

ZOFIA KIELAN-JAWOROWSKA

ARCHAEOLAMBDIDAE FLEROV (PANTODONTA) FROM THE
PALEOCENE OF THE NEMEGT BASIN, GOBI DESERT
(ARCHAEOLAMBDIDAE FLEROV (PANTODONTA) Z PALEOCENU KOTLINY
NEMEGT, PUSTYNIA GOBI)

(Plates XV—XVI)

Abstract. — A partial face with cheek teeth of *Archaeolambda* cf. *planicanina* FLEROV from the Paleocene of Naran Bulak Gobi Desert, is described and figured. The genus *Archaeolambda* FLEROV and the family Archaeolambdidae FLEROV are regarded as valid taxonomic units. The relations of Archaeolambdidae with other pantodontoid families are discussed.

INTRODUCTION

Archaeolambda FLEROV is a monotypic genus, erected by FLEROV (1952) for *A. planicanina* FLEROV, from the Paleocene¹ of the Nemegt Basin in South Gobi Desert. The monotypic family Archaeolambdidae was erected at the same time. *Archaeolambda planicanina* FLEROV was based on two fairly complete mandibles from Ulan Bulak and an incomplete maxillary fragment from Naran Bulak.

SIMONS (1960) regarded *Archaeolambda* FLEROV, 1952 as being a junior subjective synonym of *Haplolambda* PATTERSON, 1939. SIMONS based his opinion on similarities in the lower dentition of *Archaeolambda planicanina* FLEROV and *Haplolambda quinni* PATTERSON, stating (*l. c.*, p. 27): "The lower teeth of the Asian species do not exhibit any definitely distinguishing features from those of *Haplolambda quinni*, except that they are in most measurements about a quarter smaller". Unfortunately, the lower dentition of *H. quinni* was never figured in occlusal view, either by PATTERSON (1939) or by SIMONS (*l. c.*) and that is why it is difficult for the present writer to venture an opinion as to the real similarities of the lower dentition of the two species discussed here.

While the *Archaeolambda planicanina* mandible shows similarities to *Haplolambda*, this is not the case with the maxillary fragment, assigned by FLEROV to the same species. With regard to the upper dentition of *A. planicanina*, SIMONS stated (*l. c.*, p. 27): "The interruption in the posterior protocone crest of the upper P³ and P⁴ of *Haplolambda planicanina* is a real

¹ The Lower Tertiary beds of the Nemegt Basin were regarded by FLEROV (1952) as being of Eocene age. In the present author's opinion, it is still an open question whether these beds are of Upper Paleocene or Lower Eocene age. In the present paper, they are provisionally referred to as Paleocene (see also KIELAN-JAWOROWSKA & DOVCHIN, 1968, p. 16).

distinction from the condition here in the upper dentition of *Haplolambda quinni*, but this feature is probably of little taxonomic importance...". The only diagnostic feature of the upper teeth of *Archaeolambda planicanina* FLEROV, cited by SIMONS (1960, p. 28) is: "Protocone of P³⁻⁴ has a posterior crest broken by a cuspule, analogue to metaconule".

There are, however, some other features characteristic of the maxilla described by FLEROV, which are not *Haplolambda* in pattern. In FLEROV's specimen (1952, Figs. 1, 4 and Pl. 1, Fig. 1), P³, P⁴ and M¹ are subtriangular and asymmetrical, having the posterior branch of para-metacone V larger than the anterior one (the latter character recorded also by FLEROV (1952) in the discussion given on p. 47), while in *Haplolambda*, the upper premolars and molars are subrectangular and symmetrical.

Thus a careful examination of the maxillary fragment described by FLEROV casts doubt upon SIMONS' conclusion that *Archaeolambda* is a synonym of *Haplolambda*.

In the material collected by the Polish-Mongolian Palaeontological Expeditions of 1963 and 1964 in Naran Bulak (see GRADZIŃSKI *et al.*, 1968 Text-figs. 11—12), there are three fragmentary mandibles, assigned to *Archaeolambda planicanina* FLEROV and a maxilla with an almost complete cheek dentition, described here as *Archaeolambda cf. planicanina* FLEROV. The maxilla in question adds much that is new to our knowledge of the upper dentition of *Archaeolambda*, proving that the genus *Archaeolambda* FLEROV and the family Archaeolambdidae FLEROV are valid taxonomic units.

The first question, that of the pantodont material described by FLEROV and the present writer, is whether the mandibles and maxillae assigned to *Archaeolambda planicanina* are in fact conspecific.

Pantodonts are rare in the Paleocene of the Nemegt Basin and Khashaat (Gashato), which is of the same age. *Procoryphodon primaevus* FLEROV, described by FLEROV (1957) from Khashaat, is, as shown by SIMONS (1960) after MCKENNA's suggestion, a condylarthr which might be conspecific with *Phenacolophus fallax* MATTHEW & GRANGER, known from the same beds (see MATTHEW & GRANGER, 1925; MATTHEW *et al.*, 1929). Thus *Archaeolambda planicanina* FLEROV and *A. cf. planicanina* FLEROV are the only pantodonts known so far from the area discussed. The *A. planicanina* material from the Nemegt Basin consists of two mandibles from Ulan Bulak and one fragmentary maxilla and three fragmentary mandibles from Naran Bulak. The mandibles and maxilla assigned to *A. planicanina* fit each other in size, while the maxilla of *A. cf. planicanina* from Naran Bulak is 1.5 times larger. It seems very probable that the fragmentary maxilla and mandibles assigned to *Archaeolambda planicanina* are conspecific, as however they have not been found in occlusion, their conspecificity cannot be proved. As the type specimen of *A. planicanina* is a mandible (PIN No. 534—68), the assignment of the fragmentary maxilla (PIN No. 534—113) described by FLEROV, and the maxilla (Z. Pal. No. MgM-II/54) described by the present writer, to *A. planicanina* and *A. cf. planicanina* respectively, must be regarded, for the time being, as tentative.

The second question concerning the Archaeolambdidae, is the *Pantolambdodon* problem. GRANGER and GREGORY (1934) erected the new family of amblypod mammals Pantolambdodontidae, from the Shara Murun (Ulan Shireh) Upper Eocene beds from Mongolia. The only genus of this family, *Pantolambdodon* GRANGER & GREGORY, is represented by two species, both based on the lower jaws. The lower teeth of *Pantolambdodon* show close similarities to *Archaeolambda*, the latter genus being however about twice smaller. Recently Dr. MCKENNA (American Museum of Natural History) has recognized in the collections of the Institute of Palaeontology of the USSR Academy of Sciences in Moscow (personal communication) a Shara Murun upper premolar fragment of a pantodont, and kindly sent a cast of this fragment

to the present writer. The specimen PIN No. 2199—7 is incomplete, but it is unquestionably a pantodont upper premolar fragment, showing similarities to the *Archaeolambda* upper premolars, but distinctly larger than the latter.

The upper tooth of *Pantolambdodon* is incomplete and gives no information as to relationships between the Archaeolambdidae and Pantolambdodontidae. Whether or not Archaeolambdidae are just primitive members of the Pantolambdodontidae will only be decided when more upper teeth of *Pantolambdodon* are found.

The terminology used in the present paper is mostly that of VAN VALEN (1966). The materials here described are housed (see KIELAN-JAWOROWSKA & DOVCHIN, 1968, p. 12) in the Palaeozoological Institute of the Polish Academy of Sciences in Warsaw, for which the abbreviation Z. Pal. is used. The Palaeontological Institute of the Academy of Sciences of USSR in Moscow is abbreviated as PIN.

ACKNOWLEDGEMENTS

The present writer wishes to express her gratitude to Dr. MALCOLM C. MCKENNA (American Museum of Natural History) for sending her the cast of a pantodont premolar from Irdin Manha and for a discussion on *Pantolambdodon* problem. Thanks are also due to Dr. A. SULIMSKI for making the drawing published in the present paper, and to Miss M. CZARNOCKA, for taking the photographs.

Superfamily PANTOLAMBDOIDEA SIMONS, 1960

Family ARCHAEOLAMBDIDAE FLEROV, 1952

Revised diagnosis. — Small pantodonts, with size range as in *Pantolambda*. Cranium, post-cranial skeleton, incisors and upper canines unknown. No diastema. Lower canines not enlarged. P_1 compressed, with three tips arranged in anteroposterior direction. Talonids in lower molars shorter and narrower than trigonids. Upper premolars and molars subtriangular, increasing in size posteriorly, with external margin strongly incurved in the middle. P^1 one-rooted, P^{2-4} three-rooted. Para-metacone V in P^{3-4} and paracone-metacone W in M^{1-2} very large, extending for more than a half the width of the teeth, asymmetrical, having posterior part larger than the anterior. Postprotocrista in P^3 and P^4 interrupted by a deep fossa, separating protocone from metaconule. In M^{1-2} the conules, postcingulum and precingulum present, ectocingulum crescent-like. Hard palate short, choanae shifted anteriorly, situated opposite M^2 .

Stratigraphical and geographical ranges. — Paleocene of the Nemegt Basin, Gobi Desert.

Discussion. — In the structure of the hard palate and upper dentition, the Archaeolambdidae differ strongly from all known pantodonts, while their lower dentition shows similarities to certain barylambdids (*Haplolambda* PATTERSON). *Archaeolambda* approaches *Haplolambda* in not having the lower canines enlarged and in having small talonids in the lower molars. It differs, however, strongly from *Haplolambda* and all the other Barylambdidae in having the upper premolars and molars short transversely, asymmetrical and subtriangular, while they are symmetrical, subquadrangular and elongated transversely in the Barylambdidae. In *Archaeolambda*, M^1 is small by comparison with M^{2-3} (large in Barylambdidae), paracone-metacone W extends in *Archaeolambda* for more than half the width of the teeth (for one third in Barylambdidae). The large, cusp-like mesostyle characteristic of *Archaeolambda* does not occur in any barylambdids. In P^3 and P^4 of *Archaeolambda* there is a deep fossa on the post-protocrista, separating the protocone from a distinct, cusp-like metaconule. SIMONS stated

that a similar structure of P^{2-3} is characteristic of a barylambdid *Leptolambda schmidtii* PATTERSON & SIMONS (SIMONS, 1960, p. 29): "On the posterior protocone crest of the P^{3-2} can be seen an accessory cuspule, which resembles the cuspule present in *Haplolambda planicanina*". However, the photograph of the upper dentition of *Leptolambda schmidtii*, figured by PATTERSON and SIMONS (1958, Fig. 1), and SIMONS (1960, Fig. 11B), shows that in fact there is very little resemblance between the structure of the postprotocrista in premolars of *Leptolambda schmidtii* and *Archaeolambda planicanina*. While in *Leptolambda schmidtii* there is on the postprotocrista an accessory small cuspule, in *Archaeolambda planicanina* there is a deep fossa, separating the protocone from the distinct, cusp-like metaconule. The structure of the palate in the Barylambdidae, as far as the writer knows, has not been figured, and cannot be compared with that of Archaeolambdidae.

With regard to the Pantolambdidae, the Archaeolambdidae approach *Pantolambda* in their small size, in having P^1 one-rooted and the molars increasing in size posteriorly. The differences concern the smaller canines in the Archaeolambdidae, differently shaped P_1 and smaller talonids in lower molars. The upper premolars and molars are differently shaped, the external edge of M^{1-2} in Pantolambdidae forms a straight antero-posterior line, while it is strongly incurved in *Archaeolambda*. In Pantolambdidae V's of paracone and metacone are equally developed, and small in proportion to protocone V, while in *Archaeolambda* paracone-metacone W is asymmetrical, and large in proportion to protocone V. The fossa on the postprotocrista in P^{3-4} characteristic of *Archaeolambda* does not occur in the Pantolambdidae. In *Pantolambda bathmodon* (as figured in lateral view by MATTHEW, 1937, Figs. 38 and 39), as well as in *Pantolambda cavirictus* (MATTHEW, 1937, Fig. 43) the mesostyles are distinct, however, much smaller and quite different from the cusp-like mesostyles of *Archaeolambda*.

In the palatal structure there are strong differences between the representatives of the two families: the hard palate is longer in Pantolambdidae, the choanae being placed in *Caenolambda* (see GAZIN, 1956, Pl. 14) opposite M^3 , while in *Archaeolambda* opposite M^2 ; moreover, the distance between the molars on opposite sides is in *Caenolambda* twice as wide (in relation to the tooth width) as in *Archaeolambda*.

The Archaeolambdidae differ distinctly from the Titanioideidae in having smaller dimensions, in having the canines not enlarged and in the lack of diastema. P^1 is two-rooted in *Titanoides* GIDLEY, while one-rooted in *Archaeolambda*. Upper premolars and molars are symmetrical in *Titanoides*, while asymmetrical in *Archaeolambda*. The similarities in the upper molar structure concern the fact that both families have subtriangular teeth increasing in size posteriorly, with the external margin incurved in the middle. The paracone-metacone W is in *Titanioideidae* large in comparison to the Barylambdidae and Pantolambdidae, and occupies half the width of the teeth, but it is still wider in Archaeolambdidae extending for more than half the teeth width. The large, cusp-like mesostyle, characteristic of Archaeolambdidae, is lacking in the Titanioideidae. SIMONS (1960, p. 27) stated that the interruption of the posterior protocone crest, characteristic of *Archaeolambda planicanina*, occurs sporadically in *Titanoides*. Among the representatives of *Titanoides*, the upper dentition is known only in *Titanoides primaevus* GIDLEY, 1917, *T. gidleyi* JEPSEN, 1930, *T. simpsoni* SIMONS, 1960 and *Titanoides* sp. — described by SIMONS (1960, p. 39), but not figured.

GIDLEY (1917) and JEPSEN (1930) described only the lower dentition of the species erected by them, the upper dentition being figured for the first time by SIMONS (1960). However, on all the figures of various species of *Titanoides* given by SIMONS (1960, Figs. 10, D-F, and 14) the structure of P^{3-4} postprotocrista is different from that in *Archaeolambda*. Further differences between the two families concern the palatal structure. The palatino-maxillaris suture and

foramen palatinum major are placed in *Titanoides* opposite the middle of M^3 , while in *Archaeolambda* they are shifted anteriorly, and placed opposite P^4 - M^1 embrasure. Similarly choanae are placed in *Titanoides* more posteriorly, along the posterior edge of M^3 , while in *Archaeolambda* they are opposite M^2 . Lastly, the foramen palatinum major, lacking (?) in *Titanoides* (see SIMONS, 1960, Fig. 14), is present in *Archaeolambda*.

Genus *ARCHAEOLAMBDA* FLEROV, 1952

Diagnosis — as for the family.

Archaeolambda planicanina FLEROV, 1952

(Pl. XV)

1952. *Archaeolambda planicanina* n. sp.; K. K. FLEROV, Pantodonty..., p. 44, Figs. 1-4, Pl. 1, Figs. 1-5.

1960. *Haplolambda planicanina* (FLEROV); E. L. SIMONS, The Paleocene Pantodonta, p. 28.

Material. — Three fragmentary mandibles from the Paleocene sandstone, Naran Bulak, Nemegt Basin, Gobi Desert.

Discussion. — *Archaeolambda planicanina* mandibles have been described and figured by FLEROV (1952). The fragmentary mandibles in the collection of the present writer do not give much new information concerning the lower teeth structure of *A. planicanina*. They are figured in the present paper for sake of complete documentation of the *A. planicanina* material.

Archaeolambda cf. *planicanina* FLEROV, 1952

(Pl. XVI; Text-fig. 1)

Material. — One specimen (Z. Pal. No. MgM-II/54) from Paleocene of Naran Bulak, consisting of almost complete right and left maxillae, with a fragment of palate. The following teeth are preserved on the right side: a root of P^1 , incomplete P^2 , P^3 covered partially by dP^3 , dP^4 , M^1 , M^2 and fragment of M^3 , and on the left side: a root of P^1 , damaged P^2 and P^3 , dP^4 , M^1 , incomplete M^2 . DP^4 on the left side and fragmentary dP^3 on the right side have been removed intentionally, in order to show the structure of left P^4 and right P^3 preserved underneath.

Dimensions (in mm):

Z. Pal. No. MgM-II/54	P^3	P^4	M^1	M^2
Length	7.7	11.5	13.5	16.5
Width (in the midline)	9.3	13.3	14.5	14.5

Description. — *Dentition.* Roots of one-rooted P^1 are preserved on both sides. P^2 is three-rooted, on both sides somewhat damaged. It is subtriangular, with external margin strongly incurved in the middle, about as long as wide, with large paracone-metacone V and small

protocone. P^3 wider than P^2 , with posterior part of para-metacone V larger than the anterior one, protocone placed asymmetrically in the anterior part of the tooth, postprotocrista interrupted by a small fossa, separating protocone from a small metaconule.

Protoconule not developed. In P^4 , the outer margin is incurved in the middle and a narrow, semilunar ectocingulum is present in this incurvature. The para-metacone V is very large, extending for two thirds of the tooth width. This V is divided by a transverse furrow into two parts, sloping towards the middle, the posterior one larger than the anterior. Protocone V much

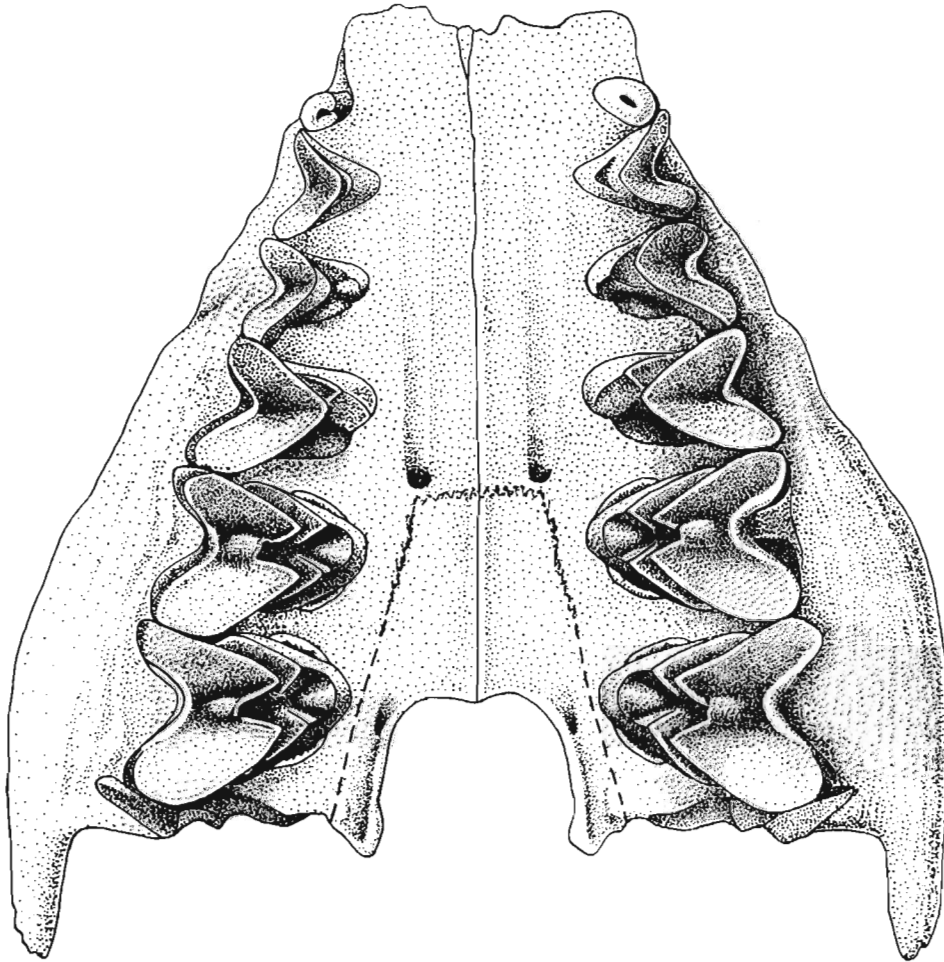


Fig. 1

Archaeolambda cf. *planicanina* FLEROV. Schematic drawing of the partial face in occlusal view, slightly restored; M^3 partially preserved; $\times 1.5$.

smaller than that of para-metacone, asymmetrical. The preprotocrista runs towards a distinct paraconule. Postprotocrista is interrupted by a deep fossa, separating the protocone from the metaconule. The metaconule is situated lower than the paraconule and distinctly larger.

On the distal part of the preparaconule wing, which runs in a prolongation of the preprotocrista, there are two small tubercles, arranged in the tandem. Similarly on the postmetaconule wing there is one small tubercule. These tubercles are not seen on the photograph,

since in the occlusal view they are hidden beneath the para-metacone V. Precingulum and postcingulum are very short, thread-like.

M¹ differs from M² only in size and they are described together. Outer margin is deeply incurved in the middle, with a crescent-like ectocingulum, present along the incurvature. The paracone-metacone W is very large, extending for about two thirds the width of the teeth, with posterior part larger than the anterior. Both sides of paracone-metacone W slope towards the middle of the tooth, to meet around a very large, prominent, cusp-like mesostyle, the base of which reaches the ectocingulum. Protocone V is conspicuous, but situated much lower than paracone-metacone W. Paraconule and metaconule distinct. Precingulum as large as postcingulum, prominent.

Only a fragment of M³ was preserved on one side, showing that M³ was large, situated somewhat outwards with regard to the outer line of the other molar teeth.

Milk dentition. Small fragment of right dP³ and right and left dP⁴ are preserved in the described specimen. DP⁴ is of the same general pattern as the milk dentition of other pantodonts, described by SIMONS (1960), being more molarised than P⁴. In the present case, it is very similar to M¹, having an asymmetrical paracone-metacone W well developed, with a characteristic large mesostyle in the middle. The outer margin is strongly incurved. Precingulum and postcingulum are well developed, much more prominent than in P⁴. Little may be said about the structure of the protocone and conules, as this part of the tooth is strongly worn. The milk teeth in the here described specimen differ strongly from the permanent ones in colour, being cream-coloured, while the permanent ones are dark brown.

Face. The palatine process of the maxilla is comparatively narrow and short, the transverse suture being situated opposite the anterior edge of M¹. Palatine groove is wide, deeper at the anterior palatine foramen, shallowing anteriorly. Posterior palatine foramen is smaller than the anterior one, fissure-like, situated opposite the posterior edge of palate (surrounding choanae). The preserved part of processus zygomaticus is comparatively massive. Foramen infraorbitalis is rounded, situated opposite P⁴, canalis intraorbitalis 1 cm long. Recessus maxillaris is flat, large, subtriangular, 3.5 cm long and 2 cm wide, with maxillary foramen at the apex of the triangle. The other foramina of the pterygopalatine fossa not discernible. The nasal surface of palatine process is convex in both longitudinal and transverse directions, nasal crest being very prominent. A longitudinal groove, bordered internally by a fine ridge, runs subparallel to the nasal crest in the anterior part of the nasal surface of palatine process.

Discussion. — The maxilla described in the present paper is 1.5 times larger than that of *A. planicanina*, described by FLEROV (1952). As FLEROV's maxilla is an adult specimen (provided with permanent premolars), and the present specimen belongs to a young individual (retaining milk dentition), it may be supposed that our individual, when adult, would have been more than 1.5 times larger than that of FLEROV. On account of such a difference in size, it is impossible to assign the maxilla here described to *A. planicanina*. As the specimen described by FLEROV is incomplete, a more detailed comparison is impossible. From the photographs and drawings in FLEROV's paper, it may be said that both maxillae are strikingly similar in the unique structure of P³ and P⁴, which indicates that without doubt they are congeneric.

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PLATES

Z. KIELAN-JAWOROWSKA: ARCHAEOLAMBIDAE FLEROV (PANTODONTA)

PLATE XV

Page

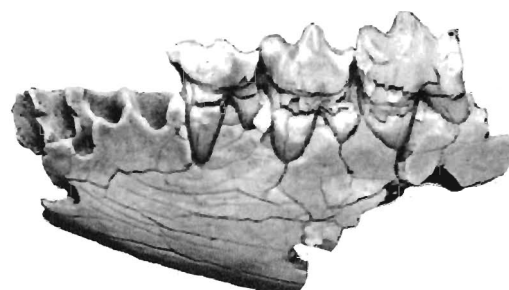
<i>Archaeolambda planicanina</i> FLEROV	137
(Naran Bulak, Nemegt Basin, Gobi Desert: Paleocene)	

- Fig. 1. *a* Incomplete left mandible with P_3 - M_1 in occlusal view, *b* the same specimen in lingual view, *c* the same specimen in labial view (Z. Pal. No. MgM-II/57); $\times 1.5$.
- Fig. 2. *a* Incomplete right mandible with damaged M_1 - M_3 in lingual view, *b* the same specimen in occlusal view, *c* the same specimen in labial view (Z. Pal. No. MgM-II/56); $\times 1.5$.
- Fig. 3. *a* Incomplete right mandible with P_2 - P_4 in occlusal view, *b* the same specimen in lingual view, *c* the same specimen in labial view (Z. Pal. No. MgM-II/55); $\times 1.5$.

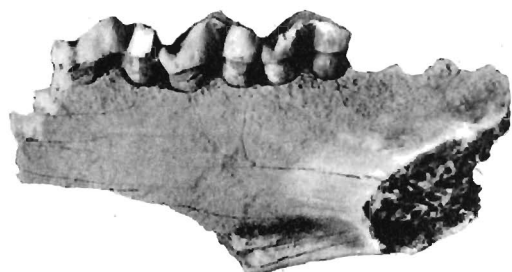
Photo: M. Czarnocka



1a



1c



1b



3a



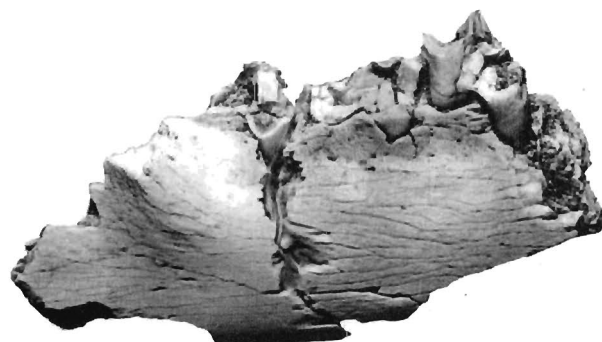
2a



3b



2b



2c



3c

Z. KIELAN-JAWOROWSKA: ARCHAEOLAMBIDAE FLEROV (PANTODONTA)

PLATE XVI

Page

Archaeolambda cf. *planicanina* FLEROV 137

(Naran Bulak, Nemegt Basin, Gobi Desert; Paleocene)

Fig. 1a. Stereophotograph of maxillae in occlusal view, with root of P¹, P², P³ partly covered by dP³, dP⁴, M¹, M² and fragment of M³ on the right side, and a root of P¹, damaged P², damaged P³, dP⁴, M¹, M² and fragmentary M³ on the left side; ×0.7.

Fig. 1b. The same specimen in dorsal view, nat. size.

Fig. 1c. The same specimen in lateral view, nat. size.

Fig. 1d. Part of the left maxilla of the same specimen in occlusal view, after removal of dP³, showing P⁴ preserved beneath; ×1.5.

Fig. 1e. Part of the right maxilla, after removal of fragmentary dP³, showing the structure of P³ preserved beneath; ×1.5.

(Z. Pal. No. MgM-11/54)

Photo: M. Czarnocka



1a



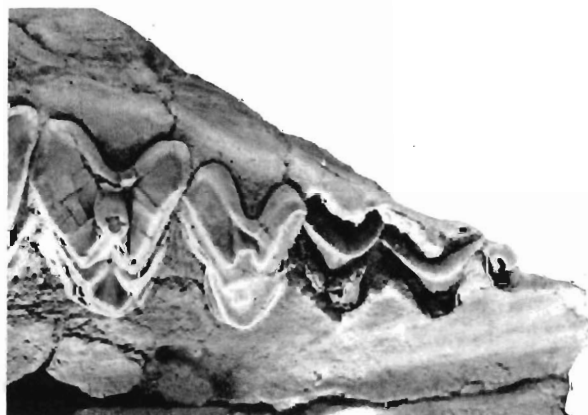
1b



1c



1d



1e