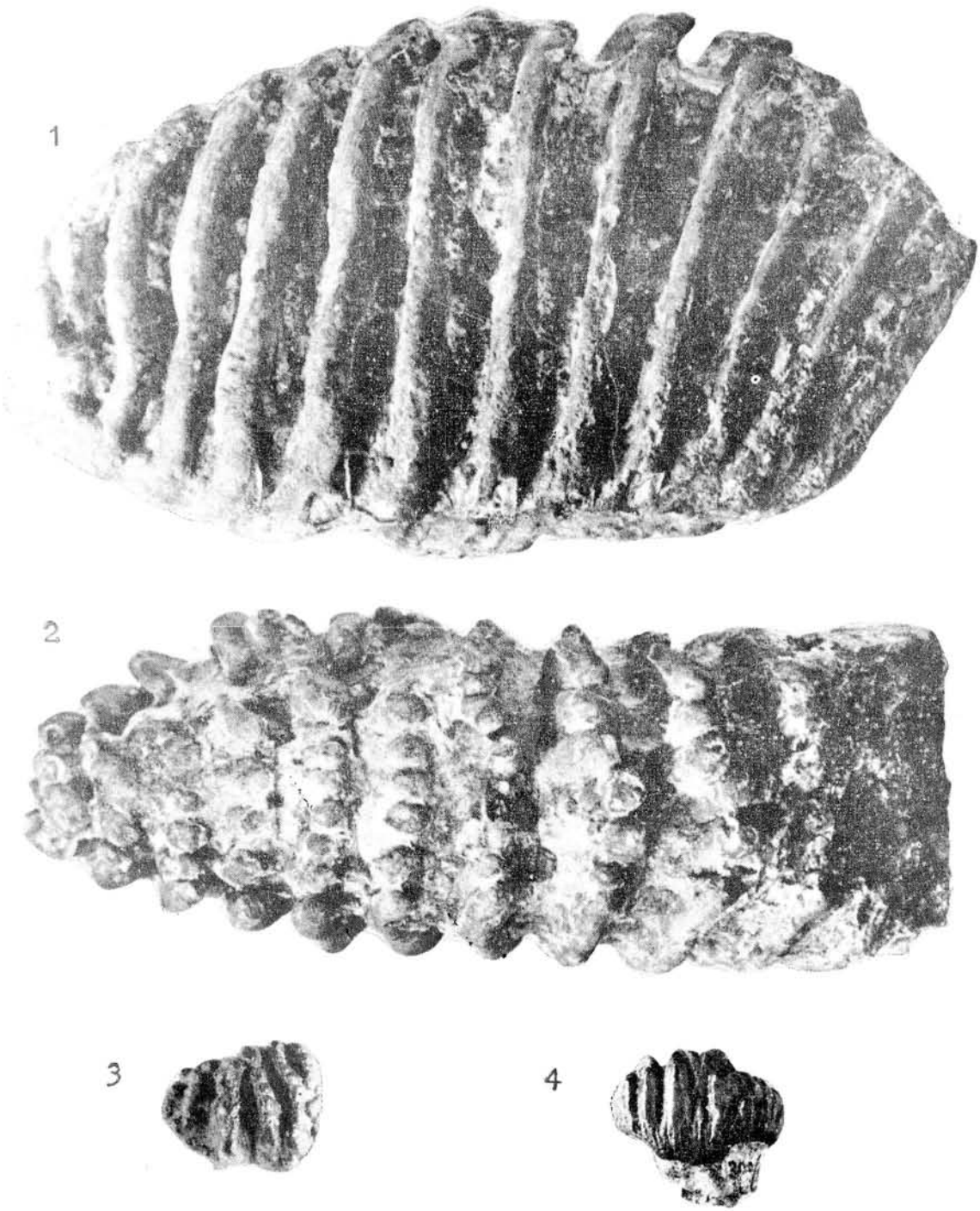
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