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Aceratherium Depereti n. sp. from the Jilančik beds.

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The second representative of the Rhinoceroses[1] from the Lower Miocene deposits of the Turgai region belongs to the subfamily *Aceratheriinae.*[2] It is a large form with elongated skull and long thin limbs. It is represented by a great number of remains: four nearly complete skulls and very numerous bones of the extremities; vertebrae have been least preserved.

Skull. All the skulls are more or less deformed (Pl. I, Fig. 1—2), therefore not all the characters of the skull of the form under description may be fully reconstructed.

The skull is dolichocephalic, with long and narrow nasals. The frontal region is in all specimens inflected, and the occiput squeered or laterally distended, the line of the superior profile of the skull being thus distorted. The frontal surface is rhomboidal in shape, with a slight longitudinal inflection; cristae parietales prominently expressed and rapidly uniting into a large and narrow crista sagittalis (its length varying in different skulls). The cranium is very narrow. The occipital shield is apparently feebly deflected backward; it is high and constricted upward; crista occipitalis forms a deep sinuosity directed forward.

The auricular region has not been uniformly preserved; its structure may be represented thus. Proc. paroccipitalis is up to 55 *mm* long (from the end of proc. posttympanicus) and is a long, straight process, slightly narrowed at its extremity. It is separated by a conspicuous groove from the

[1] See Bull. Acad. Sci., 1927, № p. 273—286.

[2] This group of Tertiary Rhinoceroses contains a large number of various forms and will probably in future be subjected to further subdivision. See Ringström. Palaeontologia sinica, (*C*), vol. I, fasc. 4, pp. 114 sqq.

shorter and more massive proc. posttympanicus disposed immediately before it. The relation of the latter to the proc. postglenoideus in the extant skulls, owing to the deformation not being uniform, is dissimilar: in the majority it abuts on the processus postglenoideus, and in one skull alone $\frac{1401}{D\,506}$ it is apposed to the latter from behind and fuses with it; this latter position must probably be regarded as normal in the skull of the form under discussion. Proc. postglenoideus is somewhat shorter and more massive than proc. paroccipitalis.

The zygomatic arches are fairly wide (up to 60 *mm* in the widest part) and thick (20—25 *mm* in the part mentioned), are constricted backward, but widen again at the surface of articulation. The anterior margin of the orbit lies opposite the hind part of M^1 (or in the interval $M^1 — M^2$; in one of the skulls it is removed still further back). The posterior margin of the naso-maxillary notch is placed between $P^3 — P^4$ (or P^4 and M^1). Lacrymale in some of the skulls is perfectly visible; it projects beyond the orbit to not more than 20 — 30 *mm*;[1] lacrymal channels $\left(\frac{1401}{D\,1150}\right)$ are disposed inside the orbit at a short distance from its margin.

The nasals, narrow and long (280 *mm* in length, 210—220 *mm* from the naso-maxillary notch) are separated from the frontals by a suture forming a wide angle opening forward. United throughout their length they form a slight groove along the median line on the upper surface to which corresponds a swelling below. Towards the lateral margins the nasals thin out and are recurved downward and even slightly inward which gives them the shape of an overturned furrow. Towards the anterior end they are constricted and become thicker, their transverse section thus assuming a semicircular shape; on the sides of the anterior extremity occur two crescentic indentations which cut it off obliquely.

The maxillare does not offer anything worth noting; the premaxillare forming a groove above the maxillare has been apparently partly preserved (the posterior portion).

Dentition. The premolars are feebly molarised (principally P^4); the features distinguishing them from the molars are most prominently manifested in teeth that are little abraded (cf. Pl. I, Fig. 3, and Pl. II, Fig. 1). They may be characterised by an inconsiderable modelling of the deuterocone and a small development of the antecrotchet. Both the crotchet and crista

[1] Short lacrymale in dolichocephaly; cf. Ringström, l. c., p. 28. See also Gregory. Evolution of the Lacrymal Bone, p. 217.

occur, but are not uniformly developed; in most cases they unite and form a mediofossete. The cingulum is well developed.

The molars are characterised by a well modelled (anteriorly and posteriorly) protocone compressed from inward (sometimes even with a small groove along the inner surface). The antecrotchet is relatively small, does not fill in the median valley and does not extend to its mouth (with the exception of M^3); the crotchet is wide and small; the crista is rudimentary. The parastyle is small, the outer ridge being well developed. The cingulum is present on the anterior and posterior faces of the tooth alone.

P^1 — first premolar — the crown is triangularly rounded and slightly elongated. The specimens extant are so much abraded that their structure cannot be ascertained. In one specimen only $\left(\frac{1401}{D1150}\right)$ may be traced the remnants of a posterior, and possibly median, valley which indicate a considerable development of the metaloph.

P^2 — second premolar — is of very large size as compared with P^1 (may it not be D^1?). The crown is quadrilateral, narrowing inward with all but equally developed proto- and metaloph; the latter are constricted towards the ectoloph while their inner ends are much swollen; the deuterocone is not modelled on the protoloph, and the antecrotchet is represented by a slight swelling; a crotchet and crista are present; sometimes $\left(\text{in } \frac{1748}{1}, \frac{1401}{D506}, \text{ and } \frac{1401}{D1150}\right)$ they fuse and form a round mediofossete; sometimes $\left(\text{in } \frac{1401}{D1342}\right)$ they remain disunited in spite of much triturition. The median valley is inconspicuously sigmoidally curved; when much abraded the inner ends of the proto- and metaloph unite $\left(\frac{1401}{D1150}\right)$, and the valley is closed. The posterior valley is anteroposteriorly elongated. The ectoloph is very wide, forms a short wide parastyle and a weakly expressed anterior ridge on its outer face.

The cingulum is conspicuously developed on the front, back, and inner faces, being lowered anteriorly and raised posteriorly.

P^3 — third premolar — is of the same form as the preceding, but slightly constricted backward owing both to the relatively less developed metaloph (as compared with the protoloph), and to the inclination of the posterior part of the ectoloph inward. On the protoloph which is slightly longer and wider than the metaloph, the deuterocone is feebly modelled, whence is more distinctly separated a wide and small antecrotchet fusing with the metaloph in specimen subject to much abrasion. The crotchet either fuses with a crista or the latter is little developed, and then the crotchet is separated from the crista by a narrow fissure; in correspondence with the above a rounded mediofossete $\left(\frac{1401}{D506}\right)$ is present, or the latter forms a continuation of the median valley $\left(\frac{1748}{1}, \frac{1401}{D1342}\right)$; the latter is slightly curved, narrow, open $\left(\frac{1401}{D506}\right)$ or closed $\left(\frac{1748}{1}, \frac{1401}{D1342}, \frac{1401}{D1150}\right)$. The inner end of the metaloph is slightly bent forward. The posterior valley is present in the form of a fissure elongated (somewhat obliquely) anteroposteriorly. The ectoloph is wide with a large parastyle and a conspicuous external anterior ridge.

Cingulum as in the preceding tooth.

P^4 — fourth premolar — retains the essential features of the preceding tooth, but is larger; the deuterocone and antecrotchet are more conspicuously modelled, the remaining characters are the same.

M^1 — first molar — may be characterised by a relatively well developed protoloph and less well developed metaloph. The antecrotchet is small, rounded, and (even in much abraded specimens) inconsiderably smaller than the protocone. The metaloph is also provided with a modelled inner tubercule on the anterior face alone, whence its inner end is directed forward. The crotchet is well developed, somewhat smaller than the antecrotchet and is directed externally forward. The crista is wanting, its place being occupied by a slight undulated curvature of the inner side of the ectoloph. The median valley is therefore very much (sigmoidally) curved with a dilatation (rhomboidal) at its mouth. The posterior valley is anteroposteriorly elongated (as a fissure in abraded teeth). The parastyle is well developed, as is the external (anterior) ridge.

The cingulum is wanting on the inner face of the crown, being present on its anterior and posterior faces; tubercular swellings are sometimes present in the mouth of the valley.

M^2 — second molar — is similarly constructed; but it possesses considerably more developed crotchet which in little worn teeth is equal in size to and sometimes even larger than the abraded part of the entire remaining metaloph; in teeth that are more abraded its relative size rapidly decreases. The parastyle as also the external (anterior) ridge is larger than in M^1.

The cingulum is still less developed.

M^3 — third molar — has a more developed antecrotchet which extends along the bottom of the widely opened median valley nearly as far as its mouth. The crotchet in the shape of a short spur is disposed nearly at a right angle to the metaloph. The external part is characterised by a very prominently developed (external) ridge and a swollen (curved nearly at a projecting angle) ectoloph (in its lower part); the cingulum has been preserved from the inner end of the ectoloph to the most projecting part of its swelling and forms a prominent spine (in that projecting part); moreover the cingulum may be traced along the anterior face alone.

Dimensions (in millimeters)

Length of skull from crista occipitalis to the end of the nasalia	570 — 590
Length of skull from condylus occipitalis to P^1	500
Width of frontal region	200
Length from margin of the orbit to the nasal notch	60
Height of occiput (from lower margin of foramen magnum)	200

		1748/1		1401/D506		1401/D1342		1401/D1341		1401/D1150	
		r	l	r	l	r	l	r	l	r	l
P^1	length	24	—	30	—	24	—	—	21?	26	—
	width	19	—	22	—	20	—	—	20	19,5	—
	height	12	—	11	—	11	—	—	13	17	—
P^2	length	36	36	34	34	34	34	—	26	31,5	32
	width	46	—	42	42	42	42	—	39	39	40
	height	20	20	25	23	16	17	—	16	17	17
P^3	length	37	37	42	42	43	44	—	32	40	40
	width	54	56	53	54	53	56	—	47	52	51
	height	21	27	32	30	21	21	—	17	14	14
P^4	length	45	46	44	44	48	46	—	42	—	43
	width	60	63	58	58	58	59	—	52?	57	57
	height	33	31	37	36	27	27	—	19	—	15
M^1	length	47	47	48	45	50	50	—	42	—	50,5
	width	56	59	59	60	58	58	—	56	55	56,5
	height	27	27	35	37	22	23	—	17	—	15

	1748 1		1401 D506		1401 D1342		1401 D1341		1401 D1150	
	r	l	r	l	r	l	r	l	r	l
M^2 length	—	54	52	52	55	53	47	44	—	54,5
width	—	61	59	60	58	58	59	58	59	60
height	—	33	40	39	30	31	17	16	19	19
M^3 length	55	60	61	59	57	57	53	52	54	55
width	56	57	56	57?	55	54	53	55	55	—
height	38	38	41?	—	34	37	24	24	—	25
$P^1 - P^4$	130		130		135		100		133	
$M^1 - M^3$	132		132		132		125		135	
$P^1 - M^3$	258		255		260		225		260	

Affinities and peculiarities. From among normal European *Aceratheriinae* no form has been yet ascertained as representing that group in Lower Miocene age:[1] in the series of that group established by Osborn[2] the Upper Oligocene *Ac. lemanense* is immediately followed by the Middle Miocene *Ac. tetradactylum*. It would therefore be interesting in the first place to establish the relations of the remains now under discussion to the two forms just mentioned.

The type form of *Ac. lemanense* Pom., well known from numerous remains preserved in the museums of Western Europe, proceeds from the Gannat Limestones (Chattian series); a very fine, although incomplete, skull from that deposit is preserved in the Lyons Museum and is figured by Roman.[3]

That skull is but slightly smaller than that of the form under description;[4] it exhibits a very great resemblance to the latter not only as regards the shape of the frontal portion, the zygomatic arches, auricular region (so far as may be judged from the latter in its imperfect state of preservation), but in the details of the structure of the nasal bones; as much resemblance is probably manifested in the structure of its occipital portion (imperfectly preserved).

The skull of *Ac. tetradactylum* Lart. has not been described in detail. An all but complete specimen, somewhat deformed, preserved in the Paris

[1] The Lower Miocene *Ac. platyodon* Mermier cannot be considered as such a form, for it exhibits considerable deviations from the typical series.

[2] Osborn. Phylogeny, etc. Bull. Am. Mus. Nat. Hist., 1900, XVII, p. 240.

[3] Roman. Les Rhinocéridés de l'Oligocène de l'Europe. Arch. Musée Hist. Nat., Lyon, 1912, t. II, p. 59, pl. VIII, fig. 1, 1a.

[4] General length about 540 *mm* (580 *mm* is the average length of the skull described in this paper). Other specimens seem to be larger and are not only not inferior, but probably even superior in size to our skull.

Museum (of the Jardin des Plantes), has a general length (from the occipital ridge to the end of the nasals) of 540 *mm*; the width of its frontal part is about 200 *mm*, the length of the nasals (median line) being 220 *mm*. The frontal surface is slightly concave, with a small groove on the middle line; cristae parietales are well expressed and rapidly fuse into one crista sagittalis. The nasals are straight and separated by a groove, more prominently expressed than in the frontal (as each of them are swollen), as well as by a suture (the nasals apparently not fusing together; in the specimen described they are deflected, the left lying lower than the right); the naso-maxillary notch is so crushed that its position is not clear. The nasals are slightly narrowed anteriorly;[1] slight indentations laterally cut off their ends which are at this place slightly bent downward. The surface of the entire anterior part of the nasals, as also of the part of the frontals above the orbits, is rugose. The orbit is well defined by the upper and lower proc. postorbitales; its anterior margin is approximately disposed opposite the middle of M^1. The zygomatic arch is not far removed from the skull: it is fairly broad, being 65 *mm* beyond the orbit and 50—45 *mm* somewhat further backward, dilating again towards the posterior end. The very thin and long anterior end of the maxillare (together with the premaxillare) is extended similarly to the nasals. In the auricular region the proc. paroccipitalis, laminar, of triangular section, rapidly narrowing and rather short, is visibly separated from the short and massive proc. posttympanicus; the latter slightly encroaches upon the proc. postglenoideus. The occipital part is very much crushed and abbreviated; it was probably slightly constricted upward.

The skull of *Ac. tetradactylum* is thus in general character as closely related to the one under description, as that of *Ac. lemanense*. All three skulls exhibit a prominently elongated posterior part (in all the distance between the anterior margin of the orbit and the occipital crest constitutes 61—64 per cent. of the total length of the skull), they are all provided with elongated nasals of the same type; in *Ac. lemanense* and *Ac. tetradactylum*, however, the length of these bones constitutes about 42 per cent. of the general length of the skull, while in ours it is but 47 per cent. of that length; the frontal and parietal parts, as well as the occipital, are perfectly similar in shape. A dissimilarity is manifested in the fusion of the nasals in

[1] At the suture with the frontal each nasal is 80 *mm* wide, being 45 *mm* wide opposite the lateral indentations of the anterior end.

our form which may be probably accounted for by their unusual length requiring a corresponding strengthening.

The dentition in *Ac. lemanense* exhibits considerable variations both in size (the general length of the dental series being 198—275 *mm* in the upper jaw; with a general length of 230 *mm*, the length of the premolars would be 100 *mm*, with a length of 256 *mm* it is 125 *mm*, etc.) and in the degree of differentiation of the teeth.

On the one hand, forms occur in which the crotchet and crista are almost totally wanting in both the premolars and molars. Such in the series figured by Roman,[1] as also a perfectly similar one (somewhat more worn) preserved in the Museum of the Jardin des Plantes in Paris (tabelled: Auvergne, № 2372), and being somewhat larger (general length about 275 *mm*, P^2—P^4 = 135 *mm*). Their premolars exhibit an increasing molarisation from P^1 to P^4; in the latter the deuterocone (although on the hind part alone) is well modelled, as is a very prominent antecrotchet; the crotchet and crista in all premolars are lacking; the cingulum is very conspicuously developed; the general shape of the crowns is exactly of the same type as in the form under description. The molars are likewise of the same type with our form; in those teeth the antecrotchet is less developed than in the premolars, and they possess a rudimentary crotchet (which is most prominent in M^3) considerably less in size than in our form; in the metaloph the inner tubercle is similarly modelled. The size of the teeth of the Auvergne specimen is similar to those of the form under discussion, but in all teeth (especially in the molars) a slightly smaller width may be observed; it is important to note that the premolars occupy a relatively lesser extent in the total series than in our form.

However, there is another type in which the teeth possess a much more developed crotchet and crista which even form a (closed) mediofossete. To such belong teeth preserved in the Munich Museum: P^3—M^2 from Göllheim (Rheinpfalz), designated on the table as var. *Gollheimense*.[2] These teeth are relatively little worn; they possess all the characteristic features of the forms which will be described below, but are probably of less size (in any case less than those of the just described French specimen from Auvergne). A second specimen from the same Museum[3] consists of an excellently

[1] L. c., pl. VIII, fig. 2.

[2] According to M. Schlosser (verbal information), they probably proceed from the Acquitanian beds.

[3] Described by Osborn. Phylogeny, etc., p. 245.

preserved left series of upper teeth from the Lower Miocene of Ulm (Eckingen bei Ulm); their general length: $P^2 — M^3 = 240$ *mm*, $P^2 — P^4 = 106$ *mm*, $M^1 — M^3 = 132$ *mm*; the height of the crown of the premolars is 20—28 *mm*, that of the molars 35 *mm* and more. In size and general structure of the crown (as regards the degree of specialisation) these teeth are very similar to those under discription. However, dissimilarities may also be pointed out; thus, the antecrotchet in the premolars has not yet attained such a swollen (as in the molars) shape, as in the jaw described, and is rather triangular in form: molarisation may be regarded as not having proceeded quite so far. In the molars the protocone is somewhat smaller in relation to the antecrotchet as than in the form under description — in our form the antecrotchet is relatively smaller in comparision with the protocone, and the latter is not compressed from the inner side.[1]

Thus, *Ac. lemanense* exhibits as it were two types of teeth: one with a strongly developed antecrotchet and feebly developed crotchet and crista; the other in which the antecrotchet is being reduced, and the crista and crotchet highly developed and forming a mediofossete.

The dentition of *Ac. tetradactylum* likewise varies in size and shape of the crown. In the scull described above the premolars (not all) possess a mediofossete (crotchet and crista); the molars have a small antecrotchet, a well modelled (on both sides) protocone and an inner end (anteriorly) of the metalophs: a well developed crotchet is present, which sometimes extends to as far as the protoloph, forming a peculiar median valley; the cingulum is not much developed, but in the mouth of the median valley occur «cords» constituting a continuation of the antecrotchet; total length of $P^1 — M^3 =$ $= 230$ *mm*. In the specimen of the Paris Museum from Sansan, № 2388, which is assigned to this species,[2] mediofossetes are even formed in the molars, and the anterior margin of the metaloph both in the premolars (only P^4 preserved) and in the molars exhibits a tendency to form festoons (wanting in the dental series described above), whence the mediofossete in M^1 is even double; in that specimen, besides, the cingulum is very much developed, even in M, where «cords» are formed within the median valleys; the length of $M^1 — M^3$ is 127 *mm*.

On the other hand, the Paris Museum possesses a specimen, referred to the same species, with much more simplified teeth (№ 2380); its premolars

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[1] Compression may be accompanied with higher differentiation; cf. teeth of *Paracerathetium bugtiense* with those of *Indricotherium asiaticum*.

[2] By Osborn, among others, l. c., p. 247.

exhibit a considerable (more so than in *Ac. lemanense*) molarisation, particularly manifested in P^4, in which the deuterocone is nearly quite distinctly expressed; the molars not only possess a modelled protocone, but are provided with a metaloph having a groove in its anterior part and exhibiting a tendency to bend outwards at its inner end; the protocone is flat from the inside, and is even furnished with a depression (M^2) on its inner side; the crotchet is very much developed, the crista is rudimentary, and there is no mediofossete; the cingulum is relatively feebly developed, even in P^4 it does not rise posteriorly, but terminates at the mouth of the median valley (i. e. encircles the protoloph alone). Both the parastyle and the external ridge are well developed.

Thus, all the data we possess relating to both species testify, first, to the undoubtedly superior specialisation of the Miocene forms as compared to those from the Oligocene (the premolars in *Ac. tetradactylum* are much more molarised than in *Ac. lemanense*), and, second, to the great diversity in the structure of the dental apparatus in both. In view of the incompleteness of the remains the question may at present remain open, in how much the modifications in the structure of the dentition in both species affect their taxonomical differences. However, there can be no doubt that the Upper Oligocene form (or forms) is closely connected with that from the Middle Miocene, and that the Lower Miocene form now described belongs, as far as its dentition is concerned, to the same series of *Aceratheriinae* (varietas with more complex teeth); it may even be suggested that among the remains proceeding from Europe there may be forms very closely allied to those from Turgai.

It may seem superfluous after what has been said to examine other related forms. However, in view of the above mentioned tendency on the part of *Aceratheriinae* towards the formation of different branches, as also of the attempts made to separate these latter,[1] it seems necessary to compare the form now under description both whith the aforementioned *Ac. platyodon*, and on grounds that will be discussed later with *Diceratheriinae*.

The skull of *Ac. platyodon* (see above) is smaller than that of the Jilančik form. Its auricular region is constructed as in the form under description (proc. posttympanicus is apposed to proc. postglenoideus, without encroaching upon it). The occipital side is of equal width both above and below (108 and 100 *mm* respectively), while in our form it appears to be

[1] Ringström, l. c.

narorwer above. But the greatest deviation is manifested in the nasals: with a length of 210 *mm* they are 100 *mm* wide near the frontal suture, and 22 *mm* at the anterior end, i. e. they narrow very rapidly; their transverse section in the hind part is similar to that in our form, but towards the front they do not become thick and represent in section an overturned shallow furrow (without swelling in the middle); the upper surface has been imperfectly preserved but apparently still bears a groove along the whole length of the middle line (according to the brief but precise description of Mermier[1]).

The dentition also approaches the more complicated teeth of *Ac. lemanense*; from our form, beyond the smaller size, the teeth of *Ac. platyodon* are distinguished by the shape of the antecrotchet in the premolars (a concave, not convex configuration), by a less pronounced molarisation, and in the molars by the smaller size of the protocone (which, however, is compressed) and a lesser development of lateral plications.

As has already been mentioned, this form should probably be regarded as a side-branch of the group of *Aceratheriinae* under discussion.

A recent revision of the *Diceratheriinae* by Peterson and Troxell, attesting the wide distribution of that group, led to the idea of seeking for a parallel group among the Rhinoceroses of the Old World. Single representatives of the genus *Diceratherium* have been known from Europe since long; latterly Ringström made an attempt to refer, although but conditionally, to such a parallel (not identical) group of «Dicerathers» of the Old World a series of forms previously described as Acerathers. Among others to this group was also assigned *Ac. lemanense,* and the grounds for such a relegation of *Ac. lemanense* to the Dicerathers were presented by its great similarity to *Diceratherium asphaltense* Dep.[2] which had earlier led some authors (Schlosser) to consider the latter as a male individual of *Ac. lemanense.*

Indeed, the dentition of *Dic. asphaltense* approaches *Ac. lemanense* in its simplified type (see above), with its well developed antecrotchet and slightly developed supplementary plications on the proto- and metalophs; but in place of the lacking crotchet a festooned anterior margin of the metaloph has arisen here both in the premolars and molars.

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[1] E. Mermier. Sur l'*Ac. platyodon.* Ann. Soc. Linnéenne de Lyon, 1896, p. 22.

[2] Ch. Depéret et H. Douxami. Les vertébrés oligocènes de Pyrimont Chalonges. Mém Soc. Pal. Suisse, 1902, v. XXIX, p. 3.

This is a fundamental distinction which has also been observed, as we have seen, in certain teeth from the Middle Miocene which have been ascribed to *Ac. tetradactylum*. A very strong development of the cingulum may be also noted.

In the skull of *Dic. asphaltense* attention is called to the presence of a double rugosity on the anterior end of the very much elongated nasals — a feature characteristic of the genus *Diceratherium*; besides, the encroachment of the proc. posttympanicus on the proc. postglenoideus may also be pointed out. This dissimilarity in the structure of the nasals between *Ac. lemanense* and *Dic. asphaltense* might he referred, as has been mentioned, to sexual dimorphism, were it not for the structure of the feet, very much abbreviated in *Dic. asphaltense*, and hence quite distinct from the limbs of the series examined *Ac. lemanense* — *Ac. tetradactylum*.[1]

This latter feature distinguishes *Dic. asphaltense* likewise from the American Dicerathers which in this very character (the structure of the limbs) exhibit a great similarity to the series of forms just mentioned (of this more will be said below).

Yet other features approximate both groups together. Thus, in the structure of the skull common characters are manifested in the very narrow cranium and correspondingly narrow occiput, narrowing still more rapidly upward (this latter character cannot be said to be fully established in the case of our form), with forwardly curving crista occipitalis; prominently expressed and rapidly converging parietal crests; a massive zygomatic arch which is especially characterised by its posterior dilatation. All these characters (including the last) occur in the serie examined of the Old World forms. Entirely different, however, is the anterior part of the skull in the American forms, with stunted nasals and large rugosities for the horns. The dentition of the American Dicerathers exhibits a series of succeeding variations in the degree of differentiation; it is characterised by a more oblique disposition of proto- and metalophs in the premolars and in a tendency towards the formation of festoons on the margins of the median valley; in other particulars they are similar both in the degree of molarisation of the premolars and modelling of the protocone, in the development of the crotchet, etc.

To a discussion on the interrelation of these forms we shall return after an examination of the structure of the skeleton.

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[1] This circumstance has already been pointed out by Osborn, l. c.

The lower jaw of the Jilančik form is known in several specimens and many fragments. Its lower margin forms a slightly convex curve; the proc. coronoideus is small; the posterior mandibular angle (angulus mandibulare) is slightly tuberculous, lying in the plane of the remaining parts of the jaw.

The dentition of the lower jaw. Of the premolars P_2 is elongated (the anterior end of the anterior crescent is anteriorly extended and slightly swollen); the remaining premolars are characterised by an angular second crescent forming a deep grade on the outer side, primary tubercles modelled at the inner ends of the crescents, and a powerfully developed cingulum.

The molars also possess primary tubercles modelled at the inner ends of the crescents (swollen inner ends of the crescents), but rounded (not angular) second crescents; the cingulum on the inner side is interrupted at the ends of the crescents and is totally wanting on the outer face.

P_2 — second premolar — has a longitudinally elongated crown; the anterior end of the anterior crescent is extended forward and slightly swollen (the primary tubercle modelled), forming the anterior lobe of P_2; its posterior end forms a small coulisse on its inner and a prominent ridge on its external side (middle lobe of P_2); the second crescent is curved at an angle somewhat more acute than a right angle (third lobe of P_2).

The cingulum is prominently developed: it embraces the crown on its outer face to the height of 5 *mm* from the base, as also on its inner face (sinking in the middle, it rises at the edges).

P_3 and P_4 — third and fourth premolars — are similarly constructed: the anterior crescent is curved twice (the anterior end, directed forward, is short), and in P_4 at a more acute angle than in P_3; the second crescent is curved at a right angle, and on its inner end is slightly modelled a primary tubercle. The anterior crescent is slightly larger than the posterior.

On the outer side the anterior crescent forms a more acute, the posterior a more obtuse rounded ridge (grade).

The cingulum is developed similarly to that in P2.

The molars may be characterised by the anterior crescent being curved twice (at a larger angle than in the premolars) and the posterior being curved as an arch (not at an angle), the inner end of which is likewise swollen (the primary tubercle modelled); the crescents are nearly equal, but in M_3 the posterior is larger than the anterior. From the outer side both the anterior crescent and the posterior in particular, are regularly rounded (in distinction from the more angular configuration of the premolars)

The incisors have not been preserved in the jaw under description; separate very large lancet-shaped incisors can scarcely be referred to this species: at least in one of the lower jaws which have been in situ together with a skull of *Acer. Depereti* has been preserved a pair of small incisors (crown 32 *mm* long and 21 *mm* wide), the true shape of which cannot be reconstructed as the tips have been injured. In any case their transverse section is triangular, and the upper flat side has a wide triturated area,

lying at an oblique angle to the remaining surface. Between the pair of these incisors are present fairly large alveolae for a second, smaller, pair of incisors.

Dimensions (in millimeters)

Length of lower jaw (from posterior angulus to anterior end, not well preserved)	> 460
Width of ascending branch (smallest)	125
Height to upper margin of the condylus	210
» » end of proc. coronoideus	250
Height in region M_3 (from the crown)	85
» » » M_1 » » »	65

	P_2	P_3	P_4	M_1	M_2	M_3
Length	34	37 (39)	38.5 (40)	40	47	50
Width	24.5	33	34	31	32.5	32
Height	30	28	29	24	25	26

Length $P_2 - P_4 = 108$; $P_2 - M_3 = 250$ *mm*.

Affinities and peculiarities. The lower jaw of *Ac. lemanense* figured in Roman's paper,[1] is distinguished by a straight lower margin from which rises its anterior part at an oblique angle. A second specimen[2] apparently exhibits similar outlines (lower margin incompletely preserved). The ascending branch is relatively slightly narrower. As regards the dentition, the premolars in comparison with our form have a more abbreviated posterior lobe, and in the molars the anterior lobe remains undeveloped, i. e. its anterior end abuts against the preceding tooth and does not bend towards the inner side; P_2 is apparently likewise shorter. The general length of the six teeth is 250 *mm*, of which 158 *mm* fall to the molars.

The lower jaw of *Ac. tetradactylum* is somewhat longer than in the form under description, and its other dimensions are accordingly somewhat larger: the proportions are the same. Its lower side is also slightly convex, the angulus is very slightly deflected. The general length of the five teeth of the lower jaw is about 210 *mm*.

The lower jaw of the Dicerathers sharply differs by the angulus being very much deflected.

As regards the incisors, in *Ac. lemanense*[3] they also possess a triangular section and a flat upper side, but a very small part of which is abraded;

[1] l. c., pl. VII, fig. 1.
[2] l. c., pl. VIII, fig. 1 Bc.
[3] Roman, l. c., p. 60.

the same shape is exhibited in separate teeth preserved in various collections, such as in Munich, from Eckingen, which has been referred to the same species.

The skeleton of the Jilančik form, with the exception of the vertebral column and several bones of the limbs, is nearly completely known.

The fore limb. The humerus (Pl. II, Fig. 2) is not very massive, with a wide proximal end (the tuberculum majus anterius being very well developed) and a little dilated distal end, the articular surface of which (capitulum) bears a feebly expressed keel; crista deltoidea descends to half the length of the bone. The maximal length of the bone is 390 *mm*.

The bones of *Ac. lemanense* and *Ac. tetradactylum* (after Duvernoy) of a similar or somewhat greater length (390—400 *mm*) than in our form are considerably wider (180 *mm*), especially the bone in *Ac. tetradactylum* (195 *mm*). In *Dic. Cooki* (American), on the contrary, the bone is even thinner than in the one under description, with a feebler developed tuberositas deltoidea.

The radius (Pl. II, Fig. 3) is a thin and long bone, nearly equal in length to the humerus (355 — 380 *mm*), slightly curved; is distinguished also from typical Acerathers by its thinness, and in that character is allied to the American Dicerathers in which the radius is a very thin bone, in length equal to the humerus.

Ulna (Pl. II, Fig. 4) is attached to the radius throughout nearly its whole length (with the exception of a short space beneath the proximal capitulum); it is a relatively thin bone with a massive proximal end (the olecranon is short and wide).

Carpus (Pl. II, Fig. 5) is characterised by its considerable height. It represents exactly the same type as in *Ac. lemanense* (Duvernoy) and *Ac. tetradactylum*; its separate bones are also distinguished by their considerable height. Os magnum, as also the other bones, is much extended anteroposteriorly (the posterior process being much developed), to which attention has been earlier called by Duvernoy in the case of *Ac. lemanense* (*gannatense*), while the Dicerathers have much shorter (anteroposteriorly) bones (posterior processes less well developed); the articular surfaces in os unciforme do not form a continuous ring (interrupted between unciforme and Mc_V); os lunatum is articulated only with the radius.

Metacarpalia (Pl. II, Fig. 5) are thin and long with slightly swollen ends; the lateral digits are feebly reduced, placed considerably backwards and adpressed to the middle digit, being at the same time curved (the distal

ends laterally diverging) and the articular surfaces of their distal ends obliquely disposed. A fifth digit is present, its metacarpal bone being thin and long, with swollen ends and a well elaborated distal joint.

Dimensions in *mm*: length of Mc_{III} — 180, Mc^{II} — 160, Mc_{IV} — 154, Mc_{V} — 70—85.

The character of the foot in *Ac. tetradactylum* is exactly the same both in the shape of the carpal bones, and in the metapods (a distinction is manifested in the articulation[1] of Mc_{II} to Mc_{III}, in a greater reduction of the fifth digit, etc.); the manus of *Ac. lemanense* (Duvernoy) is apparently of the same type. Whereas in the manus of American Dicerathers which is just as narrow and long, the lateral digits while being apposed throughout their length to the middle digit (rugosities along the whole margin Mc_{III} — Mc_{II}) are not so shortened, and their lower ends are not deflected; besides the shape of the metapods is different, as they are not swollen (or less swollen) at their ends.

The phalanges are of a purely Rhinoceros type, although the second and third of the middle and the first and second of the lateral digits are very much abbreviated, more so than in the American Dicerathers; at the same time the massive hoofs of the lateral digits claim special attention.

Hind limb. The femur (Pl. II, Fig. 6) is a slight bone, with inconsiderably swollen ends and feebly developed attachments for the muscles, in these features greatly differing from the corresponding bone of typical Acerathers. The sagittal measurement of the distal end is greater than the frontal, and the inner trochlea is larger than the outer. The same may be observed in American Dicerathers, whose bone is still slighter. Length 460 *mm*, width of proximal end 145 *mm*.

Tibia (Pl. II, Fig. 7) is also a slight and straight bone, its ends are much swollen, especially the proximal; the distal articular surface consists of two unequal parts. Length 350—380 *mm*.

This bone in European Acerathers is more massive; in the Dicerathers from N. America s still slighter.

Tarsus (Pl. II, Fig. 8). The astragalus is low, the disks of the trochlea are subequal, but of dissimilar thickness; the calcanear articular surfaces are divided, and the inner is of a convex-concave shape. The height 72,5 *mm*, the width of the upper articular surface is 70 *mm*.

In *Ac. tetradactylum* the bone has an exactly similar habitus; in the American Dicerathers two calcanear articular surfaces (middle and lower) have fused, as in *Dic. palaeosinense*,[2] whereas in *Dic. asphaltense* they are separate.

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[1] The articular surface in Mc_{II} — Mc_{III} in *Ac. tetradactylum* is inclined outward-upward, and in the form under description outward-downward.

[2] Ringström, l. c.

Calcaneum is flat, its length is 115 *mm*; in American Dicerathers it is longer. The other tarsal bones do not offer any particular interest.

Metatarsalia (Pl. II, Fig. 8) slight and long, though shorter than the corresponding bones of the fore limb (length of Mt_{III} 170 *mm*, Mt_{IV} — 143 *mm*, Mt_{II} — 140 *mm*). The lateral digits are apposed to the middle digit; their lower ends only are laterally deflected, with articular surfaces set obliquely. The medial metatarsal is straight and flat, with swollen ends; its distal end has rugose swellings. The lateral bones are shorter and much slighter.

The pes of the *Ac. tetradactylum* although belonging to the same type is slightly more massive, a condition chiefly due to the massive lateral metapods. The pes of the American Dicerathers is still narrower than the one described; the lateral digits are more shortened; the metapods are more regular in shape and are characterised by differently disposed articular surfaces: the distal articular surfaces are more deflected backward, at the same time the middle bone is slightly bent forward.

In conclusion it may be inferred that both in the structure of its skull and teeth, as well as its skeleton, the form under description belongs to the group of typical Acerathers; in degree of specialisation of its dentition and of its skull it occupies a position exactly corresponding to its geological age, i. e. between *Ac. lemanense* and *Ac. tetradactylum*. It might be considered as a missing Lower Miocene link in the series of forms mentioned, if it were not for the exceptional elongation of the anterior part of the skull (nasal bones), greatly exceeding that which is represented by other members of that series, as well as for the peculiarities of the skeleton characterised by an extreme lightness caused by the slightness of its bones. Thus, the form described must be considered as a side-branch of the series referred to (local race).

In the exceptional lightness of the skeleton (slight and long extremities) this form appears, at first sight, to approach the American Dicerathers (if their size should not be taken into consideration, the latter being mostly small forms). A more detailed study of the skeleton, however, leads us to a different conclusion; as mentioned above, the Jilančik form differ from the Dicerathers in a series of important features, — first, in the structure of the foot which has another form of the metapods and a different position of the digits; on the other hand, the Jilančik form, although very peculiar,

retains the features of the group of Acerathers with which it is most closely connected: thus, we have seen that the carpalia retain their anterio-posteriorly elongated form which distinguishes them from the bones of the Dicerathers.

As to the European «Dicerathers» and in particular to the *Ac. lemanense* and *Dic. asphaltense,* as has been stated above, it is doubtful whether their dissimilarities could be referred to sexual dimorphism alone. It is evidently more correct to solve this question in the negative, for notwithstanding the similarity in the structure of the skull and the teeth, it seems doubtful whether the extremities described by Depéret and those figured by Duvernoy could belong to animals of the same species although of different sexes.[1] It is peculiar that another Old World form referred to the same genus, *Dic. palaeosinense* Ringström,[2] similarly to *Dic. asphaltense*, has massive feet. The material which we possess is certainly still very restricted, but the few well known facts speak of an absolute reverse tendency in the structure of the feet of the Eurasiatic «Dicerathers» as compared with those of America. However, the very question of the existence of a group of Eurasiatic Dicerathers it would be more careful to keep open at present.

February 19, 1927.

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[1] Whether the feet from the Upper Oligocene of the Mainz basin recently figured by Roman belong to the species *Ac. lemanense* (Trav. Lab. Géol. Fac. Sc. Lyon, Fasc. VII, Mém. 6, 1924) has been considered as doubtful by the author himself, for what reason we share his opinion as to the necessity of awaiting fuller information on this form.

[2] Ringström, l. c.

EXPLANATION OF PLATE I.

Aceratherium Depereti n. sp.

Fig. 1—2. — Skull $\left(\frac{1401}{D\,1342}\text{ H }\frac{1401}{D\,506}\right)$.

» 3. — Upper teeth P^1 — M^3, less worn $\left(\frac{1401}{D\,506}\right)$.

EXPLANATION OF PLATE II.

Aceratherium Depereti n. sp.

Fig. 1. — Upper teeth P^2 — M^3, much worn $\left(\frac{1401}{D\,1150}\right)$.

» 2. — Humerus $\left(\frac{1401}{D\,250}\right)$.

» 3. — Radius $\left(\frac{1401}{D\,330}\right)$.

» 4. — Ulna $\left(\frac{1401}{D\,364}\right)$.

» 5. — Left manus.

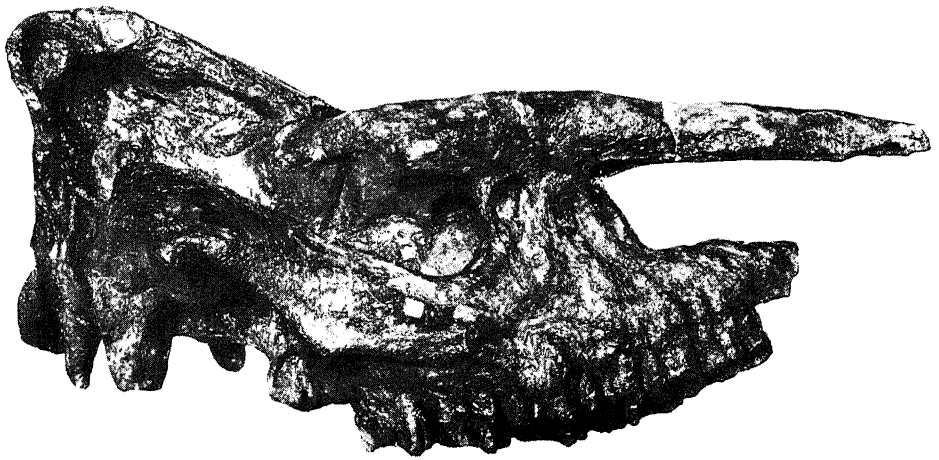
» 6. — Femur $\left(\frac{1401}{D\,367}\right)$.

» 7. — Tibia $\left(\frac{1401}{D\,220}\right)$.

» 8. — Right pes.

А. Borisĭak (A. Borissiak). *Aceratherium Depereti* n. sp.

1



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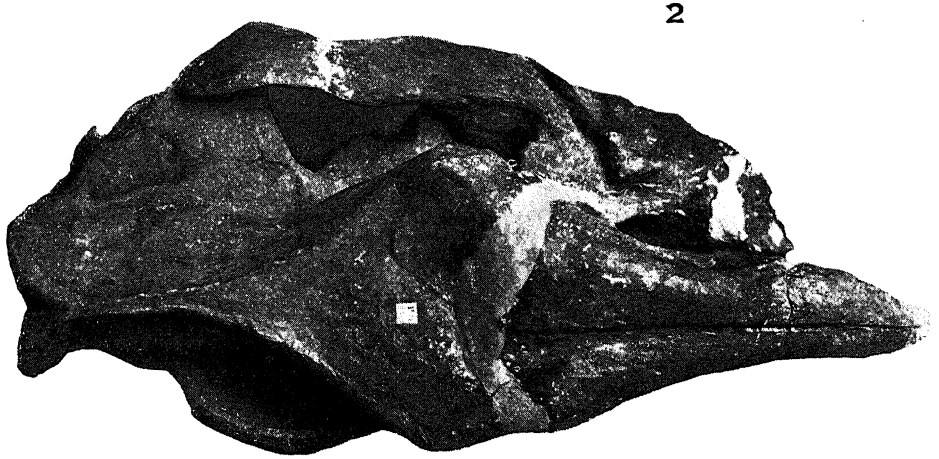

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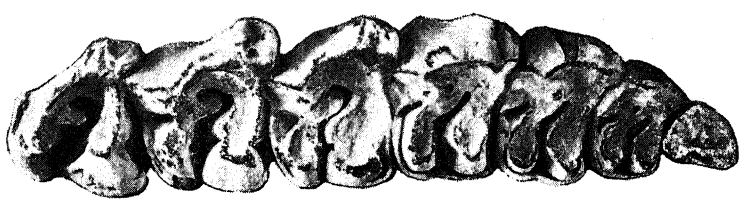

А. Borisïak (A. Borissiak). *Aceratherium Depereti* n. sp.