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ABOUT THE HYOIDEUM, STERNUM AND METACARPALE $\overline{\underline{V}}$ BONES OF *ELASMOHTHERIUM SIBIRICUM* FISCHER (RHINOCEROTIDAE)

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ABSTRACT

Brief description of rare finds of certain skeleton elements of *Elasmotherium sibiricum* Fischer is presented in this paper. It concerns hyoideum, manubrium sterni and metacarpale $\overline{\underline{V}}$ found in the vicinity of the town Engels and in the Northern Caucasus. The paper contains reconstruction of *Elasmotherium* of different authors.

Rhinoceroses, and in particular *Elasmotherium* Fischer, 1808, which attracted long ago the attention of many investigators, are known from the history of mammals fauna of the USSR to be the main component of these faunas.

Remains of *Elasmotherium* known from the Pliocene and Quaternary deposits of the USSR indicates its rather vast areal expansion covering different regions of the European and Asiatic parts of the USSR. *Elasmotherium* was found in China too.

The idea of *Elasmotherium* was based only on single finds of skulls with a typical dome-shaped frontal bones, on the finds of mandibles, single teeth and some bones of a postcranial skeleton, chiefly that of *E. sibiricum*. Skeleton finds of *Elasmotherium*, like those of other rhinoceroses, are extremely rare.

Three incomplete skeletons of *E. sibiricum* are known to have been found on the river Big Karaman in Zavolzhye, near the village Pensenka, which is not far from the town Engels (Collection of the Palaeontological Institute of the Academy of Sciences of the USSR) and on the Northern Caucasus on Stavropol territory, near the large village (stanitsa) Gaevskaya and the town Zelenokumsk (the skeletons are kept in the Museum of Regional Studies in Stavropol in the Caucasus). These finds are of great interest not only because they represent the remains of one individual but also because they contain some unknown and well-preserved skeleton elements of *Elasmotherium* such as os hyoideum, manubrium sterni and metacarpale $\overline{\underline{V}}$, whose brief description will be given below.

I have reported on these finds of *Elasmotherium* remains to the First International Theriological Congress in Moscow in 1974 (Belyaeva, 1974).

I express my hearty gratitude to the Museum of Regional Studies of the Stavropol in the Caucasus and the Palaeontological Museum after A. P. and M. V. Pavlovs attached to the Moscow Institute of Geological Survey after S. Ordjonikidze for providing me with the materials on *Elasmotherium* as well as to V. A. Presnyakov, photographer from the Palaeontological Institute of the Academy of Sciences of the USSR, for illustrational part of the present paper.

The data on the os hyoideum, which is known to be the base of the tongue root, gullet and adjacent to it thyroid cartilage (Fig. 1) of not only fossil rhinoceroses

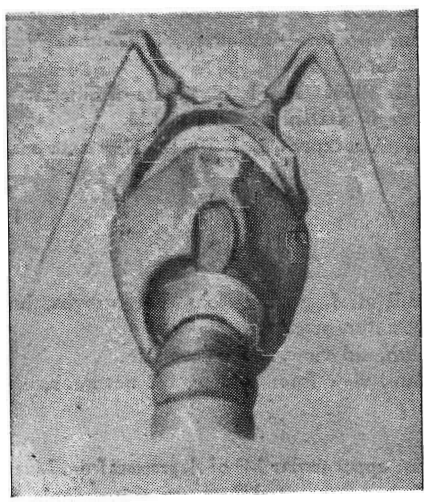

Fig. 1. Os hyoideum and larynx of *Rhinoceros indicus*. After Mayer's, 1894, tb. III, 1/3 n.s.

but also of other mammals are very scanty. By the way, the os hyoideum is not always preserved even in macerations of the skeletons of recent mammals.

Literatury data on the os hyoideum of fossil rhinoceroses are very restricted and give us only some information about this bone of *Coelodonta antiquitatis* from the well known locality of the carcasses of the mammoth and rhinocerose at Starun in the Ukraine (Hoyer, 1914) and about *Dicerorhinus binagadensis* from the extremely interesting locality of quaternary vertebrates of Binahada near Baku in the Caucasus (Jafarov, 1950, 1960). It is also to mention about the *D. etruscus* stylohyoid of the branch connecting hyoideum with the skull, which was found on the river Psekups in the Northern Caucasus (Gromov, 1948).

Os hyoideum of *Elasmotherium*, this unique find, was found during the preparation of the mandible of the skeleton of *E. sibiricum* known from the village Gaevskaya (Fig. 2).

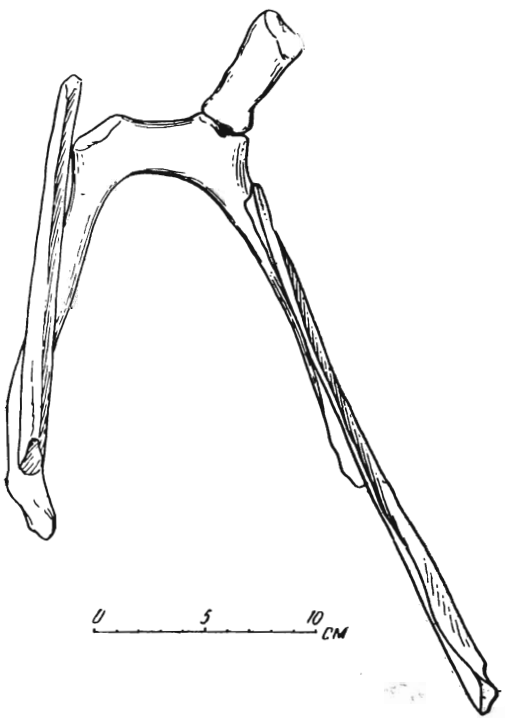

Fig. 2. Os hyoideum of *Elasmotherium sibiricum* Fischer. Northern Caucasus. View from above.

It was found laying between the ascending branches of the mandible. The corpus of the bone preserved in a form of a flat bone of 1.0 cm thick. Its transversal diameter approximates to 8.1 cm, and the anterior-posterior diameter in central portion of the bone equals to 2.4 cm. *Processus lingualis* of the bone was not developed. Parallel branches or horns grow from the lateral portions of the corpus. Some of them are oriented towards the throat, the others, towards the skull.

Large or laryngial horns, *cornua majora*, growing to wards the larynx look in *Elasmotherium* like thin branches about 15.2 cm. long. At the base of the corpus they are 2.0×1.8 cm. in diameter. Their distal extremeties are broken.

Of *cornua minora* oriented to the skull only one was preserved (Fig. 2). It is near 6 cm. long, with the diameters (width×thickness) of 2.0×0.9 cm. on proximal and 1.5×2.0 cm. on its distal extremity.

Os hyoideum of *E. sibiricum* does not differ in its general structure from *C. antiquitatis*, *D. binagadensis* and of the recent rhinoceroses. But its main distinctive feature is the absence of *processus lingualis*, adequately well-developed in *C. antiquitatis*, *D. binagadensis* and in African *Diceros bicornis*, but very weak at the Indian *Rhinoceros indicus*. Dimensional measurements of the bone also give somewhat other results (Table 1).

TABLE 1

Dimensions of the os hyoideum of rhinoceroses (in cm.).

	Elas. sibir.	*Dic. binag.*	*D. bicor.*
1. Length of corpus without processus lingualis	2.3	2.3—2.5	2.0—2.1
2. Ditto with processus lingualis ..	..	6.4—8.5	6.3—7.1
3. Width of corpus	8.1	..	5.5—6.4
4. Length of cornu majora ..	15.2	7.0	6.9—8.3
5. Length of cornu minus ..	6.0	4.8—5.8	3.0—4.5

The idea about the sternum of *Elasmotherium* we can get judging only by its anterior segment, the manubrium sterni, detected in the skeleton of *E. sibiricum*, which was found near the village Gaevskaya in the Northern Caucasus (Fig. 3). It is also one of the rarest finds of the postcranial skeleton elements of mammals.

Only one more and of manubrium sterni of *D. binagadensis* is known from the Binagadinian locality of mammals in the Caucasus (Jafarov, 1960).

Manubrium sterni of *E. sibiricum* is a rather massive bone about 37 cm. long. Its anterior extremity is somewhat damaged; the posterior extremity is oval with the corresponding diameters (height×width) of 11.3×5.9 cm. On the upper surface of the bone almost in the middle of the latter and near the lateral margins there are facets for first ribs. Proximal extremity of one of them is seen

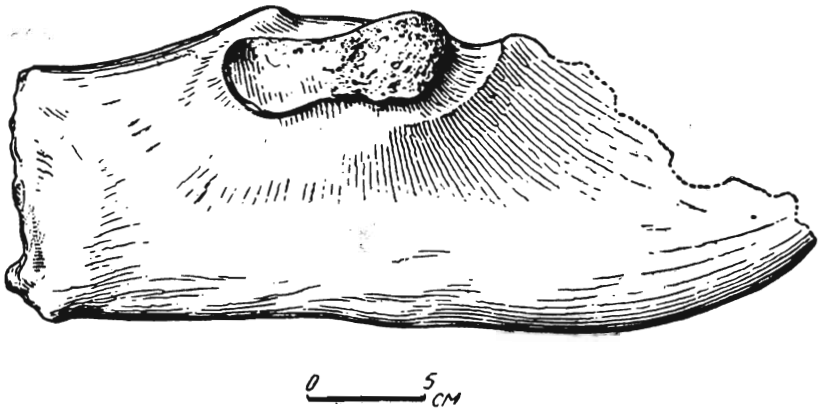

Fig. 3. Manubrium sterni of *Elasmotherium sibiricum* Fischer. Northern Caucasus.

on the manubrium sterni of *Elasmotherium* from Gaevskaya-village. The dimensions of these facets (length × width) are 9.8? × 4.4? cm.

General structure of the manubrium sterni of *Elasmotherium* is similar to that of the same bone of *D. binagadensis* and recent rhinoceroses, the bone is only considerably larger in size. For instance, the length of manubrium sterni in *Ceratotherium simum* is 25.0 cm and of *Diceros bicornis*—15 cm.

The dimensions of the manubrium sterni of *Elasmotherium* permit us to suppose that the sternum itself was very large. But it is still difficult to imagine its real dimensions, because the successive components of the sternum—corpus segments and *processus xiphoideus*—are not yet known.

Metacarpale $\overline{\underline{V}}$ of *Elasmotherium* also belongs to very rare finds. It attracts special attention in connection with the question about three-or tetradactylous front leg of *Elasmotherium*, which was raised by V. A. Teriayev at the end of the twenties of our century (Teriajev, 1930).

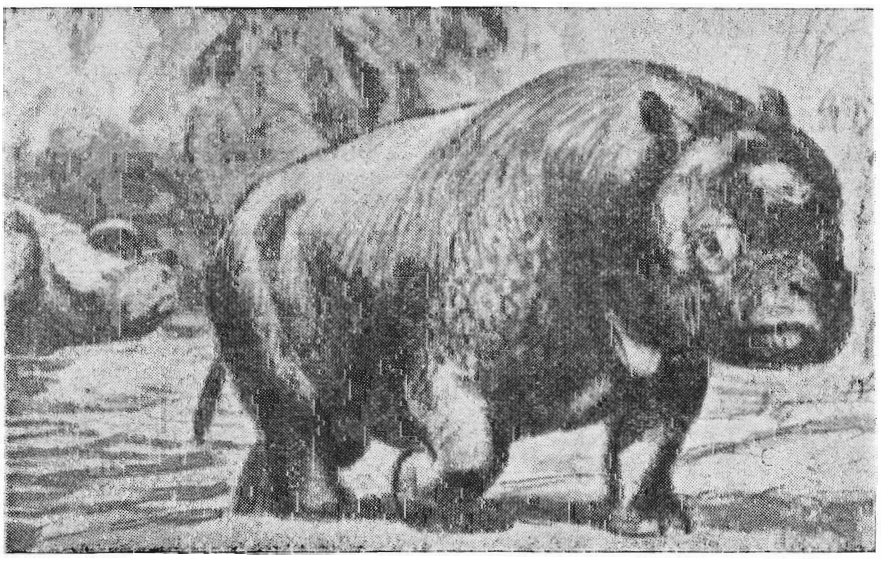

Fig. 4. *Elasmotherium sibiricum* Fischer. Reconstructed by V. A. Vatagin (Menzbir, 1934).

Morphological analysis of metacarpale $\overline{\underline{IV}}$ of *E. sibiricum* proved the large size of the fact for metacarpale $\overline{\underline{V}}$, what was considered to be of a great interest and was taken by V. A. Teriajev, in his inference as a principal argument for a normally evolved fifth digit of the manus of *Elasmotherium* and, thus, for the approval of a tetradactylous front leg of the latter. This idea was reflected by V. A. Teriajev in his reconstructions of the manus and the

outward appearance of *Elasmotherium*, this hippopotamus-like animal with shortened legs, which inhabited low riverain and water biotops (Fig. 4, 5).

Shortly after that reconstruction of *Elasmotherium* suggested by V. A. Teriajev, appeared in the series of publications of some other authors.

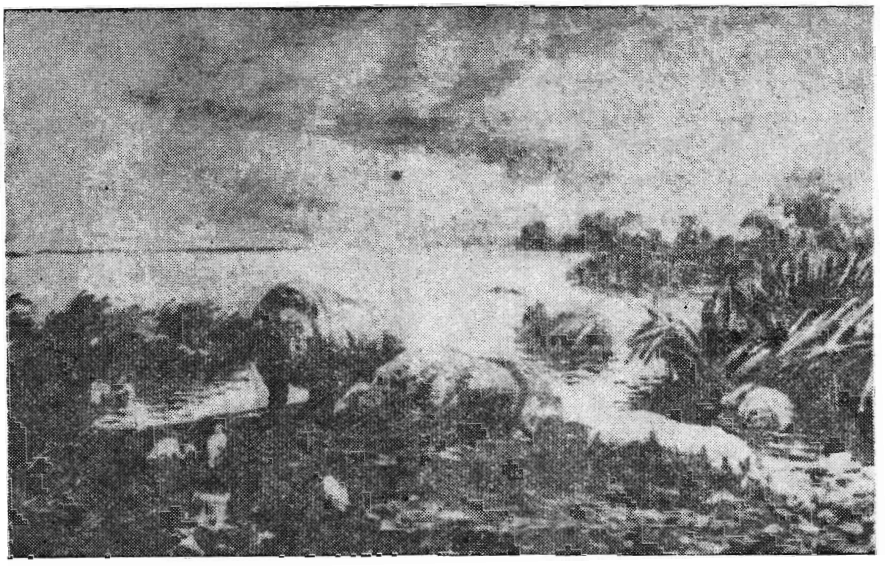

Fig. 5. Landshaft with *Elasmotherium*. After V. A. Teriayev.

V. A. Watagin, the well-known animal painter, also used this reconstruction (Fig. 4).

Elasmotherium with tetradactylous front legs is depicted by A. P. Bystrov (Fig. 6) (Gromov and Mirchink, 1936) and in the well-known album of I. Augusta and Z. Buriyan (1966), which contains illustrations of numerous animals of the past (Fig. 7). Most probably that the ideas of V. A. Teriajev affectedt he reconstruction of

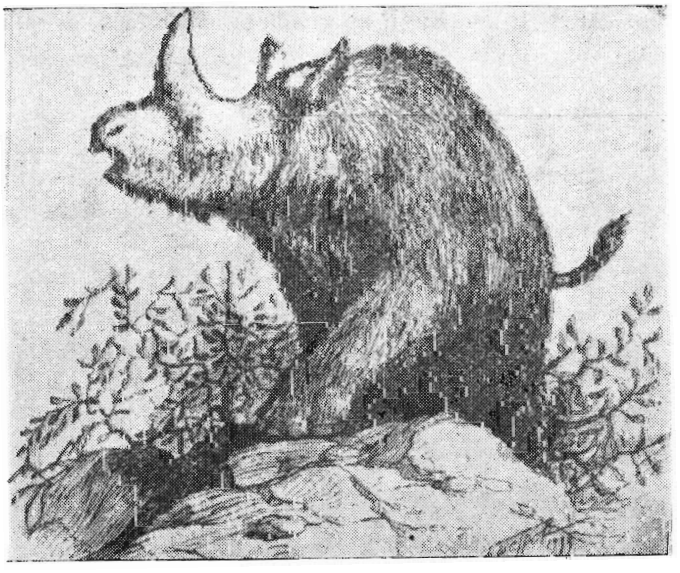

Fig. 6. *Elasmotherium sibiricum* Fischer. Reconstructed by A. P. Bystrov (V. I. Gromov and G. F. Mirchink, 1936, fig. 17).

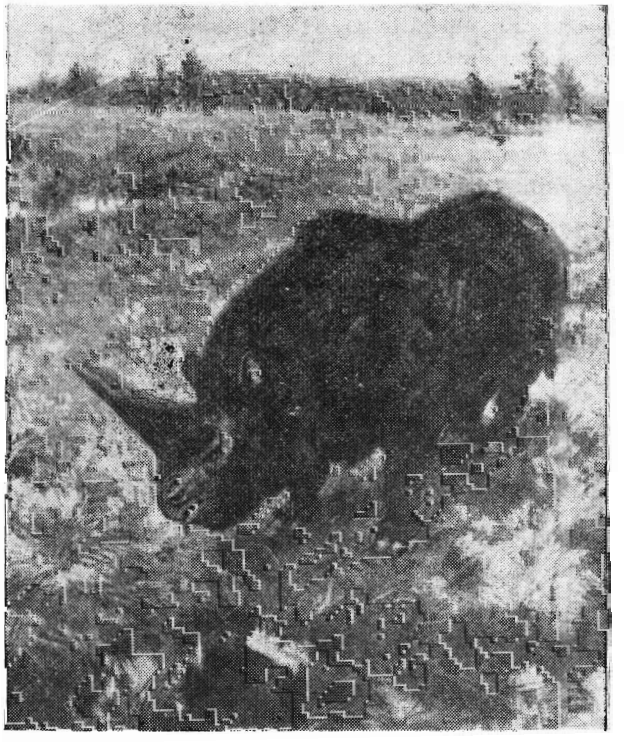

Fig. 7. *Elasmotherium sibiricum* Fischer. Reconstructed by I. Augusta and Z. Burian, 1966, tb. 17.

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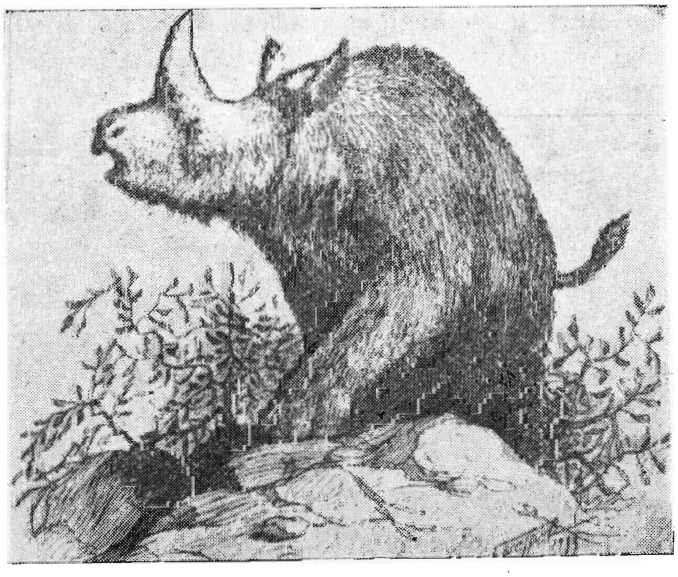

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the manus of *E. caucasicum* Borissiak, made by V. S. Slodkevich (1930 a, b). Its lateral digits are widely planted apart.

Involuntary question suggests itself, what was the real metacarpale $\overline{V}$ of *Elasmotherium* like? The answer to this question we can get after studying skeletons of *Elasmotherium* from Zavolzhye and Gaevskaya-village. It comes out that metacatpale $\overline{V}$ of *E. sibiricum* seems to be only a rudimentary part of the proximal extremity of metacarpale $\overline{V}$ (Fig. 8), which is 6.0 cm. high, 4.4 cm.

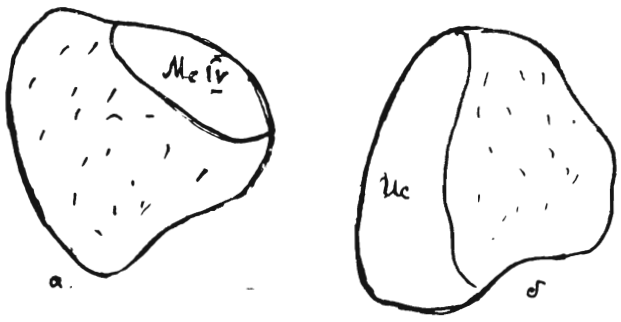

Fig. 8. Metacarpale V of *Elasmotherium sibiricum* Fischer. Northern Caucasus. a—front view, b—back view. Designations: mc IV—the facet for metacarpale IV, uc—for unciforme.

wide and 5.5 cm. thick. It has only metacarpale $\overline{IV}$ and *unciforme* facets fixing its exact position in the manus of *Elasmotherium*, the fifth digit of which could not be evolved either. Thus, the threedactylous manus of *Elasmotherium* as well as that of many other fossil and recent rhiniceroses is proved.

The data about metacarpale $\overline{V}$, about rather well -composed manus of *Elasmotherium* from Zavolzhye (Fig. 9) and the Northern Caucasus, as well as some other

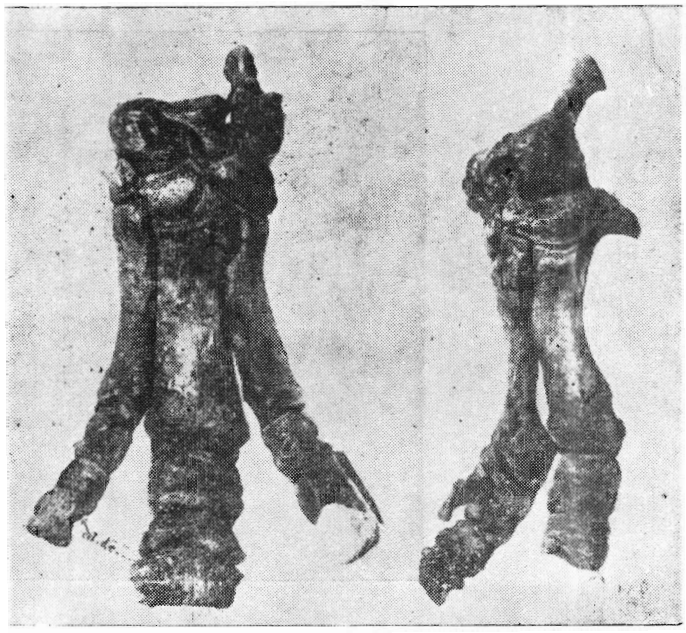

Fig. 9. The manus of *Elasmotherium sibiricum* Fischer in the skeleton from the river Big Karaman.

morphological features, i.e. hypsodont molars with a complex plicated enamel etc. make us think that *Elasmotherium* could have another appearance, different from the above. All abovementioned features characterize *Elasmotherium* as an inhabitant of the open steppe rather than that of "water" biotops. To my mind the reconstruction of *Elasmotherium* presented by Prof. K. K. Flerov (Fig. 10) seems to approach to truth most of all.

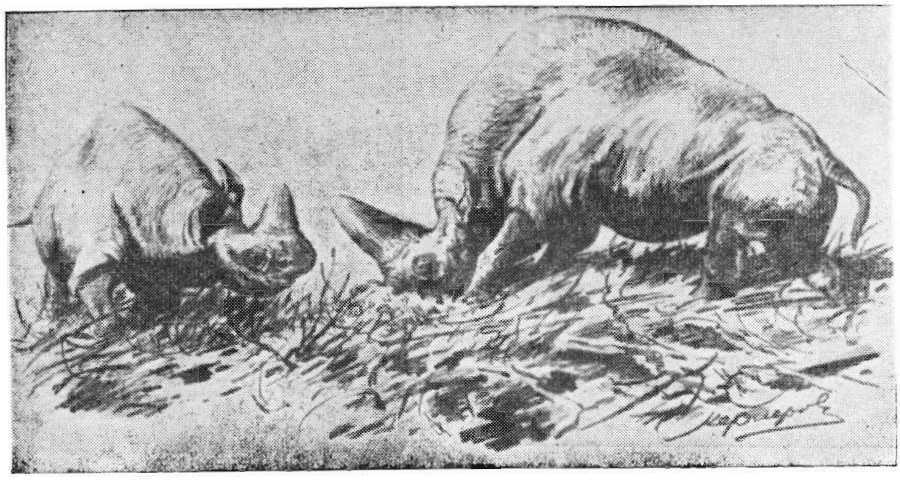

Fig. 10. *Elasmotherium sibiricum* Fischer. Reconstructed by Prof. K. K. Flerov, 1953.

All data referred to certain skeleton elements of *Elasmotherium* supplement our knowledge about this Cenozoic rhinoceros. But still there is a considerable gap, which we have to fill in. Thus, we dispose of very scant information about ribs and vertebrae of *Elasmotherium*. We hope, that one succeeds to find few more complete skeletons of *Elasmotherium*, which will fill in these "white spots" and add new facts about this unique representative of fossil rhinoceroses.

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