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ON NEW FINDS OF SIVATHERIINAE ON THE TERRITORY OF THE USSR

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ABSTRACT

The article offers an account on the skull of an early representative of the genus *Bramatherium* from Moldavia (Chimishlia) and on the horn fragment of *Sivatherium* from Tajikistan (Kuruksai) and gives the description of these finds.

Palaeontological Institute of the Academy of Sciences of the USSR is now in the possession of new materials on the giraffids subfamily Sivatheriinae collected by the expeditions from the Institute. Most interesting is the skull of an early representative of the genus *Bramatherium* found in the Maeotic deposits of Chimishlia, Moldavian Soviet Socialist Republic (collection of 1955) and a part of the horn of *Sivatherium* sp. from the Upper Pliocene of Kuruksai, Tajikistan (collected in 1970).

All data on the history of study of the Chimishlia locality, its faunal composition and bibliography are given in the Catalogues (see Belyaeva, 1948; Godina, David, 1973). Data on the Kuruksai locality are to be found in the publications of Nikonov, Dodonov and others (Nikonov, 1971; Nikonov *et al.*, 1971; Dodonov, 1973).

The skull of *Bramatherium* belongs to a new species. *Sivatherium's* horn fragment could not be specifically identified.

SYSTEMATIC DESCRIPTION

Family Giraffidae Gray, 1821
Subfamily Sivatheriinae Zittel, 1893
Genus *Bramatherium*[1] Falconer, 1845
Helladotherium[2] Gaudry, 1860 (pars)

Type-species: *Bramatherium perimense* Falconer, 1845, Middle Pliocene (Middle Siwalik), Perim Island (in the Gulf of Cambay).

Diagnosis: Gigantic giraffids, whose males had two pairs of relatively short horns. The anterior, more massive horns arose from the common median fronto-parietal elevation. They were directed upward, somewhat outward and slightly inclined posteriorly. Much smaller posterior horns projected out of parietals and were directed outwards. Females, evidently hornless, with a median elevation varying in height. The early representatives of the genus had a more elongated skull, especially in its postorbital portion. In more late species the skull was shorter, in particular its facial part. Teeth broad and with rugose enamel. Limbs heavy, little elongated.

The genus includes: (1) subgenus *Bramatherium* Falconer, 1845 with the type-species *Bramatherium perimense* Falconer, 1845; Middle Pliocene of India and Perim Island. (2) subgenus *Helladotherium* Gaudry, 1860 with the type species *Helladotherium duvernoyi* Gaudry, 1860, Upper Miocene of Greece.

Comparison: *Bramatherium* is distinguished from the nearest genus *Hydaspitherium* Lydekker, 1876 mainly by the location and shape of horns. The anterior horns in both genera arise from the common frontal-parietal elevation, but in contrast to *Hydaspitherium*, the horns of *Bramatherium* are shorter and thicker. They diverge laterally less than the horns of *Hydaspitherium*. But the main distinction between the horns of these two genera is in the location and direction of their posterior pair. In *Bramatherium* (see Colbert, 1935) horns are directed strictly outward, and the base of their anterior side is formed also with the participation of the parietal crest. In *Hydaspitherium* the posterior horns are located above the parietal crest and are directed upward, outward and somewhat posteriorly.

[1] Besides *Helladotherium* Gaudry, the synonym of the genus may be also that of Lewis (Lewis, 1939) indicated for *Bramatherium perimense* Falconer, 1845.

[2] It concerns *Helladotherium duvernoyi* Gaudry, 1860 and ? *H. gaudryi* Mecquenem, 1924; *H. grande* Pilgrim, 1911 is referred to the genus *Hydaspitherium* (Lewis, 1939).

Subgenus Helladotherium Gaudry, 1860

Type-species: *Helladotherium duvernoyi* Gaudry, 1860, Upper Miocene, Greece.

Diagnosis: Early representatives of the genus with rather long skull, in particular in its postorbital portion. The males had a fairly well developed median elevation, on which the anterior pair of horns could rest, and the minor lateral extensions on either side of the skull which appear to be the base of the second pair of horns. The latters probably had the same position as in *B. perimense*. Females hornless, median elevation of negligible height. The front of the orbit is located above M^2 or M^3.

Subgenus includes:

B. (*Helladotherium*) *duvernoyi* Guadry, 1860;

? B. (*Helladotherium*) *gaudryi* Mecquenem, 1924;

B. (*Helladotherium*) *suchovi* sp. nov.

Comparison: The species of the subgenus *Helladotherium* are distinguished from the only species of the subgenus *Bramatherium* (*B. perimense*) by the more elongated skull and less prominent elevations, from which the horns, much smaller than that of *Bramatherium* could grow. The front of the orbit in the representatives of *Helladotherium* is at the level of outer posterior semilunar of M^2 or of the same semilunar of M^3. In *Bramatherium* it lies above the anterior margin of M^2.

Bramatherium (*Helladotherium*) *suchovi*[1] Godina sp. nov.
(Plate I—a, b)

Helladotherium duvernoyi: Simionescu şi Dobrescu, 1939, pp. 1-23, Tab. I-IV.

Holotype: Collection of the Palaeontological Institute 989-697; the skull of the male (without a lower jaw), Moldavian Soviet Socialist Republic; south-western suburb of Chimishlia-settlement; Maeotice.

Material: The skull is incomplete and deformed, i.e. squeezed from left to right and slightly down from the top. It lacks the base of the cerebral portion, its occipital part, posterior margins of the parietalia as well as nasalia and premaxillae. Sutures are indistinctive.

Diagnosis: The skull high, with the short and wide face portion between P^2 and the front of the orbit. Postorbital part is more narrow and elongated. Cerebral portion of the skull is above the face. The anterior margin of the orbit is at the level of M^2. Skull roof with large sinus cavities. The teeth, especially premolars, broad and with rugose enamel, more wide than long.

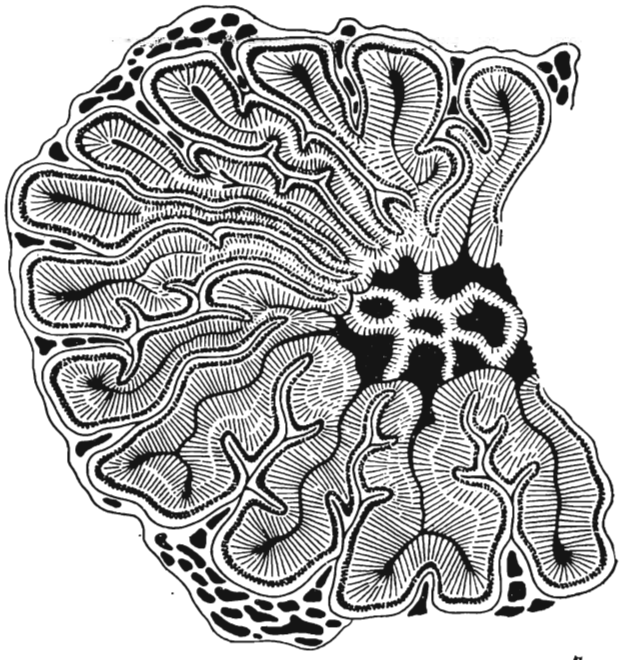
Description: The skull is high. The cerebral portion lies above the facial one. The latter is comparatively short and wide. The distance from P^2 to the front of the orbit makes up 72 per cent of the length from the anterior margin of the latter to the top of the lateral bony extensions. The greatest width of the facial portion being at the level of the anterior margins of the orbits makes up 143 per cent of that of the parietal portion at the level of extensions.

Maxilla is arched downwards and slightly concave longitudinally in its upper part. On the maxilla in the space between the anterior margin of M^1 and the middle part of M^2 there is a large swelling. The alveolar margin has a form of a rather convex arch. The anterior surface of os zygomaticum is flat. Its posterior portion is longitudinally convex. Due to deformation the anterior part of the palate is strongly narrowed. But if we measure its width between P^2 by the width of a less deformed side and take double this quantity the palate is found then to be narrowed forward not too sharply. Its width between P^2 makes up only 63 per cent of that between M^3. The lateral palatine incisures are behind the teeth row on the left side and at the level of the inner posterior angle of M^3, on the right side. The anterior margin of the choanal incisure fits to the middle of M^3 on left and to the anterior surface of this tooth, on right. The differences between the left and right surfaces are due to the skull deformation.

The orbit is located much distance above the teeth row; its front is at the level of the front of the outer posterior semilunar of M^2. The distance between its lower margin and the alveolar margin equals to 100 mm on the left and 90 mm, on the right. The lower margin forms from down a visible rim and is protruding outwards more considerably than the upper one. The outline of the orbit is irregularly oval, its longitudinal diameter is 79 mm, while the height is 65 mm on the right and 60 mm on the left, where it is deformed considerably more.

Frontalia are mostly expanded above the posterior margins of the orbits, where their width makes up 53 per cent of the length from P^2 to the upper edge of the posterior wall of the lateral bony extensions. Together with the parietal bones they form a rather prominent median elevation ("bombement") at most of 67 mm high. The left side of the elevation falls vertical (evidently due to deformation), the right side is somewhat gentle, downwardly squeezed. The anterior surface of the elevation is smooth, the posterior one, more rough. The elevation looks more gentle from its front and steeper from behind. Its anterior and posterior surface form a nearly right angle. The side-view of the posterior surface is slightly wavy because of a small convexity on the level of the lateral extensions.

[1] The species received the name in honour of the geologist I. M. Suchov, who has discovered the Chimishlia locality.



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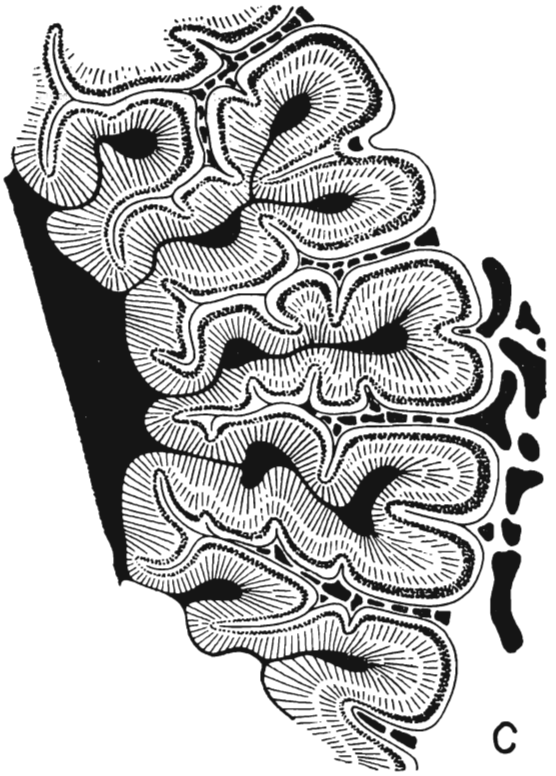

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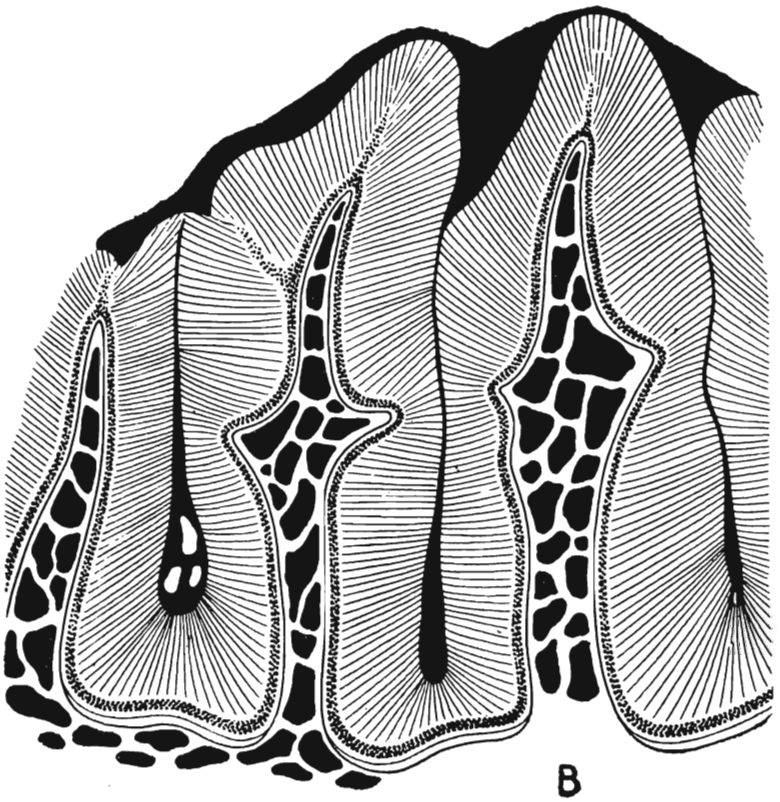

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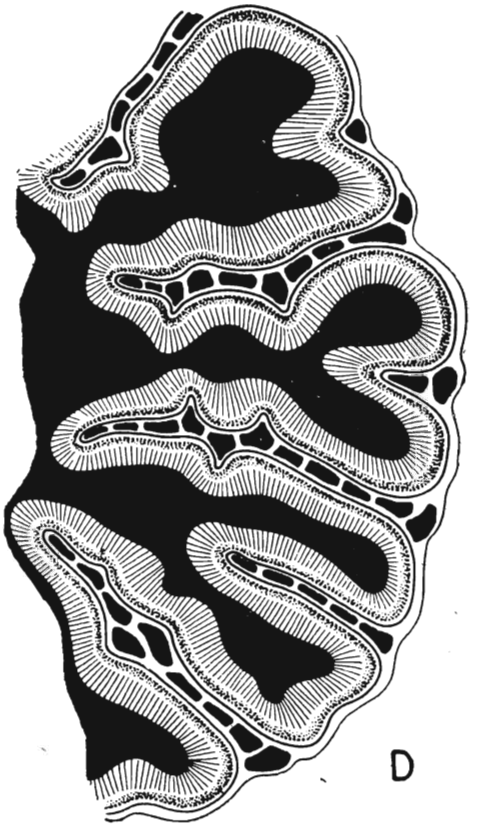

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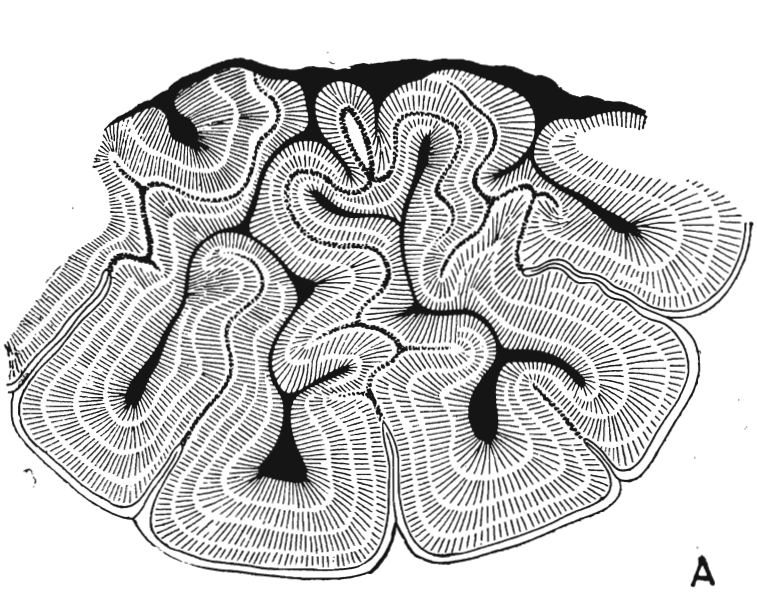

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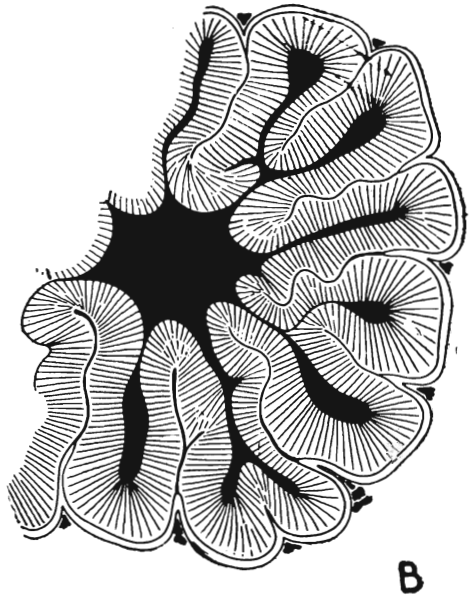

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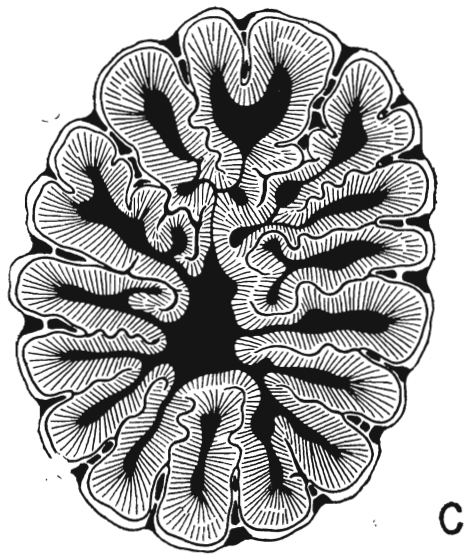

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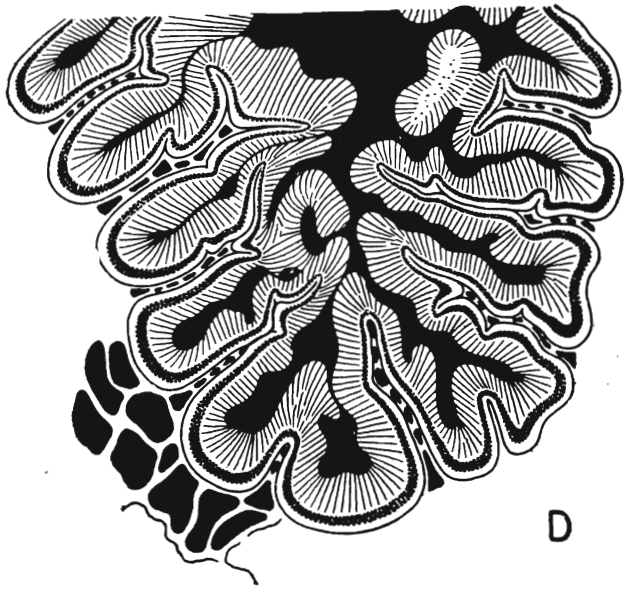

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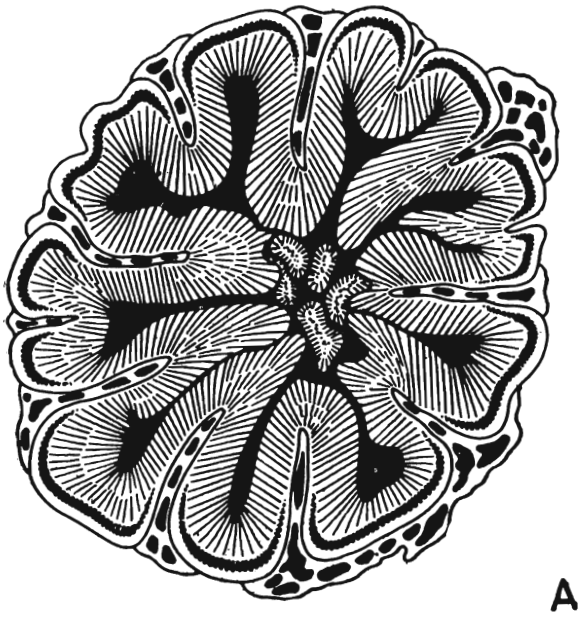
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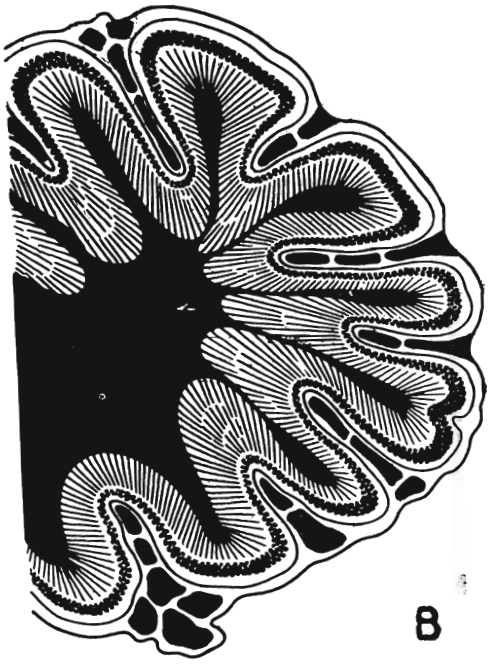
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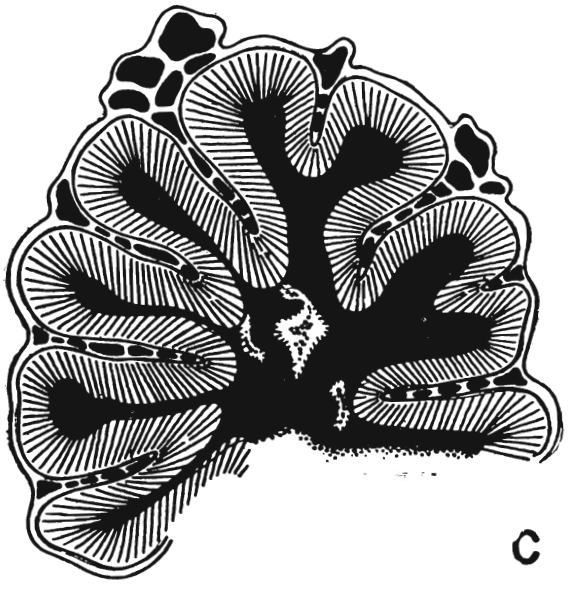
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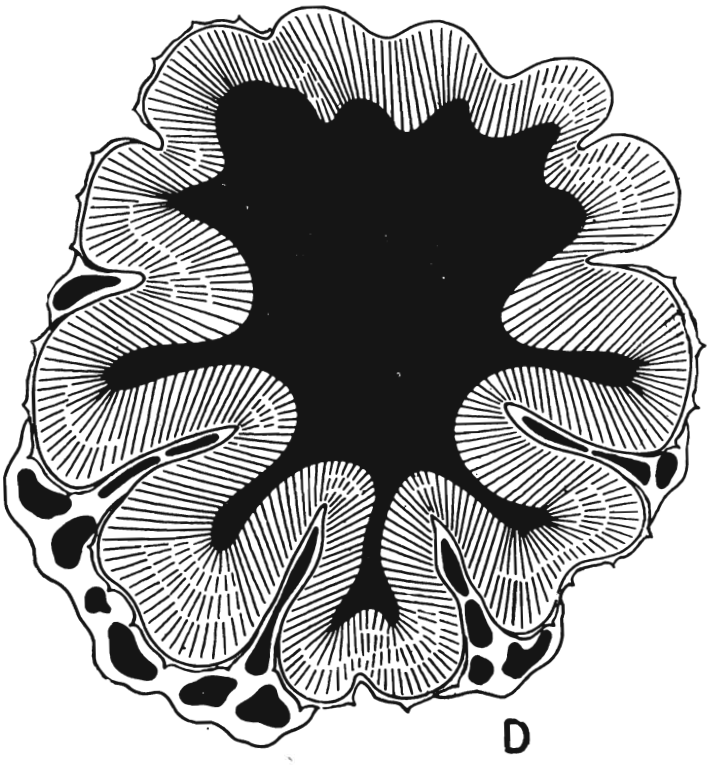
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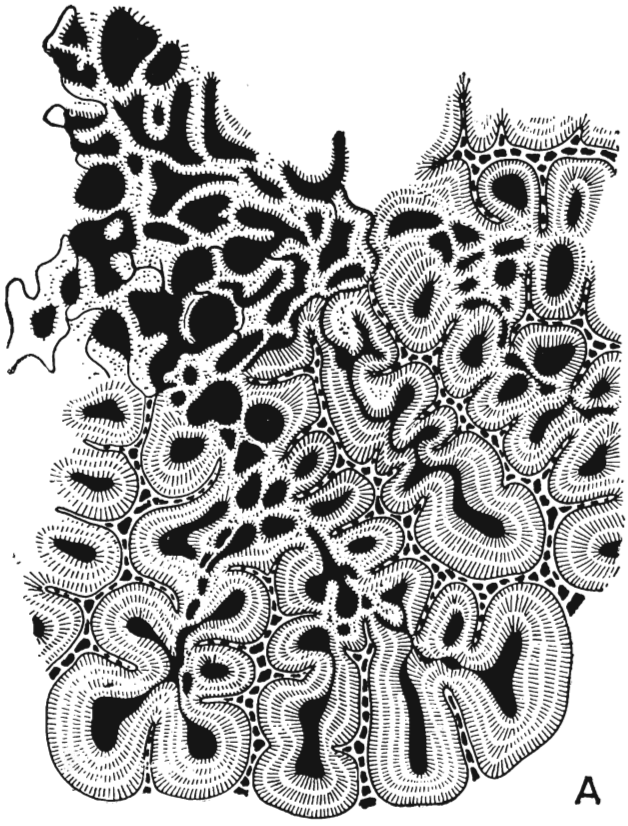
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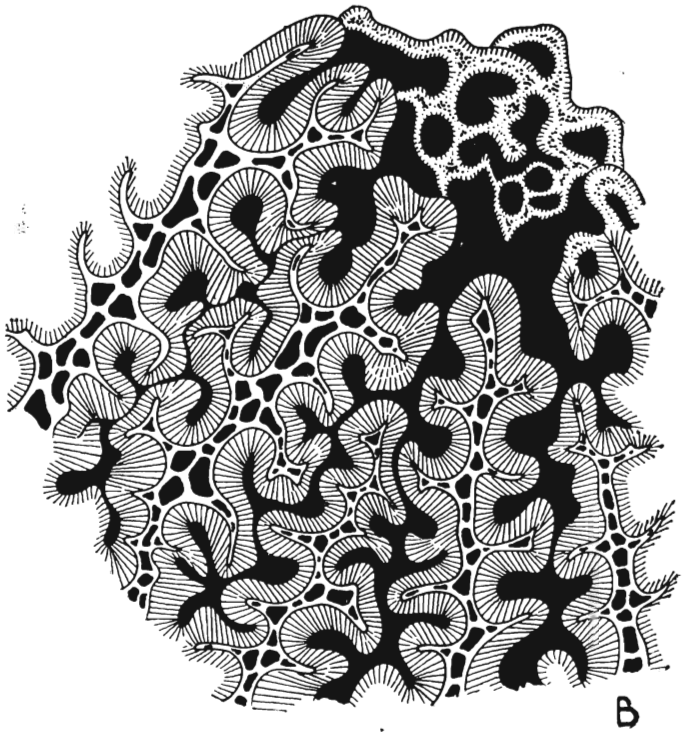
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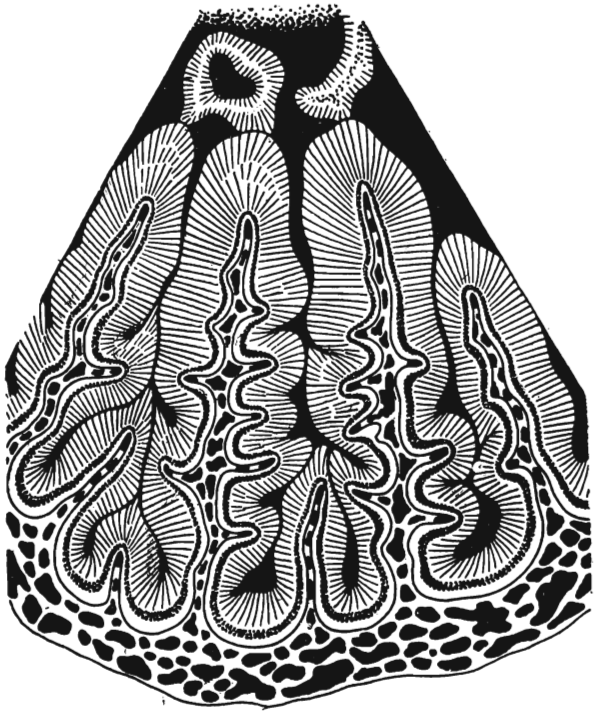
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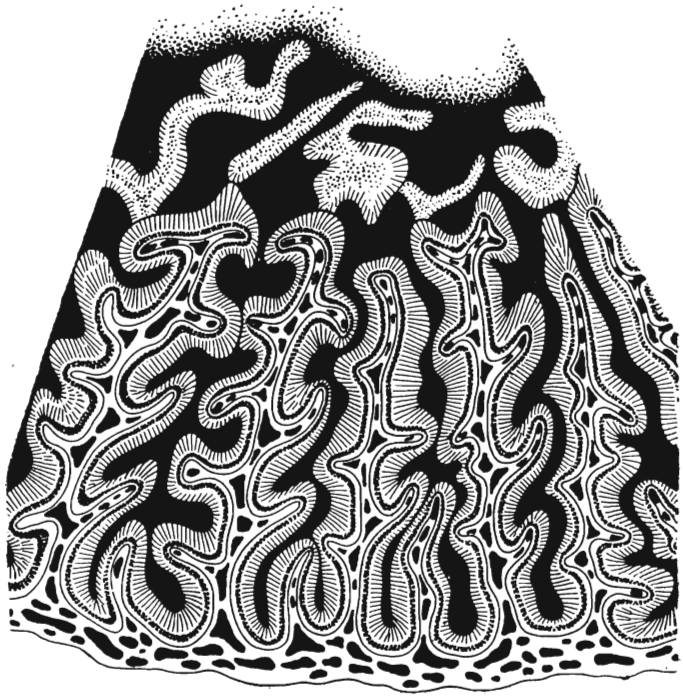
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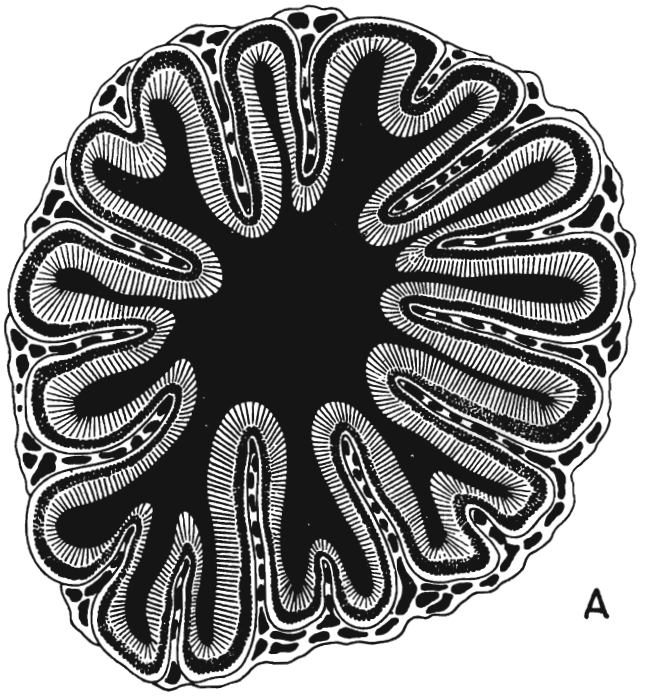

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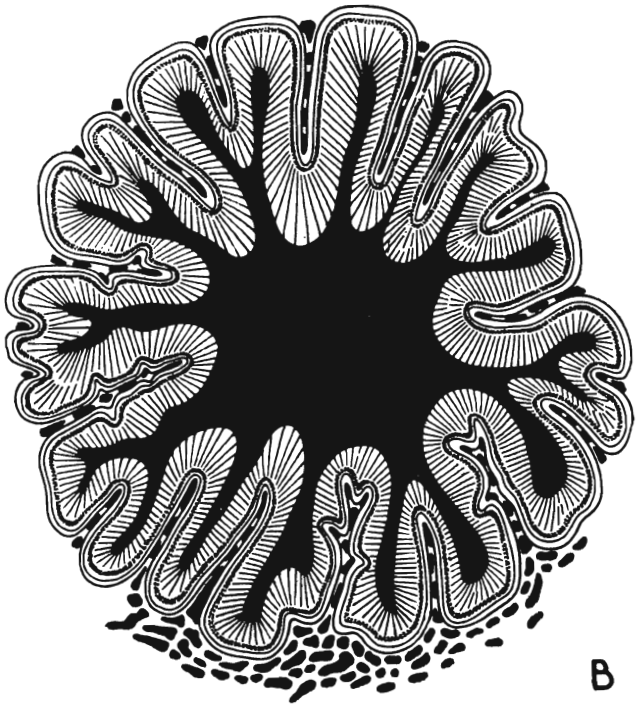

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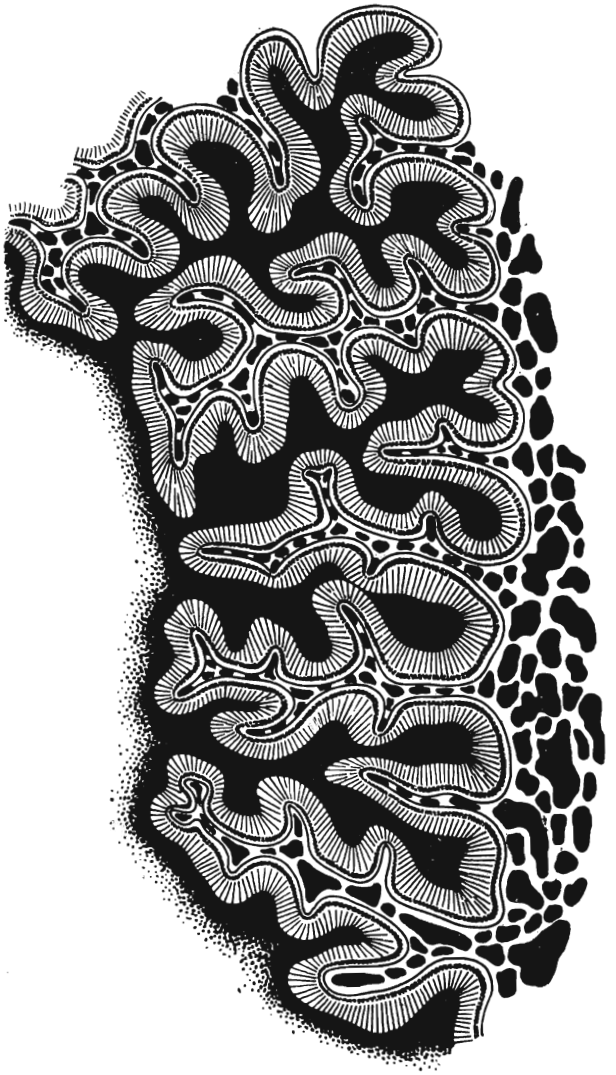

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Parietalia are rather long (posteriorly destructed). Their width at the level of the extensions makes up 88 per cent of the maximum width of the frontalia. Both sides of the median elevation they are slightly convex. At the level of the end of the posterior side of the elevation (at the above mentioned convexity) the parietalia sharply curve forming the base (lateral extensions) for the second pair of rudimentary horns directed outwards up right to the sagittal plane of the skull. The top-ends of these extensions are formed by the curvations of parietalia and terminations of parietal crests; this is better to see on the right side, although due to deformation the posterior part of the parietal crest is also bent downwards. Under the extensions the roof of the skull is exposed revealing large air cavities. Parietal crests are heavy and run parallel. They hang over the temporal grooves like the cornice. Their edges are tapered off, and that is distinctly to see from the right side, although in the proximity of the extensions the crest edge is deformed.

Measurements in mm:

Skull, sp. N 989-697

Length P^2 to the bend of parietale at the extension	442
Length P^2 to anterior margin of orbit	187
Length anterior margin of orbit to the bend of parietale at extensions	259
Width of skull above posterior margins of orbits	235
Width of skull at the level of anterior margins of orbits	236
Distance between orbits (anterior margins)	197
Width of palate between P^2	60
Estimated width (doubled width of the less deformed side)	80
Width of palate between M^3	111
Antero-posterior diameter of orbits	79
Height of orbit	65

Teeth are large, especially premolars, mesodont, rather low, with rugose enamel. The length of the row P^2—P^4 makes up 44 per cent of P^2—M^3 and 76 per cent of M^1—M^3. The premolars are very wide, especially P^4. Their relative length is: P^2—71.7 per cent; P^3—77.1 per cent; P^4—52 per cent.

The anterior style[1] is especially distinct at P^3 and P^4. It is very reinforced at base. The posterior style is most developed at P^2. The mid-ribs at P^2 and P^4 are wide and smoothed. At P^3 the rib is more narrow and convex. At the base of the outer wall of P^2 left there is a small collar and a bulge near the posterio style, and on the inner wall of the same tooth—a small cone pillar. The inner semilunar of P^2 is rounded at the base. At P^3 and in particular at P^4 the inner wall is flattened. The molars are broad, with the bases of the inner semilunars strongly projected inside. On the outer semilunars there are anterior styles strongly developed and thickened at the base. The posterior style is most distinct at M^3. The mid-ribs at M^1 and M^2 are smoother and broader if compared with M^3. On the posterior semilunars of all teeth they are also smoother and more narrow. At the base of the outer semilunar there are small collars, which are more distinct on the anterior semilunars, especially at M^1. On the inner side of the teeth collars and pillars are missing (except P^2). The length of the tooth row (along the bases of crowns) is: (in mm.)

$P^2 - M^3 = 200$; $P^2 - P^4 = 88$; $M^1 - M^3 = 115$.

The size of the teeth (length × width; the latter was measured at the base of the anterior pair of semilunars) is: (in mm.) $P^2 - 25 \times 35$; $P^3 - 27 \times 35$; $P^4 - 21 \times 40$; $M^1 - 34 \times 44$; $M^2 - 40 \times 45$; $M^3 - 38 \times 45$.

Comparison and remarks: The structural peculiarities of the skull of the giraffoid from Moldavia leave no doubt about its belonging to the subfamily Sivatheriinae, but it proved hard to define its generic affinity. It is caused by the reason that the skull from Chimishlia is characterized by the combination of structural features chiefly peculiar to the skulls of *Helladotherium* and *Bramatherium* The resemblance with the former consists first of all in that, that both chimishlian and pikermian species have considerably elongated postorbital portion of the skull Both species have the median elevation although the latter in chimishlian skull is developed to a much greater extent than in the form from Pikermi[1].

By this feature as well as by some others the form from Chimishlia is an intermediate one between *Helladotherium* and *Bramatherium* (see Gaudry, 1862—67, Pl. XLI; Colbert, 1935, fig. 174, 175). It is possible that like *Bramatherium* the Chimishlia form also bore the anterior pair of horns. Some other distinctive features are of an intermediate value. It concerns the relation between the levels of the facial and cerebral portions, which in Chimishlia form approximates to that in *Bramatherium*, as well as location of the orbit above the tooth row. In *Helladotherium* its anterior margin lies above the anterior border of the outer posterior semilunar of

[1]Names of dental elements are given according to Sokolov (1953).

[1]Bohlin (1927) notes, that the skull from Pikermi is strongly squeezed and that actually the elevation is higher than it is figured in Gaudry's work (Gaudry 1862-67).

M^3, while in Chimishlia species it lies above the anterior half of the same semilunar of M^2 and in *Bramatherium*— above the anterior semilunar of M^2. The most important distinctive feature, which makes the Chimishlian species to approach to *Bramatherium*, is the presence of lateral extensions, which could be a base of a pair of rudimentary horns directed outwards, just as it is the case in *Bramatherium*. The Chimishlian animal may be considered either as *Helladotherium* possessing features of the early evolutionary stage of *Bramatherium* or as a primitive *Bramatherium*. It was the primitive nature of the Moldavian species (as compared with *B. perimense*) which compelled us to place the primitive forms from Pikermi and Chimishlia (and, conventionally, from Maragha) into an independent subgenus of the early bramatheria designating it as the *Bramatherium* (*Holladotherium*) Gaudry, 1860, and the successive bramatheria with the single species *B. perimense* into the subgenus *Bramatherium* (*Bramatherium*) Falconer, 1845.

Of the above mentioned species *Helladotherium*, *B.* (*Helladotherium*) *suchovi* can be compared only with *B.* (*Helladotherium*) *duvernoyi*, for the skull of the Maragha species is not known. According to Simionescu and Dobrescu (1939) the lower jaw of the Chimishlian animal was much smaller than that of the animal from Maragha (see Mecquenem, 1924, p. 24, fig. 8).

When compared *B.* (*Helladotherium*) *suchovi* and *B.* (*Helladotherium*) *duvernoyi* it should be born in mind that the skulls of these species belong to animals of different sexes and that many differences between them are caused by sexual dimorphism. The diagnostic specific feature is the more frontal location of the orbits and much greater shift in the relation of levels of the cerebral and facial portions of the skull in *B.* (*Helladotherium*) *suchovi* (even with account to different sexes). These distinctive features speak well for a more progressive character of the Moldavian species as compared with the Pikermian one, although they were of very near if not of the same geological age (Pikermian deposits are possibly somewhat more ancient than the Chimishlian ones).

Matthew (1929) assumed *Helladotherium* and *Bramatherium* to be synonyms and considered *Helladotherium duvernoyi* as a possible female of *Bramatherium* or *Hydaspitherium*. The Chimishlia find does not only confirm the assumption of this author but even makes it more precise having revealed that the *Helladotherium duvernoyi* is the female of *Bramatherium*, but of a different species, more ancient than *B. perimense*.

Lewis (1939) united *Bramatherium* and *Hydaspitherium* into one genus *Bramatherium* with two species—*Bramatherium perimense* Falconer, 1845, and *Bramatherium megacephalum* (Lydekker), 1876. The materials obtained later on, especially the skulls from Chimishlia and Georgia (the locality near the village Karsimant-kari, not far from the Bazalet Lake) prove *Bramatherium* and *Hydaspitherium* rather to belong to closely related yet independent genera.

Peculiar features of the female skull from the Lower Pliocene or Upper Miocene of Georgia described by Meladze (1963, 1964, 1967) as *Karsimatherium bazaleticum* (Meladze), 1961, testify in favour of the assumption that it belonged rather to a more ancient species of *Hydaspitherium* than it was *H. megacephalum*. The location of horn swellings on the skull of *K. basaleticum* (above the parietal crest) is similar to the position of the posterior pair of horns in *H. megacephalum* (see Lewis, 1939, pl. 2, fig. 1-4), and the speciesfrom Georgia is therefore considered to be an early representative of that genus. The geological age both of *H. megacephalum* and *Bramatherium perimense* can not be estimated older than the Middle Pliocene. The finds from Moldavia and Georgia make it possible to assume that the evolutionary divergence of these two closely related genera, *Hydaspitherium* and *Bramatherium*, occurred before the Maeotice, most probably end of the Middle or beginning of the Late Miocene. It is also reasonable to suppose that the prohorese of the representatives of these genera took place from Europe to South East.

Geological and geographic distribution: Maeotice, Moldavia.

Sivatherium sp.

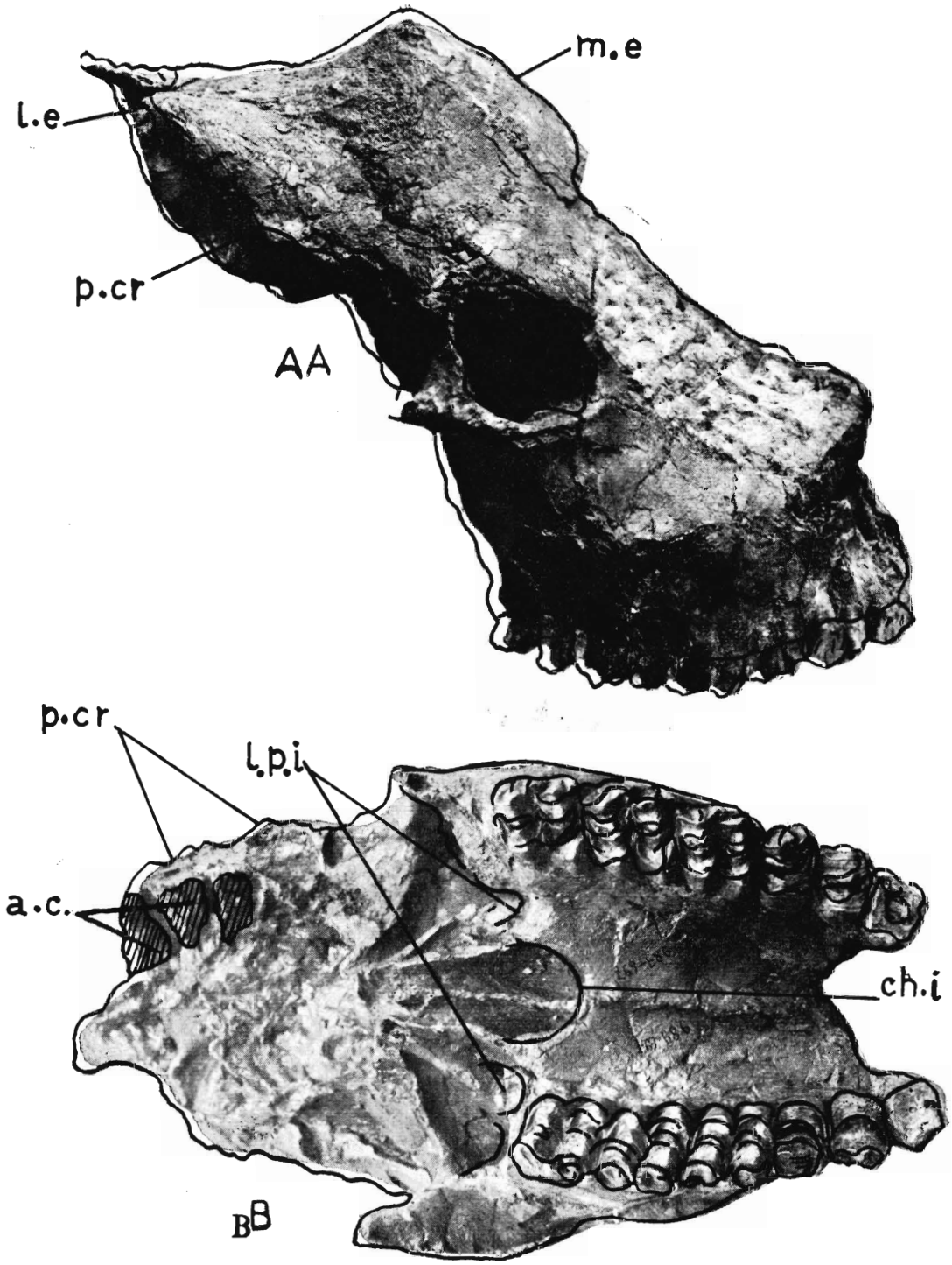
(Plate II)

Material: The middle part of the horn with the broken apex of the tine and some other defects. Collection of the Palaeontological Institute, 3120-340. South Tajikistan, Kuruksai, Upper Pliocene.

Description: Horn or antler of Palmated type, flattened. It gradually expands upwards reaching the greatest width (130 mm) at the level of the anterior side of the inner tine[1]. At the level of the tine the horn is slightly curved backwards. Its lower part is flat. The maximum width of sides is at their base, whose greatest anterior-posterior diameter does not exceed 29 mm. Upwards the lateral sides grow narrower, especially the inner side; at the beginning of the tine it becomes tapered off. Rather distinct longitudinal furrows for blood vessels run along the surface of the horn.

The tine is bent outwards. It is widening at the base and gradually tapering towards the apex. The cross section of the broken surface of the tine looks like an acute triangle with rounded angles and the apex directed backwards. The tine is 88 mm wide at base and 48

[1] The horn is oriented as on the picture in Falconer's work (Falconer, 1868, vol. I, tab. 21, fig. 3-4) and is described as a left one.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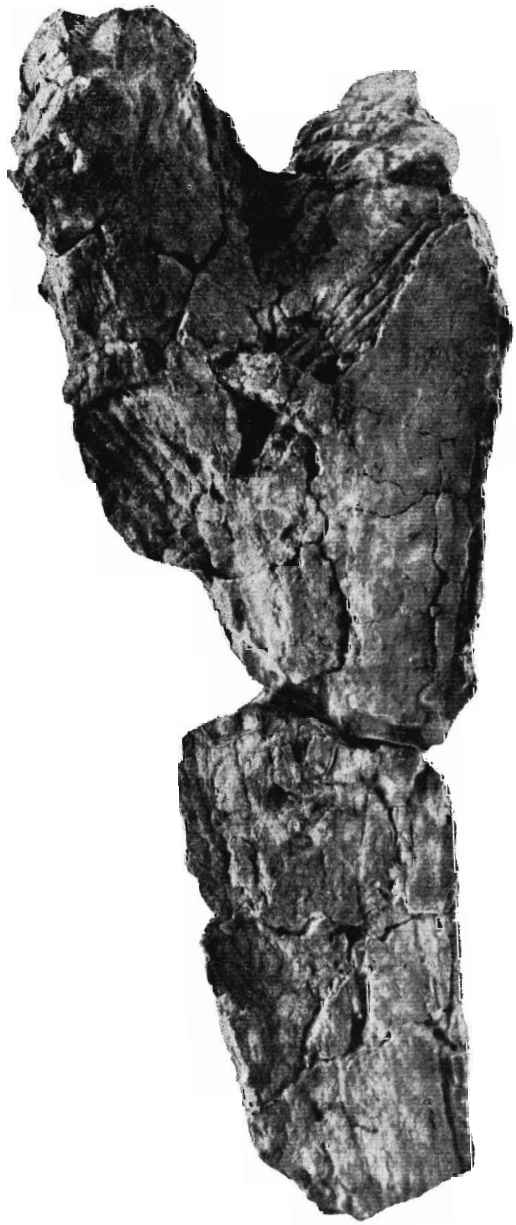

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mm, at the break. The outer side is concave, the inner side is convex. The front side of the tine is broader than the backside: at the break the width of the former is 35 mm, and that of the backside is 20 mm. The maximum length of the horn fragment is 350 mm.

Comparison: Structural peculiarities of the horn prove its belonging to the genus *Sivatherium*. Comparison with the horns of *S. giganteum* Falconer et Cautley reveals that the horn from Kuruksai stands closer to the horn remain from Siwalik pictured by Falconer (1868, vol. I, table 25, figs. 3-4). The Kuruksai horn is characterized by its smaller size (the maximum width is 130 mm while that of the form from Siwalik, is, according to the picture, 204 mm), and by the peculiar structure of the lateral tine. In the horn from Kuruksai it is curved outwards while in *S. giganteum* it was either straight or slightly curved inside. Besides, the width of the horn from Kuruksai reduced towards its base. The width of the lower end not only of the complete horn but even of its fragment described here is a half of maximum width of the horn. In *Sivatherium* from India (according to the picture in Falconer's work mentioned above, fig. 4) horn's width downward from the inner tine is equal.

Parallel with similar features there are some certain differences in the horns of Kuruksai and Siwalik *Sivatherium*. Their different size gives the reason to suppose that the horn from Kuruksai could belong to a young animal. It resembles the horns of the young *Sivatherium* reconstructed by Murie (1871, pl. XIII). It is not excluded, however, that the horn fragment from Kuruksai could belong to a new species, but the material available is not sufficient for its specific identification.

Remarks: *Sivatherium*'s horn fragment found in Tajikistan is of a special interest, for it is the first true evidence of the distribution of this animal on the territory of the USSR. Previoulsy it has been reported on the occurrence of *Sivatherium* on this territory (Orlov, 1968; Abdrakhmanova, 1973, and others) but these reports were based on the finds of separate limb bones of Sivatheriinae, which are not always suitable and decisive for the exact generic identification. Moreover, the find from Kuruksai pretends to be interesting because it permits to judge on much more extensive areal of the *Sivatherium* in the Late Pliocene of Asia. The smaller size of the horn (if it is not connected with the age of the animal) assumes its more ancient geological age.

Geological and geographic distribution: Upper Pliocene, South Tajikistan.

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EXPLANATION OF PLATES

Plate I

Bramatherium (*Helladotherium*) *suchovi* Godina, sp. nov. Skull No. 989-697, Chimishlia, Moldavia.

a—right side, approximately 1/3 of natural size: l.e.—lateral extensions, m.e.—median elevation, p. cr.—parietal crests.

b—view from below, approximately 1/3 of natural size: a.c.—air cavities, ch.i.—choanal incisure, l.p.i.—lateral palatine incisures p.cr.—parietal crest.

Plate II

Sivatherium sp. Horn fragment No. 3120-340, Kuruksai, Southern Tajikistan, approximately 2/5 of natural size.