

A NEW LATE PLEISTOCENE (WÜRMIAN) MAMMAL LOCALITY FROM THE BASIN OF DRAMA (NORTHERN GREECE)

by

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Abstract: *In the northern part of the Drama basin near, the village Aggitis a new mammal locality occurs in an unconsolidated alluvial cone. The examined fauna shows that it belongs to Würm, and the climate is cold and steppe-like. The formation of the alluvial cone is due to tectonic effects which took place at Late Pleistocene.*

INTRODUCTION

The examined locality is situated in the basin of Drama, near the village Aggitis 25 km northwestern of Drama town (fig. 1). Near the locality there is a cave, named «Maara» and the river Aggitis springs from this cave. So the area of the cave is named «the springs of Maara». The fossils were found during the construction works for an entrance to the cave. Unfortunately these works destroyed many fossils. The locality is outside the cave and our efforts to find fossils in the cave had negative results.

GEOLOGY

The Drama basin has a NW-SE trend and it is parallel to the Strimon basin. It is surrounded to the north by the Falakron mountain, to the east by the Falakron and Lekani mountains, to the south by the Pagon mountain and to the west by the mountains Pagon and Menikion. The basin of Drama is connected with the Strimon's by a wide opening found between the villages Alistrati and Kormista. The river Aggitis drains the basin and has its course in the above opening from where it connects the river Strimon.

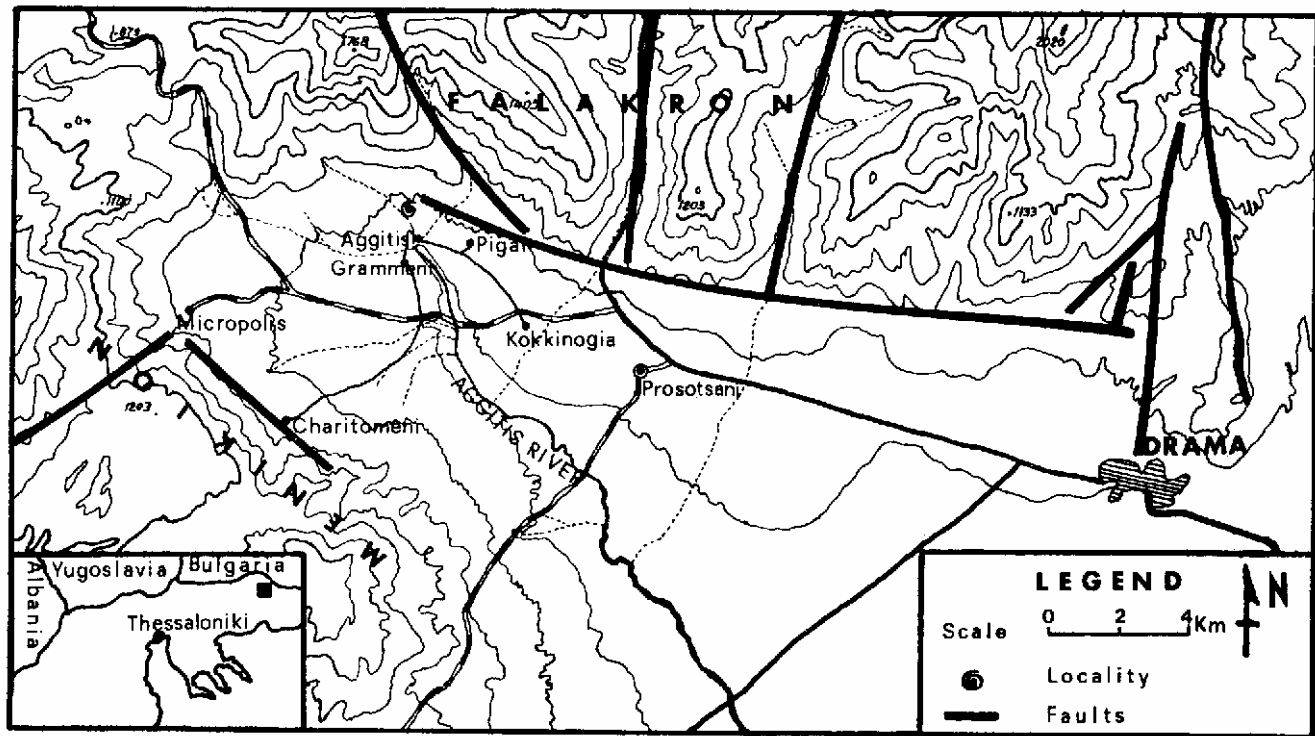


Fig. 1. Map showing the area of the locality. (The faults are coming from the map of OSSWALD, 1938).

The Drama basin belongs to the «Mass of Rhodope». The basement consists of Algonkian gneisses and marbles and Cambrian mica-schists and marbles with intercalations of amphibolite and mica schists (OSSWALD, 1938).

The basin is covered by the Neogene and Quaternary deposits of the area. The Neogene in the southern part of the basin, consisting of three series, is well understood from drillings during the study of the turf-peat deposits of the area (MELIDONIS, 1969).

a. Lower series, consisting of conglomerate, sand and lacustrine marl and clay. The clay contains lignites and probably belongs to Late Miocene or Early Pliocene. The lignitic deposits are covered by calcareous clay of probably Middle Pliocene age.

b. Intermediate series, consisting of a consolidated conglomerate and a sandy clay of fluvio-terrestrial origin.

c. Upper series, consisting mainly of grey sandy marl with intercalations of clay and sand. This series has a Late Pliocene age (*Candona* aff. *hodonensis*). The data about the presence of the Neogene in the northern part of the basin are few. The Neogene sedimentation in this part seems to begin with a conglomerate. The conglomerate consisting of gravels and pebbles from the basement (mainly from the marbles) is cemented by a red or reddish-brown intermediate material (KOCKELWALTHER, 1965). Near the village Charitomeni a conglomerate with marble-pebbles and white calcareous intermediate material, belonging to Pliocene, has been found (BOER, 1970).

The Pleistocene deposits of the basin consist mainly of a red clay and a loose fluvio-lacustrine conglomerate. In the southern part of the basin there is also a Late Pleistocene series of organic (turf-peat, soft lignite) and inorganic (clays, marls) sediments (MELIDONIS, 1969), which overlay the red clay and the conglomerate. At the boundaries between the basin and surrounding mountains there are many quaternary alluvial cones. The Holocene deposits are represented by lacustrine and fluvio-terrestrial formations, especially alluvial cones.

LOCALITY.

The locality is in a Pleistocene alluvial cone, situated in the northern part of the Drama basin, about 1 Km north of the village Aggitis (fig. 1). The fossiliferous cone consists (fig. 2) from below to upwards of:

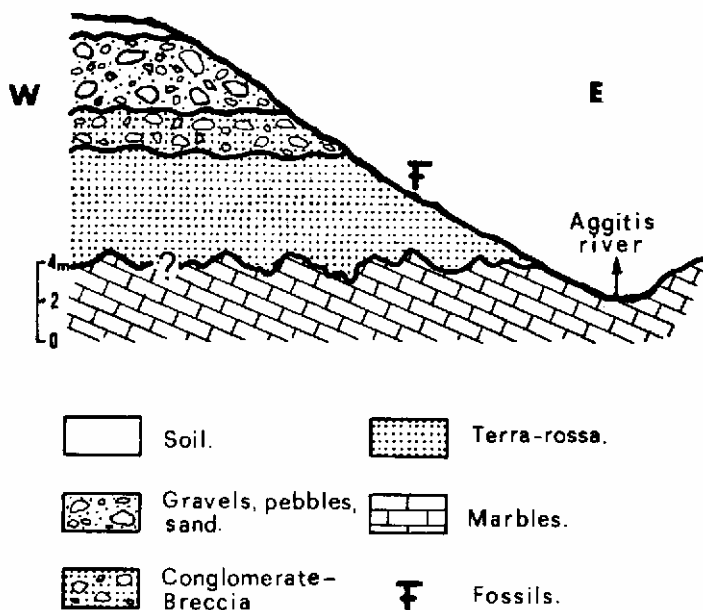


Fig. 2. Geological section of the locality.

- terra-rossa, with big pebbles from the basement.
- conglomerate-breccia, with pebbles, mainly from the marbles, loosely cemented.
- pebbles, gravels, sand.
- soil.

The fossils are found near the summit of the cone, in the upper part of the terra-rossa at a depth of about 10 m from the surface. The fossils are concentrated in little groups, consisting of pieces of jaws or bones, isolated teeth, little fragments of bones or teth from different animals. Complete bones or jaws are rare. The fossils must have been carried by water as to be so broken, separated and mixed.

PALAEONTOLOGY.

Dr. Lüttig studied the ostracods from the material of the drillings made into the Pleistocene deposits of the southern part of the basin (MELIDONIS, 1969) and found the species: *Candona albicans*, *C. marchica*, *C. rostrata*, *C. lobipes*, *C. candida*, *Candona* n. sp., *Dolerocypris* sp., *Stenocypris* sp., *Candona brisiaca*, *Cyclocypris ovum*, *Cyclocypris*

Mammuthus cf. primigenius (BLUMENBACH, 1799)

Material: m¹, AG-20; piece of the tusk, AG-19.

Measurements: m¹ AG-20.

DAP=130+ Lammellae's number=+10×
DT=67+ Enamel's thickness=2.0

Description: The tusk is so pressed laterally that it is difficult to measure its dimensions. It has a strong curvature as in the tusks of mammoths. The AG-20 is possibly a piece of m¹, which is partly destroyed. It has been cut in the middle to see and measure the preserved lammellae. The enamel is very plicated and its thickness is about 2.0 mm (this value is the mean of 10 measurements). The preserved lammellae are 10 and it is possible to have some others, maybe 2-4.

Discussion: The strong curvature of the tusk (AG-19) shows that it belongs to mammoths, since elephant tusks are almost straight. The AG-20 also seems that it is similar to some m¹ specimens of *M. primigenius* in Southern Greece (Megalopolis, Peloponissos) this species is mentioned by MELENTIS (1964) and the lamellae's number of m¹ is 9-15. CUENTHER (1977) describes *M. primigenius* from Taubach and gives the following dimensions about m¹: DAP=60-, DT=64. SICKENBERG (1962) refers the species *M. trogontherii* from Bornhausen (Austria). Its m¹ has 8½ - 10 lammellae and the enamel's thickness is 2.2 mm. The other fauna of Aggitis shows also that it belongs to Late Pleistocene and during this period *M. primigenius* lived while *M. trogontherii* lived during Early Pleistocene. Based upon these data the examined mammoth's specimens possibly belong to *M. primigenius*.

Equus caballus LINNAEUS, 1758

Material: 3p^{3,4} dex AG-3,3a,13; 3m^{1,2} AG-4,5,6; m³ dex AG-12; mandible with p₂-p₄ sin (in situ), AG-1; p₃-m₁ sin, AG-2; 2p_{3,4} dex, AG-7, 8; 2 distal part of Mc_{III}, AG-9, 10; tibia, AG-21; proximal part of Mt_{III}, AG-11.

Measurements:

p ^{3,4} dex	AG-3	34.5×29.0
p ^{3,4} dex	AG-3a	34.6×27.3
p ^{3,4} dex	AG-13	34.5×31.2
m ^{1,2} dex	AG-4	29.7×28.5
m ^{1,2} sin	AG-5	28.3×30.7
m ^{1,2} dex	AG-6	30.2×30.0
m ³ dex	AG-12	31.0×—

Mandible with p ₂ -p ₄ sin (in situ) AG-1.			
	p ₂	37.5×18	
	p ₃	31.9×21.6	
	p ₄	32.2×22.2	
	p ₂ -p ₄	106.0	
p ₃ -m ₁ sin AG-2.			
	p ₃	33.5×18.4	
	p ₄	34.8×15.5	
	m ₁	35.7×17.4	
p _{3,4} dex	AG-7	32.2×—	
p _{3,4} dex	AG-8	32.8×20.6	
Distal part of Mc _{III}			AG-9 AG-10
	DT _{dist.} at protuberances.		55 55
	DAP _{dist.} »		56 56.8
	DT _{dist. art.}		42.3 40.5
	DAP _{dist. crest.}		30.2 29.5
Tibia			AG-21
	H		410
	DT _{prox.}		102
	DAP _{prox.}		89
	DT _{dist.}		95
	DAP _{dist.}		51
	DT _{distaph.}		60
Proximal part of Mt _{III}			AG-11
	DT _{prox.}		58.7

Description: The upper cheek teeth are big and high-crowned. The fossettes are free and low-plicated. The plications are more at the posterior end of the prefossette and at the anterior end of the postfossette. The protocone is elongated and it has a sinus at the internal border. The pli-caballin is simple and elongated so as to touch the protocone in a high wear stage. The hypocone is well developed and elliptic with a deep hypoconal sinus.

The lower cheek teeth are big, hypsodont, with well developed protostylid. The external depression is deep with a clear ptychostylid. The metaconid is rounded and the metastylid elliptic.

Discussion: The examined horse specimens belong to a big form as we can see from their dimensions. During Late Pleistocene *E. c. mosbachensis* and *E. c. germanicus* lived. The first is a big-sized form, known

from the locality Mosbach (Germany). The upper cheek teeth are moderately plicated with an elongated protocone. The lower cheek teeth have a rounded metaconid and a sub-triangular metastylid, distinguished from the first by a large depression. A horse named *E. c. cf. mosbachensis* (PRATT, 1968) is known from the Russian locality of La Micoque (France). This form is similar to the examined specimens especially in the morphology of the cheek teeth but the dimensions of the teeth and bones are smaller than those of the Aggitis specimens.

E. c. germanicus is the other big form of Late Pleistocene. It has big dimensions and relatively small teeth (GROMOVA, 1949). The teeth are caballoid and there are not important differences from the other forms, but it differs from them by its massive extremities, especially metapodials. The breadth of the distal end of Mc_{III} is 53.5-57 mm, while the tibia's dimensions are: $H=364-370$, $DT_{prox}=103-110$ and $DT_{dist.}=85-88$ mm (GROMOVA, 1949). The examined specimens have similar dimensions with those of *E. c. germanicus*. Maybe the Aggitis horse belongs to *E. c. germanicus* but there is no certainty about this, because there are not many specimens. The Aggitis horse does not seem to belong to *E. c. mosbachensis*, because this horse lived during Early-Middle Pleistocene while the accompanying fauna of the Aggitis locality gives a Late Pleistocene age.

***Coelodonta antiquitatis* (BLUMENBACH, 1799)**

Material: p^4 sin, AG-16.

Measurements: p^4 sin, AG-16 36.5×50+

Description: The tooth is well preserved and it is at a high wear stage. The fossettes are free. The postfossette forms an islet in the posterior part of the tooth. The crochet, crista and anterochet are well distinguished at the prefossette. The ectoloph inclines inward and it is higher than the other lophes of the tooth.

Discussion: A skull of *Coelodonta antiquitatis* is known from Megalopolis (MELENTIS, 1965). The toothseries of this skull are well preserved but the teeth are more worn than the AG-16. The fossettes are free, but the stylids of the prefossette are not clear. The dimensions of the two p^4 are: $DAP=35-35.6$ $DT=58.4$. In p^4 of *C. antiquitatis* the frequency of the presence of the crochet is 97.1%, of the crista 95.8%, and of the anterochet 15.9% (GUERIN, 1980). The p^4 dimensions of *C. antiquitatis* are $DAP=(35.5) 43.0$ (58), $DT=(41.5) 47.16$ (54), (GUERIN, 1980).

C. antiquitatis is the woolly rhinoceros, that lived during the glacial periods Riss and Würm (GUERIN, 1980). It was found with *M. primigenius* and *Bos primigenius* in Megalopolis (MELENTIS, 1965) during Würm and it characterizes a steppe environment. The presence of this rhinoceros in the Aggitis locality shows that the fauna is glacial, probably Würmian.

Megaloceros giganteus (BLUMENBACH, 1803)

Material: Mandible with m_2 - m_3 sin (in situ), AG-18.

Measurements: Mandible with m_2 - m_3 sin, AG-18.

m_2 27.6×20.7

m_3 40.7×20.2

Description: In a piece of the mandible the teeth m_2 - m_3 are partly preserved. The anterior part of m_2 and the talonid of m_3 were destroyed. The teeth does not become thinner from the base to the occlusal surface and their outer walls are vertical. The fossetes are free and the talonid of m_3 is well developed. There is no styloid between the two lobes of the teeth.

Discussion: *Megaloceros giganteus* is a deer with very big dimensions. It appeared in the Riss and lived until the end of the Pleistocene. The dimensions of m_3 is 43.0×20.0 (TEHNIUS, 1956-59). *Cervus elaphus* is smaller and its teeth dimensions are: m_2 =24.5×15.5, m_3 =32.1×15.6 (KAHLKE, 1977). The genre *Megaloceros* is found in many Würmian European localities (GUERIN, 1980).

Cervus sp. LINNAEUS, 1758

Material: p^3 dex, AG-17; first phalanx, AG-15.

Measurements: p^3 dex AG-17 17.2×9.0+
 First phalanx AG-18
 $DT_{prox.}=60$ $DAP_{mjn-dlaph.}=17.3$
 $DAP_{prox.}=22$ $DT_{dist.}=19.5$
 $DT_{min-dlaph.}=16.2$ $DAP_{dist.}=16$
 $DAP_{dlaph.}=20$

Description: In a small piece of the mandible bone p^3 is well preserved. It is high-crowned and shows a small cingulum at the base. The outer wall of the teeth is almost vertical. The phalanx seems to belong to a young individual and the proximal epiphyse is partly destroyed.

AGE

The examined species are characteristic of Late Pleistocene and the mammoth and rhinoceros show the glacial character of the fauna. So these animals lived during a cold period of Late Pleistocene.

The fauna of the two glacial periods consists of (TERMIER, 1960):

Riss: *M. primigenius*, *Palaeoloxodon antiquus*, *C. antiquitatis*, *Rangifer tarandus*, *E. caballus*, *Cervus elaphus*, *Bison priscus*.

Würm: *M. primigenius*, *C. antiquitatis*, *Rangifer tarandus*, *E. caballus*, *Ursus spelaeus*.

The Aggitis fauna resembles the above mentioned ones and the problem is if it is Rissian or Würmian. The presence of the species *U. spelaeus*, which is abundant in the Würmian faunas (GERBER, 1973) shows that the Aggitis fauna must belong to this period. The similarity of the Aggitis horse with the subspecies *germanicus* which is Würmian is another factor about the age of the fauna. GUERIN (1980) describes for the Würm (zone 26) the following fauna: *Dicerorhinus mercki*, *D. hemitoechus*, *C. antiquitatis*, *E. c. germanicus*, *R. tarandus*, *M. primigenius*, *U. spelaeus*. This fauna is similar to the Aggitis one and, based upon all the above mentioned data the Aggitis locality must belong to Würm.

GEOLOGICAL CONCLUSIONS

As was mentioned at the beginning the fossils found near the summit of an alluvial cone, at the boundaries of the Drama basin and Falakron mountain. It must be accepted that before the formation of the cone, tectonic events occurred resulting in the renewal of the erosion and the subsequent formation of cones at the boundaries between the basin and surrounding mountains. OSSWALD (1938) accepts two tectonic actions in the basin, one during Early Pleistocene and the other during Late Pleistocene. The first was confirmed by the fossils of Volax (Early Pleistocene). The locality of Volax is in an old consolidated alluvial cone and the fossils are in a very hard terra-rossa (SICKENBERG, 1968).

It appears that something similar happened in the Aggitis area during Late Pleistocene. During the interglacial Riss/Würm a cover of terra rossa was formed on the marbles of Falakron and during Würm the fossils were formed. During or after this stage, tectonic events renewed

the erosion. At the beginning, the cover of terra-rossa with the fossils therein was carried to the basin and formed the lower beds of the cone. Then the marbles began to be cut into pieces by the erosion which was higher during the glacial periods. The materials of this erosion (pebbles, gravels, sand) were carried to the basin and formed the top of the cone. So it is thought that the locality of Aggitis confirms alongside biological data, the opinion of OSSWALD (1938) that during Late Pleistocene tectonic effects took place in the Drama basin.

PALAEOCLIMATOLOGY

The fauna of the Aggitis locality has a steppe character (*Mammuthus*, *C. antiquitatis*). *M. primigenius* was found in the southern part of the basin (MARINOS, 1965) and it is thought that this species had a wide spreading in the area where the steppe prevailed. Palynological researches in the materials from the drillings of the southern part of the basin (MELIDONIS, 1969) showed that during Würm, the environment is steppe (*Artemisia*, *Chenopodium*).

These opinions were confirmed by the study of the periglacial geomorphology of Menikion (VAVLIAKIS, 1981) which showed that during Würm the area was a steppe. The new Würmian fauna of Aggitis with the steppe character confirms biologically the above mentioned opinion and it can be accepted that during Würm the climate of Eastern Macedonia was cold and steppe-like.

ACKNOWLEDGMENTS

Many thanks to Mr. J. Kappas and Mr. Th. Karagiannidis for giving me information about the new locality. Prof. John Melentis is thanked for critically reading the manuscript. I also thanked Dr. E. Vavliakis for giving me informations about the geomorphology of the area.

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ΠΕΡΙΛΗΨΗ

ΝΕΟ ΑΠΟΛΙΘΩΜΑΤΟΦΟΡΟ ΚΟΙΤΑΣΜΑ ΘΗΛΑΣΤΙΚΩΝ ΤΟΥ ΑΝΩ- ΤΕΡΟΥ ΠΛΕΙΣΤΟΚΑΙΝΟΥ (ΒΟΥΡΜΙΟ) ΑΠΟ ΤΗ ΛΕΚΑΝΗ ΤΗΣ ΔΡΑΜΑΣ (ΒΟΡΕΙΑ ΕΛΛΑΔΑ)

ὑπὸ

ΓΕΩΡΓΙΟΥ Δ. ΚΟΥΦΟΥ

(*Εργαστήριο Γεωλογίας καὶ Παλαιοντολογίας Πανεπιστημίου Θεσσαλονίκης*)

Ἐξετάζεται ἀπὸ παλαιοντολογικῆς καὶ γεωλογικῆς ἀπόψεως ἓνα νέο ἀπολιθωματοφόρο κοίτασμα θηλαστικῶν, ποὺ βρέθηκε στὸ βόρειο ἄκρο τῆς λεκάνης τῆς Δράμας μέσα σ' ἓνα ἄλλουβιακὸ κῶνο μὲ χαλαρὰ συνδεδεμένα ὕλικά. Τὰ εἶδη ποὺ προσδιορίστηκαν εἶναι: *Ursus, spelaeus, Mammuthus cf. primigenius, Equus caballus, Coelodonta antiquitatis, Megaloceros giganteus, Cervus* sp. Ἡ πανίδα αὐτὴ δείχνει ὅτι τὸ κοίτασμα εἶναι τοῦ Ἄν. Πλειστοκαίνου (Βούρμιο) καὶ ὅτι τὴν ἐποχὴ ἐκείνη ἐπικρατοῦσε κλίμα ψυχρὸ στεππικόν. Ὁ σχηματισμὸς τοῦ κώνου ὀφείλεται σὲ τεκτονικὲς δράσεις ποὺ ἔγιναν στὸ Ἄν. Πλειστόκαινο καὶ εἶχαν ὡς ἀποτέλεσμα τὴ βύθιση τῆς λεκάνης καὶ τὴν ἀνανέωση τῆς διαβρώσεως, ὥστε νὰ ἀρχίσει ἡ μεταφορὰ ὑλικῶν ἀπὸ τὰ γειτονικὰ βουνὰ πρὸς τὴ λεκάνη. Τὰ ὑλικά αὐτὰ σχημάτισαν ἄλλουβιακοὺς κώνους στὰ ὄρια τῆς λεκάνης μὲ τὰ γειτονικὰ βουνά.

TABLE I

Ursus speleaus

Fig. 1. Fifth metacarpal, AG-14, anterior view. Nat. size.

Mammuthus cf. primigenius

Fig. 2. Part of a tusk, AG-19. 1/4 Nat.

Coelodonta antiquitatis

Fig. 3. p^4 sin, AG-16, occlusal view. Nat. size.

TABLE II

Mammuthus cf. primigenius

Fig. 1, 2. m^1 , AG-20, the surface of the two parts of the cut tooth. Nat. size.

TABLE III

Equus caballus

Fig. 1. $p^{3,4}$ dex. AG-3, 3a, occlusal view.

Fig. 2. Mandible with p_2-p_4 sin (in situ), AG-1, occlusal view.

All nat. size.

TABLE IV

Equus caballus

Fig. 1, 2. Distal part of Mc_{III} , AG-9, 10, anterior view. 1/2 Nat.

Fig. 3. Tibia, AG-21, anterior view. 1/4 Nat.

TABLE V

Megaloceros giganteus

Mandible with m_2-m_3 sin (in situ), AG-18.

Fig. 1. Occlusal view.

Fig. 2. Labial view.

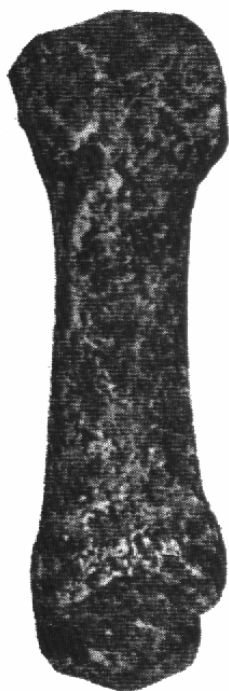
Cervus sp.

Fig. 3. p_3 dex, AG-17, occlusal view.

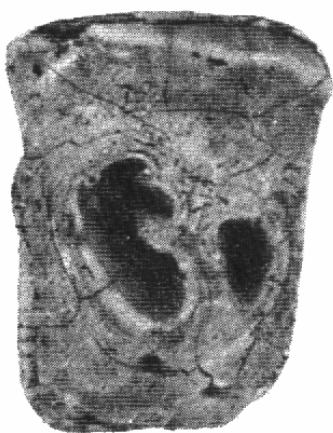
Fig. 4. First phalanx, AG-15, anterior view.

All nat. size.

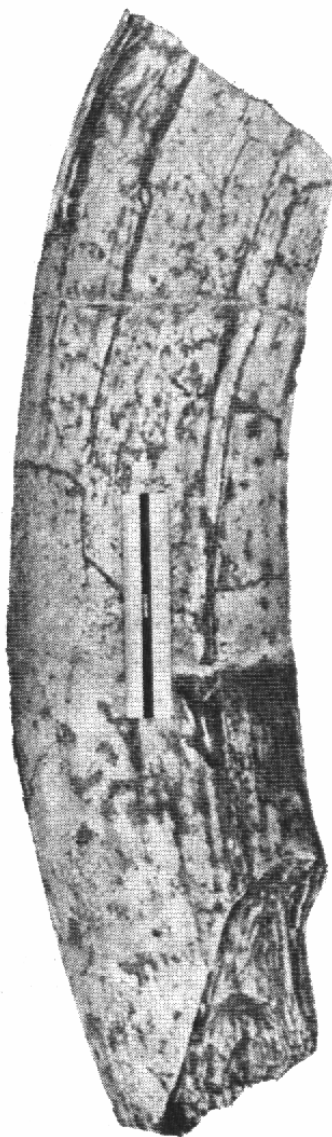
TABLE I



1

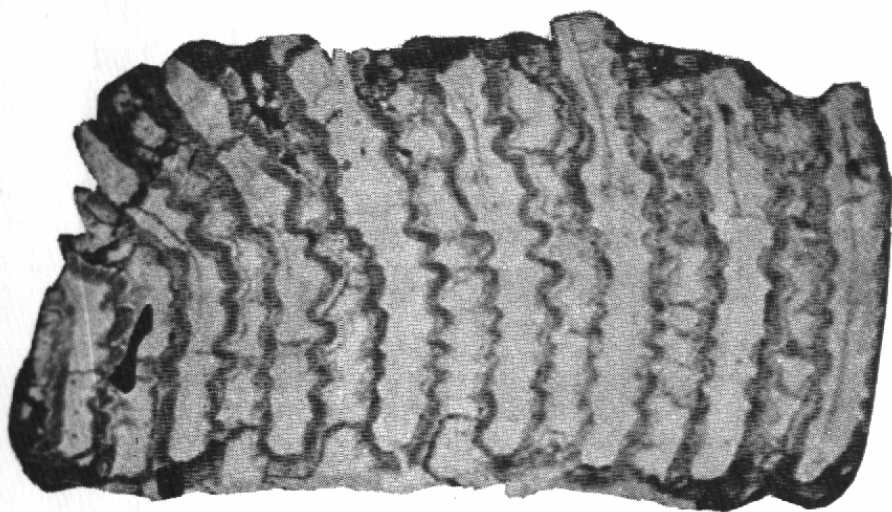


3

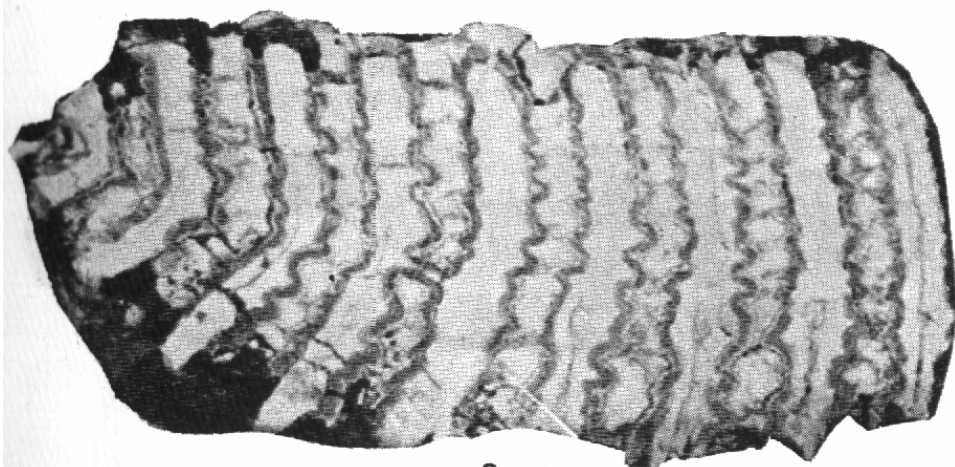


2

TABLE II

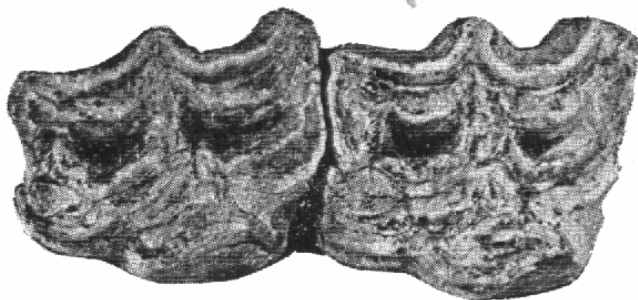


1

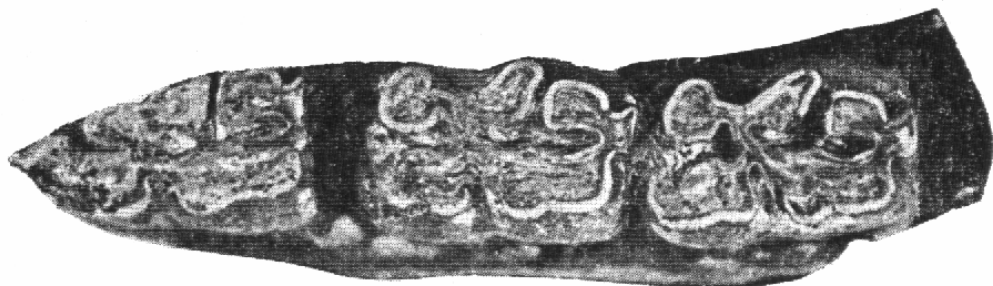


2

TABLE III



1

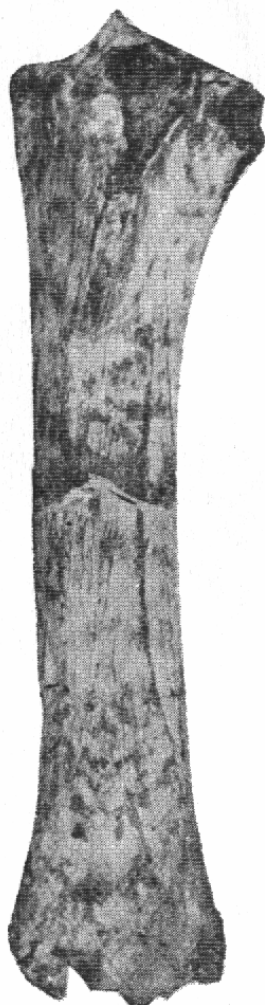


2

TABLE IV



1



3

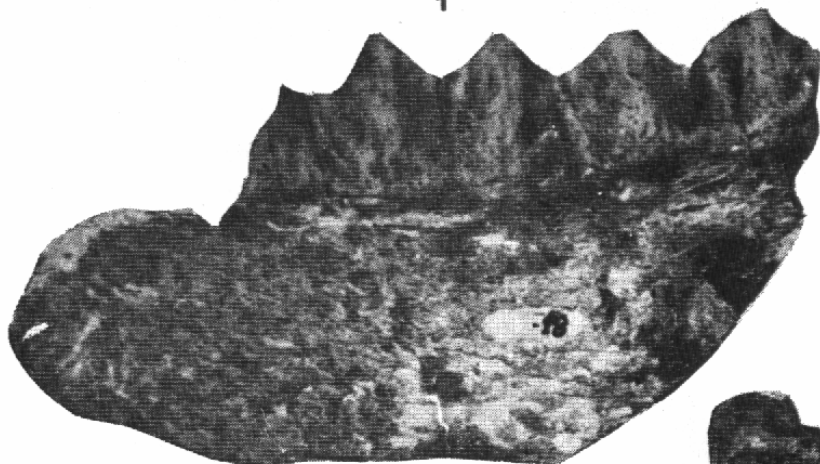


2

TABLE V



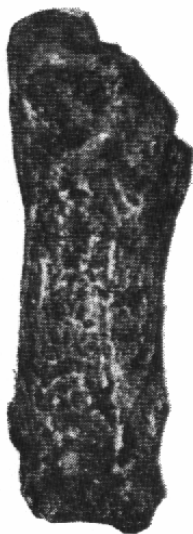
1



2



3



4