ON A NEW DIRECTION IN THE ADAPTIVE RADIATION OF MASTODONTS.

By

A. BORISSIAK

(Leningrad).

Plate III—V, 4 Figs.

Recent discoveries and investigations both in the Old and in the New World offer abundant material for ascertaining the adaptive radiation, as well as the phylogenetic classification of the Proboscidea. A general summary of all such data we are expecting to obtain from H. F. OSBORN'S monograph; although not yet completed we may judge of the results arrived at by the author from a series of his preliminary observations on the subject already published.

As a contribution to this anticipated review may not be without interest the remains described below of a Mastodon from the Anchitherium-fauna discovered last summer (1927) in the marine Tchokrak beds (Middle Miocene) of the Kuban region in North Caucasus. It may be as well to mention that this would represent the *eighth* mammalian fauna from the tertiary deposits of our Country, which in its richness in vertebrate fossils annually increases in importance.

Platybelodon danovi n. gen. et sp.

(Plates III—V.)

The remains referred to of the new Mastodon are not abundant; all that is available for description consists for the present but of a fragment of the skull with molars of both sides and a nearly complete lower jaw, there are besides some separate teeth which apparently belong to the same species; the few bones of the skeleton, with the existence of another species in the same beds, cannot be so far referred with confidence to either. — The fragment of the skull just mentioned was not found in the immediate vicinity of the lower jaw, but at a certain distance from the latter, while the teeth of the skull exhibit a slightly lower degree of wear than those of the lower

jaw; still it seems probable that both remains belong to one individual[1]) (if to two separate individuals, these latter should very closely resemble each other in age and size). As even M^3 and M_3 are very much abraded and the crown of M^2 is worn to the base the specimen in question must have been old.

Fragment of skull (pl. IV, fig. 1, 2). The fore part of the skull with both series of molars M^2—M^3 has been incompletely preserved; both the upper and hind parts of the skull are absent; only the left orbit has been preserved with a part of the jugular arch. — The skull is dolichocephalic with a narrow palate. Most remarkable is its anterior part, perfectly flat, somewhat widened in front. As in all Proboscidea in its construction take part the praemaxillaria (from above) and maxillaria (from the sides and below): its lower surface is formed of the palatine processes of the maxillaria, which widening in front have rounded ends; towards its termination in front the middle suture (between them) diverges and forms a triangular excision (pl. IV, fig. 2); along the lateral margins extend slight swellings in correspondence with the alveoles of the tusks: these swellings are more prominently bent outwards than are the margins of the fore part of the skull, so that the alveoles face outwards from the lateral margins and not from the anterior border of the skull. The intermaxillaria at the anterior end are somewhat longer (project beyond) than the maxillaria; the middle suture (between them) here also forms a slight excision, their anterior ends being not rounded, but slightly slanting towards the lateral margins. The upper surface of the anterior port of the skull is concave.

As a consequence of the incomplete preservation of the maxillary bone the left tusk is exposed throughout almost its entire length from the anterior (extant) molar (M^2) along swelling the border mentioned above (pl. IV, fig. 2). The tusk itself has not apparently been preserved intact as it disappears before reaching the border of the maxillary: possibly its anterior end freely projected. On the right side the tusk has not been preserved, but a similar outwards curved channel for supporting the tusk is present.

As regards the grinding teeth M^2 is so much worn on both sides that the outer borders of its crown alone have remained, which testifies that the crown consisted of three lophs and was constricted forwards.

M^3 (pl. IV, fig. 2; pl. V, fig. 2) is considerably less worn out; its anterior lophs have been subjected to considerable wear, while the posterior ones are hardly at all abraded (attention should be called to a more rapid abrasion of the fore part of the tooth, than is generally observed in other

[1]) Unequally worn teeth of the upper and lower jaws have been indisputably observed to belong to one and the same individual. See SCHLESINGER, Denkschr. Naturh. Staatsmus., Bd. I, 1921, Taf. V.

forms of the Mastodonts). The lophs may be characterised as exhibiting a considerably greater development of the pretritor part at the expense of the posttritor. In the first loph the large size of the pretritor part is mainly caused by its fusing with the fore talon: it presents a wide triangular figure of abrasion; that figure on the posttritor part is oval; in view of the defective preservation of the tooth the presence of an intermediate conule also at the inner border of the posttritor part could not be established. The less worn second loph, as compared with the first presents no peculiarities; intermediate conules are wanting on its posttritor part. The third loph is very little worn and possesses but one (anterior) intermediate conule on the pretritor part. The fourth loph is little developed and simply constructed (without any intermediate conules); it may be distinctly seen that it (in both parts) consists of four conelets, scarcely at all abraded. The talon is small. The cingulum is developed on the inner sidne of the crown at the mouths of the valleys: in the first valley it forms a very large tubercule close to the second loph.

Of the jugular arch has been preserved but its anterior part (maxillare + jugulare) confining a relatively small orbit (80 mm long by 65 mm high).

The mandible (pl. III, pl. IV, fig. 1) has been almost entirely preserved: but its posterior margin and the upper part of its ascending bar have been fractured, while in its fore part the ends of the tusks have been broken off and the bony sheath of the tusk partly destroyed. The general shape of the mandible has likewise been slightly impaired. Apart from the tusks, of the feeth have been preserved but both M_3 of the molars, very much worn; the M_2 are totally absent.

The mandibular rami are low and massive (their thickness 90 mm being slightly less than their height 105 mm); the deformation of the posterior part prevents the exact reconstruction of the shape of the ascending bars; on the outer surface may be observed a conspicuous depression for m. temporalis, and on the lower border one for m. masseter. On the inner surface may be seen a very large foramen alveolaris posterius, while along the lower border occurs a latitudinal depression (sulcus mylohyoideus?). The large foramen mentale is situated below the fore part of M_2, besides which on the right side has been preserved a second opening disposed in front of the posterior margin of the symphysis. The latter lies immediately forward of the anterior margin of the dental series.

The symphysis is very long and expands forward (length with tusks >700 mm). Posteriorly it is constricted (130 mm) and forms a double channel: a deeper one from above (pl. III, fig. 1) and a small shallow one from below (pl. III, fig. 2); it then rapidly increases in with (up to 245 mm)

forming a wide and rather deep (up to 50 mm) „spoon": its anterior end by which the hollow of the spoon is closed, is somewhat raised (pl. IV, fig. 1): along its lower surface throughout its length towards its anterior termination in the middle line extends the shallow channel referred to. The whole symphysis somewhat hangs down, i. e. forms a small angle with the horizontal line of the dental series.

The shape of the symphysis is due to the structure of the inferior tusks, which present a flat concave surface from above and are of a slightly spiral curved form in their distal part, while proximally (at the posterior margin of the symphysis, at the point of fracture of the jaw) they are normally elliptical in section, the long axis of the ellipse being set vertically. The greatest width of such a tusk attains 110 mm, its thickness along the middle line reaching 30 mm and along the outer side 25 mm, being but 15—20 mm at its anterior extremity; the bony sheath enveloping the tusk is 5 mm thick. The distal ends of the tusks meet one another in the middle line, while posteriorly (within the bone) they somewhat diverge. These distal ends have not been completely preserved. From the upper surface of the tusks enamel is absent; their anterior end is abraded by use throughout a length of about 100 mm, the remaining surface, being intact (denuded of the enveloping bone), bears irregular longitudinal grooves; below they are protected by enamel longitudinally striated.

Of the grinding teeth are present but M_3 very much worn (pl. III, fig. 1; pl. IV, fig. 1), more so than the corresponding teeth of the upper jaw: at the anterior end of the tooth the crown is worn down nearly to the base, while at the posterior end it is above 30 mm in height.

Owing to its being slightly more worn the crown presents figures of abrasion differing somewhat from what is observed in the upper jaw. The following features are common with those exhibited by the teeth of the upper jaw: the pretritor part is more than usually increased of the expense of the poststritor; towards the posterior end of the crown the parts of the lophs are obliquely disposed towards one another forming a reentering angle from behind; the tendency to form intermediate conules is still more distinctly manifested.

The first two lophs are so much worn that their figures of abrasion have fused. Both sides of the third loph have one common figure of abrasion which is beginning to coalesce with the preceding figures. The rectangular outline of the posttritor part (evidently relating to the base of the loph: in the following lophs, less deeply worn, it is usually oval in shape) bearing an intermediate (posterior) conule, very low and therefore scarcely affected by abrasion, should be noted; a similar intermediate (anterior) conule in the posttritor part occurs on the following fourth loph;

both conules are adpressed to the middle line of the tooth, i. e. to the intermediate conules of the pretritor part. The fourth loph also presents but one common figure of abrasion; the set of both its parts at an angle, to which reference has been made, is still distinctly manifested; the pretritor part has but one anterior intermediate conule; a similar conule on the posttritor part has been noted above; at its junction with the loph the enamel coating of the latter is interrupted. The fifth loph is considerably smaller than the others, its post- and pretritor parts are almost equal in size and possess no intermediate conules; its abrasion had just commenced. A talon (from a large conule accompanied by 2—3 small ones) not yet affected by abrasion may be also noted. A cingulum has been preserved but at the mouth of the transverse valleys mainly on the outer face of the tooth.

The above description refers to the left tooth. The right differs but in being less worn in its middle portion, the predominance of the pretritor part over the posttritor being particularly evident. In this tooth the possession of intermediate conules also by the second loph on the posttritor part may be likewise noted.

To complete the account of the features presented by the grinding teeth in the form under review the great thickness of the enamel, reaching 8 mm, should be noticed.

Dimensions in mm.

Skull.

Length of fragment		about 800
Length of flat fore part		310
Width of above at anterior margin		about 180
Thickness of tusk		40
M^2 (right) length	100; (left)	98
width	65;	65
M^3 (right) length	133; (left)	130
width	65;	65
height	41;	—

Mandible.

Total length of part preserved	1240
Length of symphysis with tusks	>700
Least width of symphysis	130
Greatest width of same	245
Thickness of ramus	90
Height of same at anterior border of dental row	120
Heigth of same at posterior ditto	105
Width (preserved) of ascending bar	210

Tusks — width		110
thickness.		15—30
M_3 (right) length	170; (left)	168
width	67;	67
height	30;	25

Of the separate detached teeth of Mastodonts found at the same beds some may be referred to the form described, as they also exhibit a tendency to form intermediate conules on the posttritor parts, and a predominating development of the anterior intermediate conule on the pretritor part. The following two of these teeth may be more closely dealt with:

M^2 (upper) representing a crown (pl. IV, fig. 3), but little worn, with three lophs inconsiderably narrowed forwards; the pretritor parts form typical trefoils; the posttritor are supplied with either intermediate conules (in the first and third lophs) or, in substitution for them, swelligns near the middle line (second loph). Cingulum is fairly well developed on the outer face, occuring but at the mouth of valleys on the inner. Size: length — 103 mm, width — 63 mm, height — 41 mm.

M_3 (lower) quite unabraded (pl. V, fig. 3); its fore lophs are characterised by a doubled number of intermediate conules of the pretritor part on its upper portion alone, so that with increasing abrasion the normal figure of the trefoil is being approached; the posterior lophs are much simpler structures, each possessing but one (anterior) intermediate conule. The posttritor parts of the anterior lophs, consisting of three conelets, have each but one intermediate conule; in the posterior lophs these parts consist of two conelets, the intermediate conules being absent. The fifth loph is wanting, but there is a well developed talon. Could it not be M^3 (upper)? Size: length — 157 mm, width — 61 mm, height — 57 mm.

Affinities and peculiarities. At the first glance at the remains described the remarkable peculiarity in the structure of the fore part of the skull and of the mandible cannot but strike the observer; if the aspect of the mandible be peculiar, so much more notable is the reduction of the upper tusks, for in all known Mastodonts these latter exhibit a contrary tendency, i. e. towards an increasing development. It can scarcely be a matter of doubt, that the form described represents a hitherto unknown direction in the adaptive radiation of Mastodonts.

Meanwhile, as it was to be expected now, when we know the general phylogenetic scheme of the Proboscidea[2]), such a type seems to have been rather distinctly anticipated among the most ancient representatives of that

[2]) I refer to the phylogenetic classification of Osborn, as presented in series of his works.

group; yet these are far from possessing the extreme features peculiar to the form now under discussion.

Of the most ancient Proboscidea, both in the character of the teeth, and in the general shape of the mandible and skull (palate), the most closely allied to the form described are the representatives of the genus *Phiomia*[3]), generally regarded as the possible progenitors of the Longirostrine Mastodonts[4]). As the peculiar features of the Kuban Mastodon are connected with the position and structure of its tusks, let us consider the form of these latter in the three known representatives of the genus *Phiomia*.

In *Phiomia minor* the upper tusks are fairly large (240, 40×26)[5]), being slightly compressed; the lower tusks are nearly of the same shape[6]) (40×36 and 27×14 mm). In *Phiomia Osborni* the lower tusks become somewhat wider (47×20 mm)[7]); but they exhibit signs of abrasion to a greater degree on their lateral (outer) sides (areas of attrition up to 105 mm in length), and to a lesser on their upper surface (same area about 50 mm long). A still greater width (and greater abrasion on the upper surface) is displayed by the third species known, *Phiomia Wintoni*, which in its lower tusks reaches a width of 50—83 mm, aside a thickness of somewhat over 26 mm, while its upper tusks retain the same dimensions as in the two preceding forms (250, $44 \times 28{,}5$ to 60×39 mm).

From this brief account about the known structure of the tusks in the three most ancient Proboscidea mentioned, it may be inferred that the build (as also the function) of the symphysis was dissimilar in correspondence with the different shape of their lower tusks. These peculiarities not having so far attracted proper attention could have possibly had more light thrown upon them than has actually been done in published contributions on the subject.

And in effect the representatives of the genus *Phiomia* as regards the structure of their lower tusks offer in a rudimentary, but in a no less distinct form two types: forms with tusks of an oval section, and with tusks of a flatter shape. Unfortunately from the published material it is impossible to trace corresponding variations in the structure of the upper tusks, which we have every reason to expect. These two types may be regarded as presenting two incipient lines of adaptation: the first towards typical Longirostrinae, the second to forms similar to the Kuban Mastodon.

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[3]) H. MATSUMOTO, Revision of Palaeomastodon. Bull. Amer. Mus. N. H., vol. L, Art. I, p. 1—58.

[4]) MATSUMOTO, loc. cit.

[5]) The first figure denotes the length, the remaining two the section in millimetres.

[6]) MATSUMOTO, loc. cit., pp. 20 and 21.

[7]) l. c., p. 48.

And indeed the last of the forms mentioned, *Ph. Wintoni* with the flattest lower tusks may be considered as being the most closely allied to the type of the Kuban Mastodon. Let us advert to certain details of its structure as exemplified by descriptions. The following account of the lower incisors of one of the specimens may be found in ANDREWS[8]): tusks straight, procumbent; transversely convex below and concave above: the outer thin and

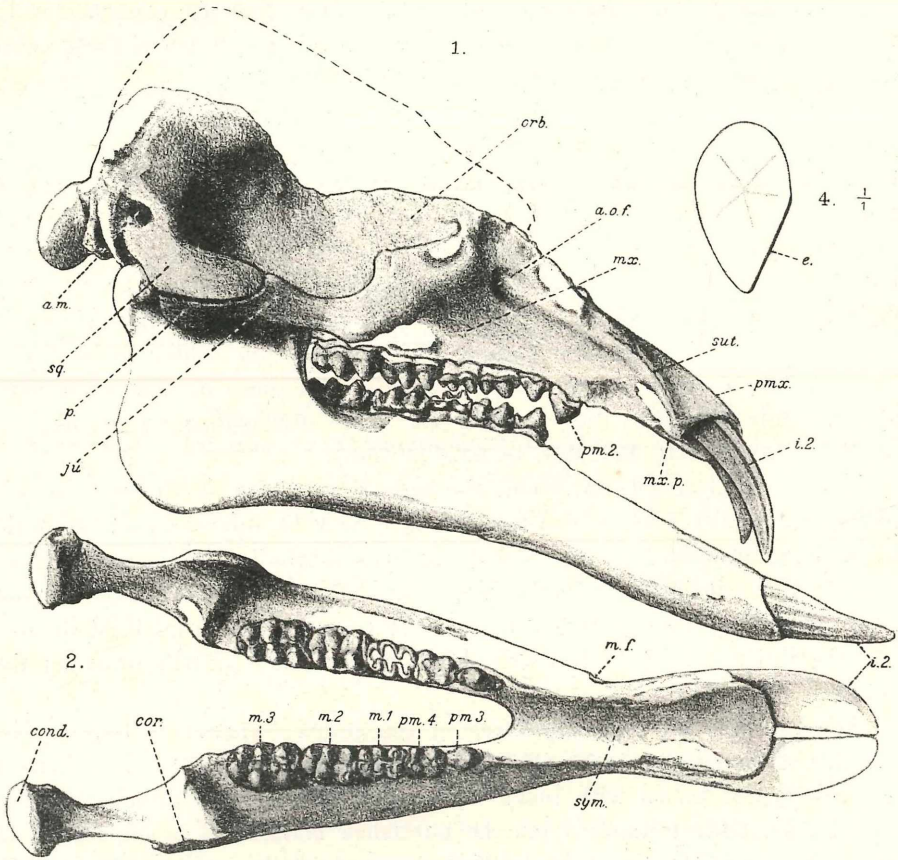

Fig. 1. *Phiomia Wintoni* Andr. (Philos. Trans. R. S. London, [B], 199, pl. 31.)

inner thickened sides are parallel to one another[9]); they meet in the middle line and represent a continuation of the spoonlike symphysis; ANDREWS figures them as projecting far beyond the jaw: to as much as 200 mm along the outer side, and 140 mm along the inner. The anterior end of the tusks worn above from use has a chisel-shaped surface convex in outline. Such a tusk is covered with enamel, thick below and bearing a number of wide

[8]) Brit. Mus. Catalogue. Tert. Vert. Fayûm Egypt. pl. XIV, fig. 3, p. 142, 1906.

[9]) The measurements given above of the smaller diameter relate to thickened inner side (MATSUMOTO).

and shallow longitudinal furrows, and thin (sometimes totally absent) above. — Another specimen of the same species[10]) exhibits lower tusks much less exposed from beneath the jaw of about the same width (52 mm) with anterior ends terminating in a point and a somewhat dissimilar shape of the whole symphysis of the mandible.

Of much interest is a description, given by the same ANDREWS[11]), of a third specimen, the best preserved, constituting an all but complete skull with its fore-part in most excellent condition, and a complete mandible (Textfig. 1). We shall mainly consider the fore-part of the skull presenting much in common with the fragment described above. In this case also the palatine processes of the maxillaries are produced forward as tongue-like projectures forming a V-like exision in the middle line at the anterior end; beyond them likewise project forward the ends of the intermaxillaries although possessing here a different (bluntly rounded) shape. But in this specimen the fore-part of the skull had not been subject to squeezing, whence the maxillary and intermaxillary bones laterally form the usual large tubulae-alveoli for the upper tusks, whose distal ends project far forwards beyond the maxillary; at the same time these tusks (compressed laterally with a wide band of enamel and a cutting outer edge, of the size of 160, 38 × 30 mm) are of much smaller diameter than the alveoli in which they are loosely set (reduction?). As in our form the mandible projects forward beyond the maxillary (by 290 mm); its symphysis is intermediate in structure between the two other specimens alluded to.

A number of detached lower incisors, more or less intact, have been likewise described; some of these, as has been pointed out, are of greater width than those to which allusion has just been made, with a variously developed enamel and surfaces of abrasion (thus, these worn areas both above and below reach 50 mm; nothing is mentioned on the abrasion on the sides).

What was the subsequent development of the type under discussion, as represented by the form described?

The third of the mandibles of *Phiomia Wintoni* referred to, and the best preserved, has a length of about 370 mm from the posterior margin of the symphysis to the fore-end of the tusks, with a greater common width of both lower incisors of 135 mm. Thus, the symphysus of the mandible was in this form roughly speaking, twice (1,9) smaller than in the Kuban form described (its respective dimensions being > 700 and 245 mm). On the other hand, if the mandible be taken in its entirely, the symphysis in the Kuban form has not only increased twice in size absolutely, but also relatively (in

[10]) ANDREWS, l. c., p. 157, textfig. 53; MATSUMOTO, l. c., p. 24, fig. 23.

[11]) Philos. Trans. R. Soc. London (B), 199, p. 393, 1908.

relation to the remaining part of the mandible) but slightly less than 1,5 times: a mere look at the figures will show that the symphysis in *Phiomia Wintoni* is less than half the total length of the mandible, while in the Kuban Mastodon it is more than half of that length. The „spoon" formed by the symphysis of the mandible has deepened, while its fore-end has been bent upward; correspondingly the tusks have become flatter, which being of the same or of a slightly greater thickness have attained an all but double width; the enamel has been preserved on their lower surfaces alone. Modifications in the fore-part of the skull are particularly remarkable: the upper tusks have been reduced and in correspondence with the widening of the mandible have been turned by their tips sideways projecting now from the lateral margins of the widened fore part of the upper jaw which has become perfectly flat and thrust forward beyond the distal ends of the upper tusks; such tusks could be of no longer use in the nutrition of the animal, and could perhaps by their laterally projecting ends but serve as a means of defence. The orbit has apparently become relatively smaller than in the most ancient forms.

The modifications in grinding teeth call for especial notice. These teeth have been subject to a growing complexity of the same character as in typical Longirostrinae; but such a complexity had developed at an accelerated rate by reaching a higher degree than in the contemporaneous representatives of the latter. In effect, the structure of the crown as described above, with its increased number of intermediate conules and lophs (five in M_3) etc, allies it to those representatives of *Tetrabelodon angustidens* which are regarded as transitional to *T. longirostre;* and the number of conelets constituting the loph (see above, as in description of posttritor parts) is alone less in the Kuban Mastodon than in such transitional forms (in this feature is perhaps manifested its more ancient age) that have appeared in Europe much later[12]).

Of other features exhibited by the grinding teeth in the Kuban form should be noticed: a greater thickening of the enamel than in normal Mastodonts; a more rapid wear of the fore part of the crown in comparison to its posterior portion; a more intensive manifestation of all the features indicated in the lower, than in the upper, jaw.

Such are the peculiarities of the type of Proboscidea we are interested in, in its early form, *Ph. Wintoni*, and in their extreme manifestation — the

[12]) In this respect interest is afforded by the Mastodon, described by SCHLESINGER (Denkschr. Naturh. Staatsmus. Wien, Bd. I, 1921, S. 25—26, Taf. IV—VI) from Dornbach; it also belongs to the second mediterranean beds and is apparently the most ancient form known with the features of *longirostre:* at first sight its teeth are very similar to those described here, but they still gravitate towards the forma *subtapiroidea*, while the structure of the symphysis of the mandible leaves no doubt as to its being allied to the typical Longirostrinae.

Kuban Mastodon. It now remains to endeavour to ascertain the direction of adaptive radiation assumed by this type.

In the case of the most ancient Proboscidea the ethological conditions of their existence have been established convincingly enough, and according to these conditions the genus *Phiomia* should be regarded as comprising inhabitants of lowlands and river valleys. The long and wide symphysis of their mandible with a mobile muscular upper lip, overlapping that symphysis, was adapted to the prehension of food (such as grass, leaves, branches); the upper tusks were made for defence and attack. In the subsequent Mastodonts, constituting the subfamily Longirostrinae, regarded as inhabitants of steppes and forest, the lower tusks have been transformed into a powerful instrument for excavating plants: they are oval in transverse section, and their tips joined together form a chisel shaped point for loosening the earth[13]). The upper tusks continue to grow in size and present powerful means of defence, but they may have also been suited for bending down boughs of trees or digging the earth (as is now performed by recent elephants). In the mean time the lower tusks of these forms lose the capacity of prehension, which is transferred to the upper lip gradually transformed into the trunk. We saw that certain representatives of the genus *Phiomia* gravitate towards such a type of structure of the jaw.

Other representatives of that genus, as we have seen, have on the contrary, as it were anticipitated, the type of the Kuban form described. Nor is this all, it would scarcely be incorrect to say that it is the latter that is most closely connected with the Lower-Tertiary *Phiomia* and has consequently most fully preserved the outward appearance of the latter. What adaptive tendency then does this form exhibit? The character of the deposits in which it was found cannot obviously assist us in the solution of this question; the terrestrial fauna discovered has been but accidentally found in marine deposits. We can therefore rely only upon morphological characters for this purpose and of these upon the parts of the skull alone, since the remaining osteological material is insignificant and may even possibly belong to another contemporaneously discovered Mastodon.

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[13]) Of great interest is SCHLESINGERS observation (l. c., s. 10) on a flatter position of the lower tusks in young specimens, as is evidenced by the areas of junction (l. c., Taf. I, fig. 4); these tusks only later assume a more oblique (in reference to the horizontal plane) position and obtain the character of a powerful instrument for loosening the earth. It is of no less interest that the lower milk tusks are flatter than the permanent tusks (cf. STEHLIN, Eclogae geologicae Helvetiae, Bd. XIX, No. 3, 1926, S. 693, and KHOMENKO. La faune méotique du village Taraklia, Trav. Soc. Nat. Bessarabie. v. III, 1911—1912, p. 43—44, pl. I, fig. 11—12); STEHLIN is correct in regarding this feature as having been preserved unmodified from the most ancient Proboscidea (l. c., S. 697).

These features in the structure of the skull in the Kuban form show that the latter did not the typical Mastodonts in their migration to the steppes and the fore its enormous and at the same time thin lower symphysis presents too weak an armature for digging the earth, which purpose was neither served by its spoon-like shape bent-up at its anterior end: it could only be adapted for soft moist ground. The reduction in the upper tusks indicates that the animal did not require them for pulling down branches or digging the earth, neither were they required as organs of

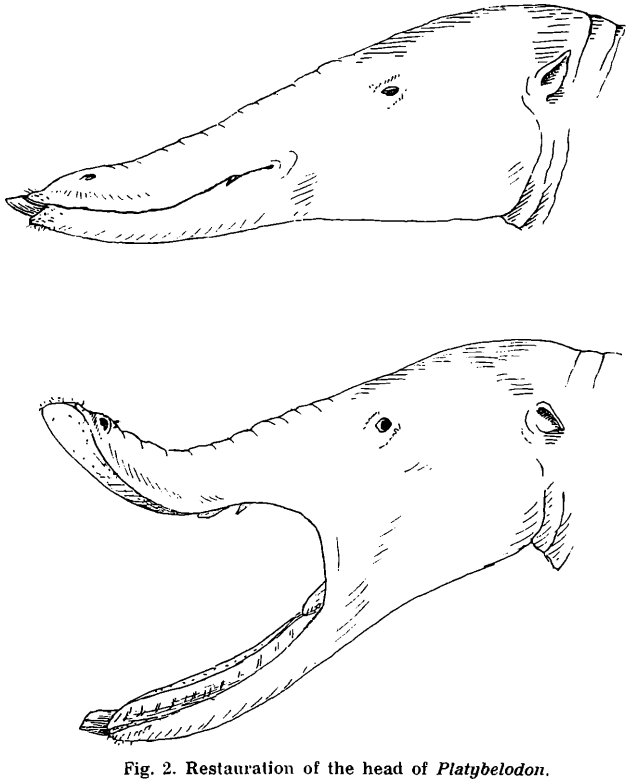

Fig. 2. Restauration of the head of *Platybelodon*.

defence, and it must therefore have had more reliable means of escaping from enemies. The above seems to indicate that this animal was driven in an opposite direction from the banks of the river to that followed by typical Mastodonts, in other words it fed and saught its safety from enemies in the water itself. To such a conclusion lead many other features in the structure of the animal, such as: the wide cup-like shape of the lower symphysis which contributed towards the retention of water plants from drifting away; an acceleration in the growth of complexity in the crowns of the molars in connection with the inusually rapid wearing out of the teeth, especially those

of the mandible (food with a large amount of silt, f[illegible] muddy water would first affect the lower jaw); lower tusks, pr[illegible] exposed but a short distance beyond the mandible, not only slen[illegible] but having lost their coating of enamel from the upper surface; perhaps, an incipient modification in the structure of the skull displayed by the diminution of the orbit. The animal, as also its Lower-Tertiary ancestors, was deprived of a trunk and similarly to them continued to seize its food with its muscular upper lip, covering the mandible; the lower tusks against which the upper lip pressed its food mixed with sand and mud therefore wore out along their anterior end from above; possibly this upper lip recalled the wide fore part of the muzzle of the *Hippopotamus*, although much more lengthened out. Neither had the animal probably acquired the large ear of the elephant[14]).

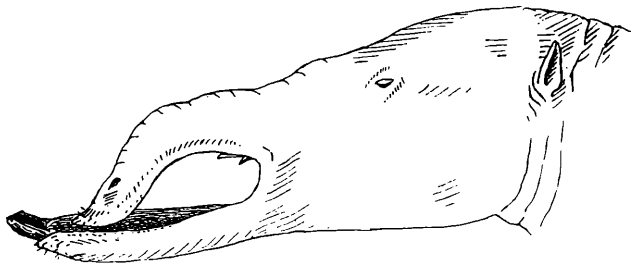

Fig. 3 The rinsing of plants by the upper lip.

Hitherto, in the restitution of the outward appearance of the head of our animal the lines of the reconstruction of *Palaeomastodon (Phiomia)* as supplied by OSBORN might be followed (Textfig. 2). The Kuban form, in comparison with its lower tertiary progenitors exhibits however a subsequent differentiation. It had acquired a wider and longer symphysis; the latter displays of the same time a much more marked constriction of its proximal end, — while its upper groove is so much narrowed that it may be doubted, whether the tongue of this animal could be long. It would be more correct to assume that the tongue did not protrude as far as the „spoon", where the food would be moved by the upper lip alone (Textfig. 3). Nor is that all; in connection with the narrowing referred to P. P. SUSHKIN has drown my attention to an adaptation described in rodents[15]) by which the fore part of the jaws, adapted to gnawing is insulated from the mouth proper where mastication is performed in order to protect the mouth from foreign matter attacked by the incisors in the act of digging the earth. In the form under

[14]) See OSBORN'S note in his Classification of Proboscidea, Palaeont. Hungarica. v. I, 1921—1923, p. 41.

[15]) B. VINOGRADOV, On the mechanism of gnawing and mastication in some fossorial Rodents. — Ann. Musée Zoolog. Ac. Sc. d'URSS, 1926, p. 275.

description there could be no enveloping of the incisors by the lip, as occurs in rodents *(Ellobius);* but it is admissible that in the constricted part the lips closed the mouth while the „spoon" collected aquatic plants which were being rinsed by the upper lip (Textfig. 4) before they entered the mouth, not without an addition of a certain quantity of mud (see above).

However that may be and quite independently of such a marked specialisation of the fore-part of the skull, the molars as we have seen, accomplish their evolutionary process in exactly the same way as the descendants of other branches of *Phiomia* constituting the subfamily Longirostrinae. In this circumstance we cannot but recognize a confirmation of the idea of the independent development of characters first proposed by W. KOVALEVSKY and which has led to such magnificent results in the phylogenetic schemes of the modern American school. If found isolated the teeth of the Kuban form could have been referred to the well known European form *Tetrabelodon angustidens* alone. And only a somewhat earlier developed complexity of their crowns, which should be attributed to the conditions of nourishment, may be regarded as exhibiting a specialization peculiar to them.

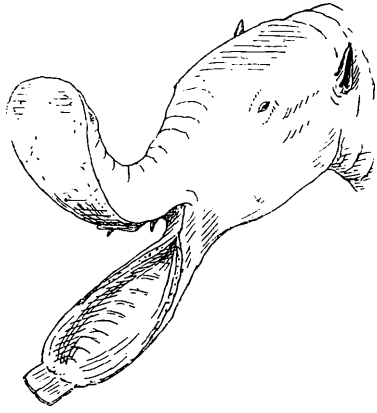

Fig. 4. The mouth is closed by lips.

The peculiar features in the structure of the form described, which do not conform to the diagnosis of any known genus, that of *Phiomia* included, affords grounds for regarding it is a distinct genus; in concordance with other generic names of Mastodonts as also in view of the shape of the lower tusks this genus could be given the name of *Platybelodon.* It may be characterised as possessing a mandible with a very well developed symphysis of a wide spoon-like shape corresponding with the wide and flat lower tusks, and a upper jaw provided with small tusks, its flat and wide anterior end projecting beyond the distal ends of these tusks; the grinding teeth of a complex bunolophodont type.

The peculiar direction in the adaptation of similar forms which have apparently not hitherto been ascertained simply because of the highly fragmentary condition of the remains (mainly in the form of detached teeth), should be emphasized by these forms being separated into a distinct subfamily *Platybelodontinae.*

Fig. 1. — 1/7.

Fig. 2. — 1/7.

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Fig. 1. — 1/7.

Fig. 2. — 1/7.

Fig. 3. — 2/5.

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Fig. 1. — $^{3}/_{5}$.

Fig. 2 — $^{2}/_{3}$.

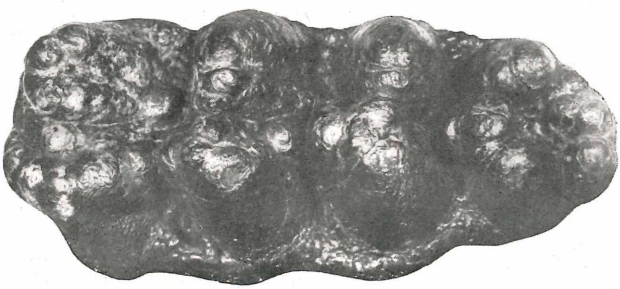

Fig. 3. — $^{1}/_{2}$.

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Addendum.

Since my manuscript was forwarded to the Editor of the Palaeobiologica I received from Prof. ABEL, who has seen my figures, a letter, in which he informs me of a new work by BARBOUR describing a mandible from a form closely related to the one from the Kuban, namely *Amebelodon Fricki* g. et sp. n., from the Upper Pliocene or Lower Pleistocene beds of Nebraska[16]). Although not in possession of that work, yet from a short description (with dimensions) and two figures (of the Mandible and M_3), very kindly communicated to me by ABEL concurrently with the letter referred to — for which I use this occasion to tender him my cordial thanks, — I venture to advance the suggestion that the form from Nebraska constitutes a subsequent step in the evolution of the same branch of Mastodonts, to which likewise belongs my *Platybelodon danovi*. A higher differentiation of the American form (to which corresponds its association with much more recent beds) is manifested in the following characters: a considerably larger size (length of mandible being 2133 mm, which in the Kuban form is > 1240 mm); relatively still larger size of symphysis (nearly twice the length of the mandible itself); presence in the latter of but one functional tooth (M_3); a further complication yet still in the same direction in the crown of the latter; the appearance of cement. It would seem that these distinctive features are of sufficient weight to warrant the retention for the Kuban form of a separate generic name; as regards the subfamily, however, it should according to the rules of priority retain the name given it by BARBOUR *(Amebelodontinae)*. The Nebraska discovery, besides zoogeographical importance, offers a proof of the wonderful vitality of this remarkable branch of Mastodonts.

[16]) The Nebraska State Museum. Vol. I, Bulletin 13, June, 1927.

Explanation of Plate III—V

Platybelodon danovi nov. gen. et spec. — Marine Tchokrak Beds (Middle Miocene) of the Kuban region in North Caucasus.

Plate III.

Fig. 1. Mandible, upper surface. — 1/7.
2. Mandible, lower surface. — 1/7.

Plate IV.

Fig. 1. Fragment of skull with mandible, side view. — 1/7.
2. Fragment of skull, palatal surface. — 1/7.
3. A second upper molar, crown surface. — 2/5.

Plate V.

Fig. 1. Third lower molar from the mandible (Plate III). — 3/5.
2. Third upper molar from the fragment of the skull (Plate IV, fig. 2). — 2/3.
Fig. 3. A third lower molar, crown surface. — 1/2.