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*AGRIOTHERIUM INTERMEDIUM* N. SP. FROM THE PLIOCENE  
BONE BRECCIA OF WĘŻE

Study on the Tertiary bone breccia Fauna from Węże  
near Działoszyn in Poland

PART VIII \*

*Abstract.* — The writer describes fragments of dentition of *Agriotherium* Wagn. (= *Hyaenarctos* Falc. & Cautl.) from the Pliocene bone breccia recovered at Węże near Działoszyn, Poland. He refers these remains to an individual of a new species from genus *Agriotherium intermedium*, which occupies an intermediate systematic position between *A. insigne* (Gerv.) from Montpellier in France and *A. siwalense* (Falc. & Cautl.) from Siwalik in India, in what concerns the shape of the crown of molars, that of  $M^2$  in particular.

## DESCRIPTION OF MATERIAL

The bone breccia discovered at Węże near Działoszyn from which the writer has already described *Arctomeles pliocaenicus*, *Ursus wenzensis* and *Nyctereutes* sp.<sup>1</sup>, all belonging to the group of carnivores, has also yielded the remains of *Agriotherium* (= *Hyaenarctos*), another carnivore whose size greatly exceeds that of any other animal forms associated with the said breccia.

The remains here considered are small, mostly detached fragments, mainly referable to one individual.

1) The largest of these remains is a fragment of the right upper jaw, showing remnants of the fourth premolar and the first and second molars in a damaged condition.

The other remains consist of:

2) lingual edge of crown of left upper second molar ( $M^2$ );

\* Parts I-V — see *Acta Geol. Pol.*, vol. II-V/1952-55; parts VI-VII — *Acta Palaeont. Pol.*, vol. I/1956.

<sup>1</sup> *Arctomeles pliocaenicus* n. gen. & sp. from the Melinae subfamily. *Acta Geol. Pol.*, vol. II/1951. *Ursus wenzensis*, new species of a small Pliocene bear. *Ibid.*, vol. III/1953. *Nyctereutes* (Canidae) in the Pliocene of Poland. *Ibid.*, vol. IV/1954.

- 3) broken off external cusp of right upper first molar ( $M^1$ );
- 4) posterior portion of the right upper fourth premolar ( $P^4$ );
- 5) fragment of left mandible with remnants of lower fourth premolar ( $P_4$ );
- 6) a detached, well preserved lower third incisor ( $I_3$ );
- 7) a likewise beautifully preserved complete left lower first molar ( $M_1$ );
- 8) right lower first molar ( $M_1$ ), slightly damaged.

The fragment of right maxilla, mentioned at the head of the here specified remains, is, by far, the most diagnostic specimen.

The upper fourth premolar of this fragment of maxilla is badly damaged, the crown and the anterior part being altogether missing. The outline of the base of the crown in the posterior end of tooth, however, as well as the outline of its root are discernible. Not much inference can be drawn from this tooth as regards its shape and size. The only conclusion of some probability is that the length of the tooth had been 29 mm. In this it agrees with the size ascertained for that same tooth in *Agriotherium insigne* (Gerv.) by Ch. Frick (1926—30). The figure of the 29 mm length has been obtained by taking into account the 12 mm length of the broken off posterior cusp (metacone) of the tooth under item 4, and by comparing it with the same cusp in *A. insigne* (Gerv.) from Montpellier which is likewise 12 mm long, as figured by Frick (1926-1930, fig. 20) in a natural size drawing of the complete crown of the upper fourth premolar.

The upper first molar ( $M^1$ ) in this fragment is likewise in a very poor state of preservation, as all the four cusps are missing, having been partly broken off after the animal had perished and partly worn down, namely in the lingual side of the crown. On the preserved base of crown, however, it is possible to recognize its outline and measure its size. The base shows to be of sub-quadrate shape with corners somewhat rounded. Externally the tooth is 26 mm long, 25 mm medially and 22.2 mm internally. The crown of the tooth is thus narrower lingually and with inner border more rounded. The crown, as measured at mid-tooth length is 25 mm wide. The size of the external posterior cusp (metacone) in this tooth may be figured out by measuring the broken off cusp of another  $M^1$ , under item 3. This cusp, as measured externally, is 15 mm high including the cingulum, 10 mm without the cingulum, and 13 mm wide. The summit of the cusp is pointed, the edges conspicuous, the surface wrinkled, this being better recognizable on the external side of the cusp.

The upper second molar ( $M^2$ ) is in a far better state of preservation, the paracone and the external border only being missing. Perfectly preserved are its second external cusp (metacone) and the whole lingual

part of the crown, including the cingulum, and the ridge running lengthwise through the centre of the tooth. The crown of this tooth is likewise sub-quadrate in shape, with rounded angles. The length here is 23.5 mm externally, 24.5 mm at mid-length and 25.2 mm on the lingual side; the width is 26 mm anteriorly, 25 mm medially and 24 mm posteriorly. These three dimensions are only approximate since the external border has not been preserved and only the transition of the root into the crown is anteriorly well discernible. The height of the metacone as measured externally, without the cingulum, as this is missing, is 6.8 mm, the length of the edge descending lingually is 8 mm, that of the posterior edge, measured to the inner border of the here present cingulum, is 9 mm. The cusp is in the shape of an almost regular pyramid, with well showing anterior, lingual and posterior edges, and finely wrinkled surface. This cusp was separated from the anterior cusp (paracone) by a rather prominent depression. A gently curving rib, in the shape of a diagonal extending lingually to the posterior angle of the square, and well preserved over its complete length, branches off from the posterior border of the missing paracone. It is difficult to indicate the exact position of the lingual cusps on this rib. The greatest height, 3.8 mm, is attained by the rib medially, opposite to the depression separating the paracone from the metacone. It is also here that the rib attains its maximum width of 6.5 mm, while at its initial and terminal part it is 3.8 and 3 mm respectively. An elongated, more or less triangular area separates the rib along its entire length from the sharply outlined border of crown, formed by the cingulum. This flat area is covered by densely arranged but shallow wrinkles. There is no lingual extension whatever of the posterior end of the crown, i. e. no talon. The circumference of the tooth consists of a single cingulum, particularly high (6.8 mm) on the lingual side of the crown.

A detached fragment of the lingual edge of the left upper second molar (item 2) is probably referable to the same individual even though its length (26.5 mm) exceeds somewhat that of the lingual border of the just described  $M^2$ . In this fragment also is the dense transverse wrinkling readily recognizable over the surface separating the rib from the cingulum.

A fragment of the left mandibular branch has been recovered consisting of a part extending from the posterior end of the canine to the beginning of the first molar ( $M_1$ ). The length of this fragment is 48 mm, the height — 51 mm. Of the dentition a trace of the lower third premolar ( $P_3$ ) has been preserved, with fragment of a single root embedded in a rather small alveolus, 5 mm in diameter, also of the lower fourth premolar ( $P_4$ ) directly adjacent. It is this remnant of the fourth premolar

which made it possible to ascertain the exact length of the tooth to be 18 mm and its maximum median breadth as 10 mm. The area between the canine tooth which is missing here, and the alveolus of the third premolar does not show any trace of teeth.

Very well preserved is the crown of a detached left lower third incisor ( $I_3$ ). In shape it markedly resembles the crown of this incisor in bears. A smaller accessory cusp branches off laterally towards the canine from the main shaft of the crown. It is externally separated from the central shaft by a shallow groove, while lingually three ribs descend from the summit of the crown to its base, namely along the inner edge of the shaft, medially, and from the external edge, uniting at the base of the crown. The height of the central shaft measured externally from the base of the crown is 17.5 mm, that of the side branch 13 mm; the summit of the shaft overtops by 4.5 mm the summit of the side cusp. The width of the crown measured at the base is 11 mm, while the thickness of the tooth at its base is 12 mm.

In a very satisfactory state of preservation are also two detached specimens of the right and left mandibular first molars. They both, probably, belonged to the same individual as they differ neither in shape nor in dimensions. Their size is rather large, the basal length of the crown being 37 mm, frontal width 17.5 mm, that in the middle along the line of the central cusp (protoconid) 18.7 mm, while at the end, within the talonid, it is 20.5 mm. The principal cusp (protoconid), which is strongly developed, attains 21 mm when measured from the lower border of the cingulum on the outside. Its basal width is 16 mm, the length 14 mm. A distinct narrow ridge, 10 mm long, runs from the summit anteriorly, uniting directly with the posterior ridge of the preceding anterior cusp. The shorter (4 mm) posterior ridge bifurcates only just a little below the summit to form two sharply outlined ridges, 8 mm in length, which encircle the flat triangular posterior wall of the cusp, steeply descending to the depression of the talonid. The lateral external ridge is poorly discernible, whereas numerous fine wrinkles are well shown at this side, arranged almost parallel to each other, from the summit to the cingulum. The anterior cusp, the paraconid, measured at the base, is 12 mm thick and 11.5 mm long. Its height measured from the lower margin of the cingulum is 15 mm. It shows only two distinct ridges, the anterior one descending from the summit to the base where it unites with the cingulum, and the posterior one, 6 mm in length. The external surface of that cusp is also finely wrinkled. On the lingual side the summit of the metaconid rises beyond the main cusp. Its height measured internally from the lower margin of the cingulum is 13.5 mm, while measured from the side of the talonid it is 6.5 mm; the meta-

conid is 7.75 mm long. Anteriorly the metaconid touches the base of the large protoconid, forming with it and with the posterior cusp the trigonid, 28 mm long. Really it forms the beginning of the internal delimitation of the talonid. Beyond it, on the lingual side is the conspicuously lower entoconid, with height of 10 mm measured from the lower margin of cingulum, followed by the still lower entoconulid, which partially closes up posteriorly the talonid by its arcuate low summit ridge. The hypoconid rises externally, opposite the two last small lingual cusps. Its height measured externally from the lower margin of the cingulum is 14.5 mm, that measured from the talonidal depression being 6 mm; its thickness is 12 mm, the posterior summit ridge is 5.8 mm long, while the anterior, reaching to the base of the cardinal cusp is 8 mm long. No cusp or thickening is discernible on this ridge.

The talonid, being thus lingually delimited by three cusps — the metaconid included — and labially by the hypoconid and its anterior ridge, is relatively broad and rather long. The cingulum surrounding the crown at the base is high (7 mm) on the outer side, below the hypoconid, that is to say posteriorly. It is, however, relatively weakly marked, near the summit it ascends and becomes almost entirely obliterated, to be again, though very indistinctly discernible, near the anterior cusp. Lingually the cingulum is almost completely obliterated.

#### GENERIC AND SPECIFIC DETERMINATION

The shape and size of the here described teeth lead with perfect surety to the inference that they formed part of the dentition of an individual belonging to a group of species originally known under the common generic name of *Hyaenarctos* (Falconer & Cautley).

Remains of an individual from this genus were first recovered from Pliocene deposits in the Siwalik Hills of India. They consisted of a strongly damaged right mandible with  $P_1$ ,  $M_1$  and  $M_2$ , also with alveoli referable to two premolars and  $M_3$ , which are all missing. The next find was that of part of a skull with preserved canines,  $P^4$ - $M^2$  in a damaged condition, and alveoli of  $P^2$ - $P^3$ . These remains were in 1836 described by H. Falconer and Cautley and referred by them to the skeleton of a bear which they called *Ursus sivalensis* Falc. & Cautl.

The authors themselves, and later in 1837 also A. Wagner, laid emphasis on the dentition of the described specimen not agreeing with that typical of the genus *Ursus*, so much so that the generic name of *Agriotherium* was suggested by A. Wagner for the individual from the Siwalik Hills. Some time after the name of *Hyaenarctos* Falc. & Cautl. was introduced for that genus by R. Owen who asserted that the authors had

originally intended to call their specimen by this name guided by the resemblance in shape of  $P^4$  to that tooth in the hyena. This name, accepted by H. Falconer (1848) as subgeneric for this type of fossil mammal, has been since used by palaeontologists as generic.

Genus *Hyaenarctos* (Falc. & Cautl.) has been subsequently split up into genus *Agriotherium* Wagn. with *Agriotherium sivalense* (Falc. & Cautl.) as genotype, genus *Indarctos* Pilgrim with *Indarctos salmonianus* Pilgrim as genotype, and subgenus *Hyaenarctos* (*Lydekkerion*) Frick which has not been generally accepted, with *Hyaenarctos palaeindicus* Lydekker as genotype.

The main differences between *Agriotherium* Wagn. and *Indarctos* Pilgr. lie in the shape of dentition, of the upper jaw particularly. They have been summed up by Ch. Frick, W. D. Matthew, G. E. Pilgrim and others. The chief ones are as follows:

1. In *Indarctos* Pilgr. the anterior external accessory cusp, the parastyle, on  $P^4$ , is poorly developed while it is prominent in *Agriotherium* Wagn.; in *Agriotherium* this tooth is large and longer than the next molar,  $M^1$ .

2. In *Indarctos* Pilgr. the basal section of  $M^1$  is sub-quadrate, while in *Agriotherium* Wagn. the lingual border of the crown is shorter than the labial and with angles distinctly rounded.

3. In *Indarctos* Pilgr. the labial posterior border of  $M^2$  extends into a more or less prominent talon, while in *Agriotherium* Wagn. there is no talon on this tooth.

4. In *Indarctos* Pilgr.  $M_1$  is relatively long, with the talonid somewhat shorter than the trigonid, and the hypoconid lower than the entoconid, while in *Agriotherium* Wagn.  $M_1$  is relatively short, with the talonid markedly shorter than the trigonid, and the hypoconid higher than the entoconid.

On differences of dentition, as here specified, between *Agriotherium* Wagn. and *Indarctos* Pilgr. one is with perfect surety led to the inference that the described remains belonged to the skeleton of an individual from genus *Agriotherium* Wagn. Namely:

1)  $M^1$  is with the lingual border distinctly shorter than the labial and with angles rounded;

2) the lingual posterior border of  $M^2$  displays no posterior convexity, which means that the crown is without a talon;

3) the anterior part of  $M_1$ , the trigonid, is considerably longer than the posterior, the talonid; the crown of this tooth is largest within the talonid, and the hypoconid is higher than the entoconid.

It is far more difficult specifically to identify the remains of *Agriotherium*, found in the Węże breccia.

The paucity of remains thus far recovered from diverse sites, in most cases consisting of the detached upper or lower jaw only, has sometimes prevented their undoubted identification with this or another species of *Agriotherium* Wagn. or of *Indarctos* Pilgr.

For this reason such remains were mostly referred to some species within the group of *Hyaenarctos* without generic differentiation into *Agriotherium* and *Indarctos*. In this way, a score or so of species have been established — part of which are probably identical — or they were simply called *Hyaenarctos* sp.

The recovery, therefore, from the same deposits, within so small an area as that occupied by the Weże breccia, of fragments of both the upper and lower dentition of an individual, undoubtedly referable to one species from genus *Agriotherium*, provides important evidence for the knowledge of the dentition of this species.

Since dental dimensions serve as supplementary evidence in specific diagnosis and since the group of forms known under the common name of *Hyaenarctos* has a very wide range of distribution within the Holarctic area, it seems most advisable to tabulate data concerning the dimensions of the here studied teeth in species thus far identified from the general group of *Hyaenarctos* (see table on p. 8-9).

A review of the species listed in the here annexed table shows the predominance, within the entire Holarctic area, of species referred by their authors to genus *Indarctos* Pilgr. The predominance would, perhaps, be still greater, should the upper second molar be always present in the remains of forms belonging to the *Hyaenarctos* group, recorded from different sites. On the presence or absence of a talon in this tooth, the remains could without doubt be referred to some species within genus *Indarctos* or *Agriotherium* respectively. Species tentatively determined as *Hyaenarctos* sp. would then also disappear from the list.

The assignment of a form to genus *Agriotherium* or to genus *Indarctos* on the first molar only, does not always seem quite justified to the writer. A comparison for example of this tooth, collected from the Weże breccia, with the same tooth recovered from the island of Samos, the shape of which is excellently shown on photographs in a paper by H. Helbing (1932, fig. 3 a-b), here reproduced in pl. II, fig. 5-6, shows their almost identical similarity. In both, the hypoconid is higher than the entoconid and a distinct entoconulid is present in addition to the entoconid. And yet, on the absence of talon in the upper second molar in the Weże specimen, it is genus *Agriotherium*, while the presence of a prominent talon in the same tooth belonging to the Samos specimen refers it to genus *Indarctos*.

The following are, after Ch. Frick (1926-30), species undoubtedly referable to *Agriotherium* Wagn.:

Table showing dimensions of  $P^1$ ,  $M^1$ ,  $M^2$  and  $M_1$   
in species within the group of *Hyaenarctos* (in mm)

Species	$P^1$	$M^1$	$M^2$	$M_1$	Patria	Genus
<i>intermedium</i> n. sp.	—	25 × 25	24.5 × 25	37 × 20.5	Weże, Poland	Agr.
<i>insignis</i> Gervais, 1853	29.1 × 21	27.8 × 27.5	27.4 × 26.5	41.5	Montpellier, France	..
<i>insignis</i> Gervais, 1853	—	—	—	40 × 22.5 38 × 21.5	Boutonnet, France	..
sp. Helbing, 1932	—	—	24 25.2 × 28.5	—	Vialette, France	..
sp. Gervais, 1853	30 × 23	—	—	—	Alcoi, Spain	Agr.?
sp. Flower, 1877	—	30 × 30	—	—	Felixtow, England	Agr.?
<i>ponticum</i> Kormos, 1913	—	—	—	41 × 19.5	Baltavár, Hungary	Agr.?
<i>laurillardii</i> Me- neghini, 1863	—	—	—	33	Monte Bam- boli, Italy	Agr.?
<i>arctoides</i> Depéret & Lleuca, 1895	24.6	24.6 × 22	28.2 × 22	25	Orignac, France	Ind.
<i>arctoides</i> Depéret & Lleuca, 1895	27 × 21	27 × 23.5	29 × 21 30 × 24.5	—	Montredon, France	..
<i>atticus</i> Dames, 1883	—	—	—	40	Pikermi, Greece	..
<i>vireti</i> Villatta & Crusafont, 1943	—	—	—	—	Vallés-Pe- nedés, Spain	..
sp. Helbing, 1932	29.1 × 24.3	29 × 27	26 34 × 26	41.6 × 22.2	Samos, Greece	..
sp. Tobien, 1952	—	—	25.1 × 18.3	—	Gau-Weinh. Germany	..
<i>sivalensis</i> Falconer & Cautley, 1836	32 × 22	29 × 29.9	29 × 30.5	38	Siwalik, India	Agr.
<i>punjabiensis</i> Lydekker, 1878	32 × 22.5	30 × 28	31 × 27 28 × 23	42.5 × 21.5	Siwalik, India	Ind.
<i>palaeindicus</i> Lydekker, 1878	—	27 × 25.5	27 × 27.5	39.5 × 21	Siwalik, India	Agr.



Table showing dimensions of  $P^4$ ,  $M^1$ ,  $M^2$  and  $M_1$   
in species within the group of *Hyaenarctos* (in mm)  
(continued)

Species	$P^4$	$M^1$	$M^2$	$M_1$	Patria	Genus
<i>maraghanus</i> Mequenen, 1925	—	—	—	44 × 23	Maragha, Persia	Ind.
<i>salmontanus</i> Pilgrim, 1913	—	29 × 25.5	35 × 27	—	Salt Range, India	..
<i>lagrelii</i> Zdansky, 1924	27.3 × 21.4	27.3 × 25	32.6 × 23.4	37.5 × 20.8	Pao-Te distr. China	..
<i>sinensis</i> Zdansky, 1924	—	—	—	42.8 × 21.4	Pao-Te distr. China	..
sp. Lydekker, 1844	—	—	—	—	South China	Agr.?
<i>gregori</i> Frick, 1921	32.3 × 21.7 35.4 × 25.8 36.5	30.5 × 32.3	—	43.5 × 23.5	Eden, California	Agr.?
<i>oregonensis</i> Merriam, 1916	31.7 × 22.6	—	35.3 × 27.2	—	Oregon, USA	Ind.
<i>schneideri</i> Sellards, 1916	—	29.8 × 30.2	—	41 × 23.5	Florida, USA	Agr.?
sp. Matthew, 1918	—	—	26 × 24	—	Snake Creek USA	Agr.?
sp. Freuden- berg, 1910	—	—	—	46.5 × 24	Tehuichila, Mexico	Agr.?

1) *Agriotherium insigne* (Gervais, 1853) (= *Hyaenarctos insignis* Gervais) from Montpellier in France;

2) *A. sivalense* (Falconer & Cautley, 1836) (= *Ursus sivalensis* Falc. & Cautl.) from Siwalik in India;

3) *A. palaeindicum* (Lydekker, 1878) (= *Hyaenarctos palaeindicum* Lydek.) from Siwalik in India;

4) *Agriotherium* sp. (Helbing, 1932) (= *Hyaenarctos* sp. Helb.) from Vialette in France.

The following are also regarded by Ch. Frick (l. c.) as belonging to *Agriotherium*:

*Hyaenarctos* sp. Gervais, 1853, from Alcoy in Spain (fragment of upper jaw with  $P^4$  and a remnant of the anterior part of  $M^1$ );

*H. „schneideri“* Sellards, from Brewster, Florida, USA ( $M^1$  only);

*Hyaenarctos* sp. Flower, 1877, from Felixstow near Waldringfield, east of England (M<sup>1</sup> from Red Crag only);

*H. gregori* Frick, 1921, from Eden in California, USA (damaged P<sup>4</sup> and M<sup>1</sup>, also P<sub>4</sub>-M<sub>2</sub>).

Thus truly but one single species from *Agriotherium* Wagn. has been recorded from Europe, namely that of *Agriotherium insigne* (Gerv.). This species has been established on fragment of the upper jaw, with partly preserved dentition, belonging to one individual from Montpellier. P. Gervais, when describing the dentition of this individual, also published in 1853 and 1859 a natural size drawing of the fourth premolar and of both molars. These are teeth with shape which offers particular interest owing to their comparability with the teeth of *Agriotherium* recorded from Weże. The lower dentition of *A. insigne* (Gerv.) was, on the other hand, described in 1939 by J. Viret on evidence of three mandibular fragments collected from Boutonnet, Montpellier. Excellent photographs shown in table II, fig. 2 a-b of J. Viret's paper, enable a close comparison to be made of the shape of the first molar in *A. insigne* (Gerv.) with that of the same tooth in the Weże specimen.

For a better comparison of these teeth the following drawings are reproduced in pl. II of the present paper: upper dentition (P<sup>4</sup>-M<sup>2</sup>) in species *A. insigne* (Gerv.), *A. sivalense* (Falc. & Cautl.) and *A. palaeindicus* (Lyd.), M<sup>2</sup> in *Agriotherium* sp. (Helb.), and lower dentition (M<sup>1</sup>) in *Indarctos* sp. Helb. and M<sub>1</sub> in *A. insigne* (Gerv.) described by J. Viret.

When comparing the size and shape of the maxillary molars in the Weże specimen with dimensions in other species of *Agriotherium* specified in the annexed table, also with the drawing of teeth by Ch. Frick included in his description of *A. insigne* (Gerv.), it is observable that the teeth in the Weże specimen are somewhat smaller and the crown in the better preserved molar somewhat differently shaped, to say:

1. The length of the anterior external cusp<sup>2</sup> in the Weże specimen practically equals that of the next cusp, the metacone (12.2 : 12 mm), the boundary line where their bases meet is at mid-length of the tooth, while in *A. insigne* (Gerv.) the anterior cusp is distinctly longer than the posterior (15 : 11 mm) and the bases of the cusps meet beyond the mid-length point of the tooth.

2. The anterior border of crown in M<sup>2</sup> of the Weże specimen is almost parallel to the posterior border, while in *A. insigne* (Gerv.) the borders are inclined to each other at an acute angle.

<sup>2</sup> Though in the Weże specimen this cusp is broken off, we can see outlined there the course of the cingulum from the edge of which the measurements were made. The lingual edge of this cusp is discernible on the crown of the tooth, as well as the line where the base of this cusp meets with that of the next cusp, the metacone.

3. The posterior border of the tooth in the Węże specimen is almost perpendicularly disposed to the lingual border, with an inconspicuous depression at its mid-length, while in *A. insigne* (Gerv.) the posterior border is broadly rounded lingually and displays a distinct cavity upwards of its mid-length.

In many of these characters  $M^2$  of the Węże specimen approaches the same tooth in the specimen from Vialette, by H. Helbing (1932) defined as *Hyaenarctos* sp. In the Vialette specimen, however, the rib extending obliquely over the entire length of the crown is quite distinctly divided into separate lingual cusps.

Much closer than to *A. insigne* (Gerv.) does  $M^2$  in the Węże specimen come, as shape is concerned, to *A. sivalense* (Falc. & Cautl.), a species which J. Viret is inclined to identify with *A. insigne* (Gerv.). In *A. sivalense* (Falc. & Cautl.), however, there is some slight tendency to develop a talon, owing to which the lingual border of this tooth is somewhat longer than the labial (27 × 25 mm), according to dimensions shown by the drawing in Ch. Frick's paper.

The lower first molar is less diagnostic in the matter of comparison and specific identification. In the Węże specimen  $M_1$  is 37 mm long, while its maximum width on the talonid is 20.5 mm; in *A. insigne* (Gerv.) these dimensions are not much greater, being after J. Viret (1939) 38-40 mm and 21.2-22.5 mm respectively. The tooth is, however, shaped somewhat differently, to say:

1. In the Węże specimen, on the lingual side of  $M_1$ , two distinct cusps rise in addition to the metaconid, that is the entoconid and the entoconulid, as an extension of this border of the crown. In *A. insigne* (Gerv.) the entoconulid is missing in this tooth, the entoconid only constituting besides the metaconid the lingual wall of the crown.

2. The cingulum of the crown on the labial side of the tooth is less prominent in the Węże specimen and it is not discontinuous as in the tooth of *A. insigne* (Gerv.).

The complete obliteration of the crown in  $M_1$  belonging to the specimen of *A. sivalense* (Falc. & Cautl.) impedes the comparison of its shape with that of the crown in  $M_1$  of the Węże specimen.

On the ground of differences of shape, observed in teeth just mentioned, belonging to the Węże specimen and those in *A. insigne* (Gerv.) and *A. sivalense* (Falc. & Cautl.), and also in consideration of the great geographical distance separating Węże from the Siwalik Hills in India which have yielded the remains of *A. sivalense* (Falc. & Cautl.), the present writer believes it advisable to assign an independent name to the Węże specimen, namely that of *A. intermedium* n. sp. Some lucky discovery of more ample material, at these or other sites, will perhaps in the future

lead to the knowledge of variations, if any, and of the extent to which they may have affected the shape of dentition in individuals from *Agriotherium* Wagn.

#### GENERAL REMARKS

Fossil remains belonging to animals from the group here considered and originally referred to under the common name of *Hyaenarctos* (Falc. & Cautl.) have been recorded from Spain, France, Great Britain (Felixstow near Waldfieldring), Germany, Poland, Hungary, Italy, Greece (Pikermi, island of Samos), Persia, China, India, also California, Nebraska, Oregon, Florida in the USA, and Mexico. The area inhabited by this group of carnivores is thus seen to have been a vast one, since it extended over nearly the whole of southern and central Europe and stretched on eastward to Asia, occupying also wide territories within North America.

This suggests great similarity if not identity of living conditions of this group of animals, prevailing during a certain period of time over immense territories under the same geographical latitude. These environmental conditions were probably responsible for the development of geographic and ecologic forms showing no important differences.

Should only those forms from the common group be taken into account as are now referred to under the generic name of *Agriotherium* Wagn., still, the occurrence of *A. insigne* (Gerv.) in France, of *A. intermedium* n. sp. in Poland and of *A. sivalense* (Falc. & Cautl.) in the North of India (Siwalik) points out to the existence at one time of common links uniting very closely related forms, distributed along a track extending from France to India.

Some difficulties are encountered in determining the time of occurrence of the *Hyaenarctos* group. Geologists do not always agree as to the age of deposits from which fossil remains have been recovered referable to representatives of that group, the age assigned to them ranging from the Upper Miocene to the Upper Pliocene. Deposits which have yielded remains of *Agriotherium* are regarded as of Pliocene age and it is the Middle or the Upper Pliocene periods which appear to have witnessed the greatest specific abundance of this genus. Fossil remains of *Indarctos*, on the other hand, are more copious in the Lower than in the Middle Pliocene and *Indarctos* is by G. E. Pilgrim, H. Tobien and others regarded as the time-marker for the Hipparion fauna in the south of Europe and Asia.

The carnivores from the Weże bone breccia, which have thus far been given closer consideration, resemble fossil faunas recorded from the Montpellier deposits in France. Since the age of these deposits is now being shifted from the Lower to the Middle Pliocene it is hence to

be inferred that the remains of *A. intermedium* are likewise assignable to the Middle Pliocene age.

Though the morphology of species of *Agriotherium* Wagn. comes quite close to that of *Indarctos* Pilgr. being probably referable to a common ancestor and to a contemporaneous date of origin and extinction, yet they constitute two independent stocks. Their ancestor is to be searched for in the Miocene among the multitude of small forms belonging to genus *Ursavus* Schloss. Differences of size excepted, the molars of *Ursavus* come so near in shape to those of *Indarctos* that some species of *Ursavus* were originally referred to *Hyaenarctos* (Falc. & Cautl.), as for example *Ursavus brevirohinus* Hofmann, 1887, by M. Schlosser in 1887 identified as *Hyaenarctos minutus* Schloss., and *Ursavus depereti* Schlosser, 1902 in 1895 by Ch. Depéret referred to *Hyaenarctos arctoidens* Dep.

Individuals from *Agriotherium* have sometimes attained considerable dimensions. The skull of *A. sivalense* (Falc. & Cautl.) is by R. Lydekker reported to have been 482.6 mm in length, which makes the size of the whole body of that form equal the dimensions of the largest individuals of the cave bear. The skull of *A. intermedium* n. sp. could not have been much smaller. Since, in *A. sivalense*, with length of M<sup>1</sup> and M<sup>2</sup> at 57 mm, the length of skull is 482.6 mm, then, with the same ratio applied to *A. intermedium*, in which the length of a number of teeth attain 51 mm, the length of skull would have to be 431.4 mm.

The strongly developed carnassials in all species belonging to the *Hyaenarctos* group indicate that representatives of this group were all carnivores with powerful bodies. The large size of the upper fourth premolar, shaped very much like that of the *Hyaena*, must probably have made easy the crushing of the biggest bones. The mode of life of *A. intermedium* may, therefore, have resembled that of hyenas. Its habitat was perhaps one of steppes with a few trees and bushes clustered here and there particularly in the vicinity of water reservoirs.

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#### REFERENCES

- DEPÉRET CH. 1895. Résultats des fouilles paléontologiques dans le miocène supérieur de la colline de Montredon. *C. R. hebd. Séances Acad. Sci.*, **121**, 433—434, Paris.
- DEPÉRET CH. & LLUECA G. 1928. Sur l'*Indarctos* arctoides et la phylogénie des Ursidés. *C. R. Soc. Géol. France*, **4**, 149-160. Paris.
- ERDBRINK D. P. 1953. A review of fossil and recent Bears of the Old World. *Inaug. Dissert. Min. Geol. Inst. Univ. Utrecht*, **1-2**, 1-597. Utrecht.

- FALCONER H. & CAUTLEY. 1836. Note on the *Ursus sivalensis*, a new fossil species from Siwalik Hills. *Asiatic Research*, 19, 193-200.
- FLOWER W. H. 1877. Note on the occurrence of the remains of *Hyaenarctos* in the Red Crag of Suffolk. *Quart. J. Geol. Soc.*, 33, 534-536. London.
- FRICK CH. 1921. Extinct vertebrate faunas of Badlands, of Bautista Creek and San Timoteo Canon, Southern California. *Univ. Calif. Publ. Geol.*, 12, 277-424. Berkeley.
- 1926/1930. The Hemicyoninae and an American Tertiary Bear. *Bull. Amer. Mus. Nat. Hist.*, 56, 1-119. New York.
- GERVAIS P. 1853. Description des ossements fossiles de mammifères rapportés d'Espagne par MM. de Verneuil, Collomb et de Lorière. *Bull. Soc. Géol. France*, 10, 147-167. Paris.
- HELBING H. 1932. Über einem Indarctos-Schädel aus dem Pontien der Insel Samos nebst einem Anhang: *Hyaenarctos* sp. aus dem Pliocen von Vialette (Haute-Loire). *Abh. Schweiz. Paläont. Ges.*, 52, 1-18. Basel.
- HOFMANN A. 1887/88. Über einige Säugethierreste aus der Braunkohle von Voitsberg und Steieregg bei Wies., Steiermark. *Jb. k. k. geol. Reichsanst.*, 37, 207-218. Wien.
- LYDEKKER R. 1884. Indian Tertiary and Post-Tertiary Vertebrata. P. VI: Sivalik and Narbada Carnivora. *Palaeont. Indica*, ser. 10, 2, 202-239. Calcutta & London.
- MATTHEW W. D. 1929. Third contribution to the Snake Creek fauna. *Bull. Amer. Mus. Nat. Hist.*, 56, 437-560. New York.
- OWEN R. 1840/45. *Odontography*. Vol. 1-2. London.
- PILGRIM G. E. 1931. Catalogue of the Pontian Carnivora of Europe. *Brit. Mus. (Nat. Hist.)*, 1-174. London.
- SCHLOSSER M. 1891. Die Affen, Lemuren, Chiropteren, Insectivoren, Marsupialier, Creodonten und Carnivoren des europäischen Tertjärs und deren Beziehungen zu ihren lebenden und fossilen ausser-europäischen Verwandten. T. 3. *Beitr. Paläont. Österr.-Ung. u. Oriens*, 8, 1-106. Wien.
- TOBIEN H. 1952. Indarctos und Ursavus (Carnivora, Mamm.) aus den Unterpliozänen Dinotheriidanden Rheinhessens. *Nbl. Hess. Landesamt. Bodenf.*, 6, 7-14. Wiesbaden.
- VIRET J. 1939. Monographie paléontologique de la faune de Vertébrés des sables de Montpellier. 3: Carnivora Fissipedia. *Trav. Lab. Géol. Fac. Sci.*, 37, 7-26. Lyon.
- WAGNER A. 1837. Paläontologische Abhandlungen. *Geol. Anz. Mitgl. k. bayer. Akad. Wiss.*, 5, 168, p. 320; 169, 327-328; 170, 334-335. München.

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JAN STACH

*AGRIOTHERIUM INTERMEDIUM* N. SP. Z PLIOCEŃSKIEJ BREKCJI KOSTNEJ  
WYDOBYTEJ Z MIEJSCOWOŚCI WĘŻE W POLSCE

*Streszczenie*

Autor opisuje szczątki *Agriotherium* Wagn. (= *Hyaenarctos* Falc. & Cautl.) z brekcji kostnej, wydobytej w miejscowości Węże koło Działoszyna (woj. łódzkie), pomiędzy którymi zachowały się stosunkowo dobrze pierwszy i drugi ząb trzonowy

górnjej szczęki oraz nieuszkodzony pierwszy ząb trzonowy dolnej szczęki tego samego osobnika, pozwalające określić z wszelką pewnością rodzaj tego zwierzęcia.

Autor zestawia wszystkie (24) opisane dotychczas gatunki z pierwotnej systematycznie grupy *Hyaenarctos*, rozdzielanej obecnie na dwa rodzaje: *Agriotherium* Wagn. i *Indarctos* Pilgr., podając, według danych zaczerpniętych z prac różnych autorów, rozmiary zębów  $P^4 - M^2$  górnej szczęki i  $M_1$  dolnej oraz miejsca znalezienia tych gatunków.

Szczegółowe porównanie zębów trzonowych osobnika znalezionego w Wężach wykazało, że należy go zaliczyć do rodzaju *Agriotherium* Wagn., bowiem brzeg dożykowy korony pierwszego zęba trzonowego górnej szczęki jest u tego osobnika krótszy niż brzeg zewnętrzny, gdy tymczasem u *Indarctos* Pilgr. przekrój podstawy korony tego zęba jest niemal kwadratowy, a w drugim zębie trzonowym  $M^2$  brak zupełnie talonu, który u *Indarctos* jest na tym zębie mniej lub więcej wydatnie wykształcony.

Nieco trudniej określić dokładnie gatunek *Agriotherium* znalezionego w Wężach. Dotychczas z pliocenu Eurazji poznano cztery gatunki, które na podstawie kształtu zębów trzonowych zaliczono do rodzaju *Agriotherium* Wagn. Autor porównuje kształt zębów okazu z Wężów z kształtem zębów tych czterech gatunków i dochodzi do przekonania, że pomiędzy tymi zębami zaznaczają się wyraźne różnice. Okaz z Wężów pod tym względem zajmuje jakby pośrednie stanowisko pomiędzy *A. insigne* (Gerv.) poznanym z Francji (Montpellier) a *A. sivalense* (Falc. & Cautl.) z Siwalik w Indiach. Dla zobrazowania różnic występujących w kształcie zębów trzonowych pomiędzy osobnikiem z Wężów a innymi gatunkami, autor zestawia na pl. II kształt zębów czterech pokrewnych gatunków *Agriotherium* Wagn. według rycin, podanych w opisach tych gatunków przez innych autorów. Autor nadaje gatunkowi z Wężów nazwę *Agriotherium intermedium* n. sp.

Obszar zamieszkały przez grupę zwierząt obejmowanych wspólną nazwą *Hyaenarctos* był bardzo rozległy, zajmował bowiem niemal całą południową i środkową Europę, łączył się dalej ku wschodowi z siedzibami ich w Azji i rozprzestrzeniał się szeroko w Ameryce Północnej. Pozwala to przypuszczać, że w pewnym okresie czasu warunki życiowe na dużej przestrzeni w Holarktyce, przynajmniej w pewnej szerokości geograficznej, były dla tej grupy zwierząt o ile nie jednakowe, to bardzo do siebie zbliżone, i dawały początek powstawaniu form geograficznych czy ekologicznych mało się od siebie różniących.

Jeżeli nawet z tej wspólnej grupy wyłączymy formy, obejmowane obecnie nazwą rodzajową *Agriotherium* Wagn., to występowanie *A. insigne* (Gerv.) we Francji, *A. intermedium* w Polsce i *A. sivalense* (Falc. & Cautl.) w północnych Indiach (Siwalik) wskazuje na istnienie w pewnym okresie czasu nici wiążącej formy bardzo do siebie zbliżone na długim szlaku od Francji do Indii.

Określenie czasu występowania grupy *Hyaenarctos* napotyka na pewne trudności, nie zawsze bowiem zgodnie ustalany jest przez geologów wiek złóż, w których

znajdowano szczątki przedstawicieli tej grupy i waha się on w granicach od górnego miocenu do górnego pliocenu. Złóża, w których znaleziono szczątki *Agriotherium* Wagn., datowane są z pliocenu; środkowy lub górny pliocen zdaje się być okresem największego rozwoju gatunków tego rodzaju. Natomiast szczątki *Indarctos* Pilgr. spotykane są częściej w dolnym, aniżeli w środkowym pliocenie, i *Indarctos* uważany jest (G. E. Pilgrim. 1931; H. Tobien, 1952 i in.) za charakterystyczny element fauny hipparionowej w południowej Europie i Azji.

Ponieważ drapieżne, poznane dotychczas dokładniej z brekcyj kostnej Węzów, zbliżają się do elementów wymarłej fauny, znanych ze złóż Montpellier we Francji, a czas powstania tych złóż przesuwany jest z dolnego do środkowego pliocenu, przeto i szczątki *Agriotherium intermedium* należałoby datować jako pochodzące ze środkowego pliocenu.

Jakkolwiek gatunki rodzaju *Agriotherium* Wagn. morfologicznie zbliżają się bardzo do gatunków rodzaju *Indarctos* Pilgr. i prawdopodobnie miały wspólnego przodka, a także niemal ten sam czas swego powstania i wygaśnięcia, to jednak ich rodowe linie będą oddzielnie. Przodka ich szukać należy w miocenie i kryje się on wśród rzeszy drobnych form rodzaju *Ursavus* Schloss. Pomijając różnice wielkości, zęby trzonowe *Ursavus* Schloss. są tak zbliżone kształtem do tychże u *Indarctos* Pilgr., że niektóre gatunki rodzaju *Ursavus* były początkowo oznaczane jako należące do rodzaju *Hyaenarctos* (Falc. & Cautl.), np. *Ursavus brevirohinus* Hofmann, 1887. opisany przez M. Schlossera w 1887 r. jako *Hyaenarctos minutus* Schloss., a *Ursavus depéreti* Schlosser, 1902, opisany przez Ch. Depéreta w 1895 r. jako *Hyaenarctos arctoidens* Dep.

Osobniki rodzaju *Agriotherium* dosięgały znacznych rozmiarów ciała, gdyż czaszka *A. sivalense* (Falc. & Cautl.) miała, według R. Lydekkera (1884) 482,6 mm długości, czyli zwierzę wielkością zbliżało się do bardzo dużych okazów niedźwiedzia jaskiniowego. Niewiele mniejszą musiała być czaszka *A. intermedium*, gdyż — biorąc pod uwagę stosunek długości zębów  $M^1$  i  $M^2$  w górnej szczęce u *A. sivalense* do długości czaszki tego gatunku (57 mm : 482,6 mm) — przy długości tych zębów u *A. intermedium*, która wynosi 51 mm, długość czaszki tego gatunku wynosiłaby 431,4 mm.

Silnie rozwinięte zęby tnące u wszystkich gatunków grupy *Hyaenarctos* wskazują, że przedstawiciele tej grupy były drapieżnikami o potężnych rozmiarach ciała. Duży ząb przedtrzonowy czwarty górnej szczęki, podobny kształtem do tegoż zęba u hieny, ułatwiał zapewne zwierzęciu kruszenie nawet dużych kości. Sposób życia *A. intermedium* mógł więc być podobny do życia hien. Mogły to być zwierzęta stepów, z występującymi gdzieś skupieniami drzew i krzewów, szczególnie w pobliżu zbiorników wody, które z całą pewnością musiały występować w pewnym okresie czasu w okolicy Węzów.



## OBJAŚNIENIA DO ILUSTRACJI

## Pl. I

Fig. 1. Fragment prawej strony górnej szczęki z resztką przedtrzonowego czwartego i zębami trzonowymi pierwszym i drugim.

Fig. 2. Siekacz trzeci z lewej strony górnej szczęki.

Fig. 3. Fragment dolnej szczęki z lewej strony z resztką czwartego zęba przedtrzonowego.

Fig. 4. Pierwszy trzonowy z lewej strony dolnej szczęki, widziany od strony dojęzykowej.

Fig. 5. Pierwszy ząb trzonowy z prawej strony dolnej szczęki: *a* od strony zewnętrznej, *b* od strony dojęzykowej.

Wszystkie okazy wielkości naturalnej

## Pl. II

Fig. 1. Szereg zębów górnej szczęki P<sup>4</sup> - M<sup>2</sup> *Agriotherium insigne* (Gerv.), wg Ch. Fricka (1926—30); nieco zmniejszone.

Fig. 2. Szereg zębów górnej szczęki P<sup>4</sup> - M<sup>2</sup> *A. sivalense* (Falc. & Cautl.), wg Ch. Fricka (*l. c.*); nieco zmniejszone.

Fig. 3. Szereg zębów górnej szczęki P<sup>4</sup> - M<sup>2</sup> *A. palaeindicum* Lyd., wg Ch. Fricka (*l. c.*); nieco zmniejszone.

Fig. 4. Drugi ząb trzonowy górnej szczęki M<sup>2</sup> *Agriotherium* sp. wg H. Helbinga (1932); wielk. nat.

Fig. 5. Pierwszy ząb trzonowy dolnej szczęki M<sub>1</sub> *Indarctos* sp. z Samos, wg H. Helbinga (*l. c.*); wielk. nat.

Fig. 6. Ten sam ząb, widziany z góry, wg H. Helbinga (*l. c.*); wielk. nat.

Fig. 7. Pierwszy ząb trzonowy dolnej szczęki M<sub>1</sub> *A. insigne* (Gerv.) z Montpellier, widziany z góry, wg J. Vireta (1939); wielk. nat.

## ЯН СТАХ

## AGRIOTHERIUM INTERMEDIUM N. SP. ИЗ ПЛИОЦЕНОВОЙ КОСТНОЙ БРЕКЧИИ ИЗВЛЕЧЕННОЙ В МЕСТНОСТИ ВЕНЖЕ В ПОЛЬШЕ

## Резюме

Автор описывает фрагменты зубов *Agriotherium* Wagn. (= *Hyaenarctos* Falc. & Cautl.), извлеченных из плиоценовой костной брекчии в местности Венже в Польше и определяет их принадлежность к новому виду *Agriotherium intermedium*, который занимает в строении короны коренных зубов, в особенности M<sup>2</sup>, как бы промежуточную систематическую позицию между *A. insigne* (Gerv.) из Монпелье (Montpellier) во Франции и *A. sivalense* (Falc. & Cautl.) из Сивалика (Siwalik) в Индии.

*Agriotherium intermedium* был составной частью фауны близкой фауны из Монпелье и его геологический возраст был также вероятно средне-плиоценовый. Образ жизни *A. intermedium* был вероятно близок образу жизни гиен, подобно остальным представителям этой группы.

Pl. I

- Fig. 1. Fragment of the right maxilla with damaged P<sup>4</sup>, M<sup>1</sup> and M<sup>2</sup>.  
Fig. 2. I<sup>3</sup> of the left maxilla.  
Fig. 3. Fragment of the left mandible with P<sub>4</sub> strongly damaged.  
Fig. 4. M<sub>1</sub> of the left mandible, lingual view.  
Fig. 5. M<sub>1</sub> of the right mandible; a labial view, b lingual view.  
All figures of natural size

Pl. II

- Fig. 1. P<sup>4</sup>-M<sup>2</sup> of *Agriotherium insigne* (Gerv.) after Ch. Frick (1926—30); somewhat reduced.  
Fig. 2. P<sup>4</sup>-M<sup>2</sup> of *A. sivalense* (Falc. & Cautl.), after Ch. Frick (*l. c.*); somewhat reduced.  
Fig. 3. P<sup>4</sup>-M<sup>2</sup> of *A. palaeindicum* Lyd., after Ch. Frick (*l. c.*); somewhat reduced.  
Fig. 4. M<sup>2</sup> of the right maxilla of *Agriotherium* sp., after H. Helbing (1932); nat. size.  
Fig. 5. M<sub>1</sub> of the mandible of *Indarctos* sp. from Samos, after H. Helbing (*l. c.*); nat. size.  
Fig. 6. The same tooth, top view, after H. Helbing (*l. c.*); nat. size.  
Fig. 7. M<sub>1</sub> of mandible of *A. insigne* (Gerv.) from Montpellier, top view, after J. Viret (1939); nat. size.



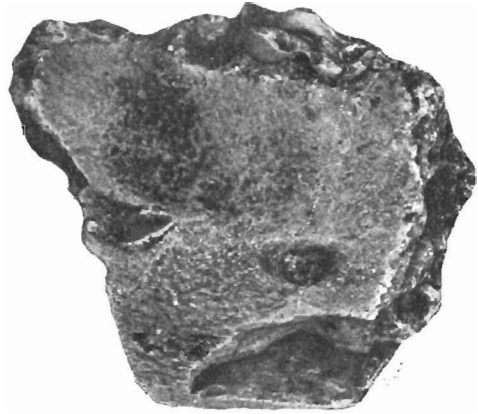
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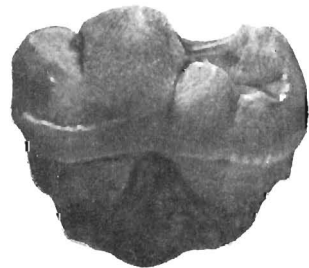
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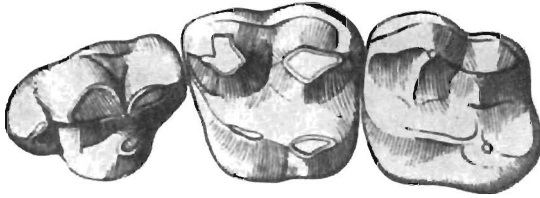
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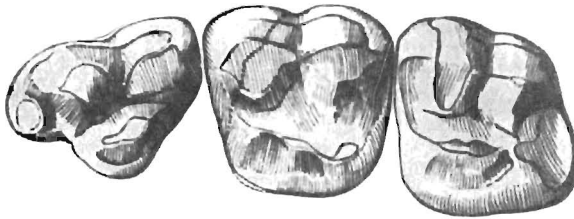
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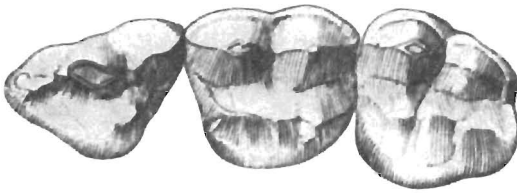
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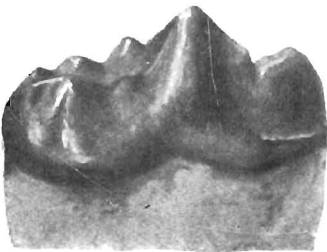
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