

## Redescription of *Eucricetodon atavus* (MISONNE, 1957) (Rodentia) from Hoogbutsel (Belgium)

by Matthijs FREUDENTHAL

### Abstract

The Hoogbutsel material (Tongrian, Oligocene) of *Eucricetodon atavus* (MISONNE, 1957) is redescribed, and compared with material from Germany, France and Spain, attributed to the same species. *E. atavus* appears to be restricted to its type-locality, where it is accompanied by two other species of the genus.

**Key-words:** Mammalia, Oligocene, Belgium.

### Résumé

Le matériel d'*Eucricetodon atavus* (MISONNE, 1957) de Hoogbutsel (Tongrien, Oligocène) est redécrit, et comparé avec du matériel d'Allemagne, de France et d'Espagne, attribué à la même espèce. *E. atavus* semble être restreinte à sa localité-type, où elle est accompagnée de deux autres espèces du genre.

**Mots-clefs:** Mammalia, Oligocène, Belgique.

### Introduction

*Cricetodon atavus* was described by MISONNE, 1957 on the basis of 52 specimens from the Tongrian of Hoogbutsel (Belgium). It was transferred to the genus *Eucricetodon* by THALER, 1966.

After the first description of *E. atavus* this taxon has been reported from many European localities by various authors, as shown in Table 1. Since the original description is more than 30 years old, and none of these authors described the Hoogbutsel material in detail, it seemed appropriate to restudy the material and give a new description by today's standards.

Through the kind co-operation of Drs P. Sartenaer and P.L. Bultynck of the Koninklijk Belgisch Instituut voor Natuurwetenschappen (Brussels, Belgium) I have been able to study the original material. Two specimens appeared to be fragments of insectivore teeth; the material studied in this paper consists of the three specimens figured by MISONNE (Pl. 2, fig. 4-6) and 48 non-figured specimens.

Furthermore Dr de Bruijn of the Instituut voor Aardwetenschappen (Utrecht, The Netherlands) put a collection at

my disposal, and the Rijksmuseum van Geologie en Mineralogie (Leiden, The Netherlands) possesses a collection of this taxon from Hoogbutsel.

### MATERIAL

The specimens figured by MISONNE are kept in the Koninklijk Belgisch Instituut voor Natuurwetenschappen (Brussels, Belgium). The type numbers are:

Pl. 2, fig. 4. M<sup>2</sup> dext., no. M 1145,

Pl. 2, fig. 5. M<sup>1</sup> dext., no. M 1146,

Pl. 2, fig. 6. M<sub>2</sub> sin., no. M 1147.

In the course of this study the remaining Brussels specimens have been catalogued under numbers KBIN M 1476 through M 1523. MISONNE did not designate a holotype. DIENEMANN (1987) mentions the M<sup>1</sup> no. 1146 as the holotype. Once this decision has been made, it seems best to consider this specimen as the lectotype of *E. atavus*.

The Utrecht specimens bear the numbers HB 301, 302, 311-319, 321-323, 331-335, 351, 361-365, 371, 372, 381-385, 391-399, 401-404, 411-413.

The Leiden specimens are catalogued under numbers RGM 148988-149062.

There is some doubt about the provenance of some of the KBIN specimens. The M<sub>1</sub> M 1470 and M 1471 differ from the rest of the material by the state of preservation, colour, and adhering matrix. They almost certainly come from a karst fissure, possibly Quercy. The same goes for the mandibula fragment with M<sub>2</sub>, M 1493, and the isolated M<sub>2</sub> M 1488.

A few specimens are thought to belong to other species of *Eucricetodon*: The M<sub>1</sub> HB 302 and the M<sup>2</sup> RGM 149046 are considerably smaller than the *E. atavus* specimens. The M<sup>1</sup> HB 365 is considerably larger. These specimens are left out from the table of measurements, and described as different species. Apparently three species of *Eucricetodon* are found in the locality of Hoogbutsel.

Measurements technique and terminology of the parts of the teeth are as described by FREUDENTHAL (1966), MEIN & FREUDENTHAL (1971), and FREUDENTHAL & DAAMS (1988); the measurement unit is 0.1 mm.

## Descriptions

### *Eucricetodon atavus* (MISONNE, 1957)

#### MEASUREMENTS

	Length				Width			
	N	Min.	Mean	Max.	N	Min.	Mean	Max.
M <sub>1</sub>	21	14.3	15.70	16.8	22	9.7	10.49	11.5
M <sub>2</sub>	39	12.7	13.85	14.9	39	10.2	11.47	12.7
M <sub>3</sub>	15	11.5	12.83	14.0	14	9.8	10.65	11.3
M <sup>1</sup>	27	16.5	18.03	19.0	34	10.8	11.71	12.7
M <sup>2</sup>	29	12.8	13.47	14.5	30	11.1	12.18	12.9
M <sup>3</sup>	12	9.7	10.42	11.4	13	9.9	10.85	12.3

#### DESCRIPTION

M<sub>1</sub> — The anteroconid is small, generally lower than the protoconid, with labially and lingually descending cingulum ridges. In about half the specimens the labial ridge reaches the base of the protoconid, in the other half it ends before the protoconid, and leaves the protosinusid open. In most specimens the anteroconid lies rather far from the protoconid, giving the tooth an elongated aspect; the anterosinusid is wide. The anterolophulid is absent (3), interrupted (5), or complete, either low or high (14). The anterior metalophulid is absent (4), interrupted (5), or complete (14). The posterior branch of the protoconid is always connected to the hind wall of the metaconid; this connection is transverse and low (4), transverse and high (19), or it is directed backwards and curved towards the metaconid (1). The sinusid is open (5), closed by a cingulum ridge (11), or there is an ectostylid (7). The sinusid is broad, either with a transverse posterior border (9), or the posterior border is curved backwards (12). The mesosinusid is open (9), or closed by a ridge descending from the metaconid (14). The ectolophid has a low connection with the posterior wall of the protoconid; it is longitudinal or oblique, but nearly always a line drawn over the ectolophid passes labially of the anteroconid, and crosses the posterior border of the tooth at mid-point. The mesoconid is absent (13), weak (8), or strong (2). The mesolophid is absent (11), short (4), or of medium length (8). The ectomesolophid is absent (12), weak (7), or strong (4). The hypolophulid is transversely connected to the foremost point of the hypoconid. The posterior branch of the hypoconid is absent (5), short (8), or long (9), never connected to the entoconid. The labial posterolophid is absent (6), small (8), or well-developed (7).

The M<sub>1</sub> HB 316, 16.8 × 10.4, is characterized by a more longitudinal ectolophid: a line drawn over the ectolophid passes through the anteroconid and through the labial part of the posterior border of the molar; the anterolophulid is complete, the anterior protolophulid is absent, the hypoconid branch is long. This large specimen might belong to *Eucricetodon* sp. 2, described hereafter. Another large specimen, M 1477, 16.7 × 11.5, has the same longitudinal ectolophid. In this specimen the anterior protolophulid is complete.

M<sub>2</sub> — There may be a tiny anteroconid at the meeting-point of anterolophonid and anterolophulid. A percentage for this feature is not given, because it can only be assessed reliably in unworn specimens, and such specimens are not sufficiently represented. The lingual anterolophid is long and the anterosinusid well-developed in all but one specimen. In various cases the anterolophid does not close on the anterior wall of the metaconid, and consequently the anterosinusid remains open. The metalophulid is slightly directed forwards, connected to the anterolophulid (31), seldom to the anteroconid (2), or to the protoconid (2). The posterior branch of the protoconid is connected to the base of the metaconid (23), higher to the metaconid (3), or it is free (9). The sinusid is always open, mostly broad and transverse, or directed slightly backwards, less frequently narrow. The mesosinusid is open (26), or closed by a cingulum ridge descending from the metaconid (8). The ectolophid is generally slightly oblique, the mesoconid is absent (19), weak (12), or strong (4). The mesolophid is absent (2), short (12), of medium length (20), or long (2). The ectomesolophid is absent (31), or weak (5). The hypolophulid is transverse and slightly curved forward, before it reaches the ectolophid (21), or transversely connected to the ectolophid (14). The posterior branch of the hypoconid is absent (28), short (4), or long (3), never connected to the entoconid. The labial posterolophid is absent (23), small (9), or strong (2).

The length/width diagram of M<sub>2</sub> (Fig. 1) shows, that the distribution of the measurements is somewhat irregular. The largest specimen, M 1846, measurements 14.9 × 12.7, is characterized by a longitudinal ectolophid, a strongly developed, free-ending posterior branch of the protoconid, a fairly well developed anteroconid, and a backward-curved protosinusid, which gives the protoconid an asymmetrical aspect. The enamel seems to be thicker than it is in most other specimens; the sinusid is rather narrow and curved backwards; there is no posterior branch of the hypoconid, but the posterolophid is thick, slightly inflated. The labial anterolophid is relatively short, and descends steeply. This specimen may belong to *Eucricetodon* sp. 2, described hereafter. Several other large specimens (M 1489, 14.5 × 12.3; RGM 149004, 14.5 × 12.2) share part of these features. It has not been possible to make a clear separation. In most specimens the posterior part is wider than the anterior part. This is a common situation in cricetid M<sub>2</sub>, but in this case there seems to be a separation into two groups of teeth: one group with an almost rectangular outline, and a second group in which the anterior half of the tooth is considerably narrower; the latter group contains mainly small specimens, but — again — no clear separation is possible.

One specimen, RGM 149005, 14.7 × 11.0, draws the attention by its slender appearance, and the very much reduced labial anterolophid and protosinusid.

M<sub>3</sub> — There may be a tiny anteroconid at the meeting-point of anterolophid and anterolophulid. The lingual anterolophid is long and the anterosinusid well-developed. In two cases the anterosinusid remains open lingually. The metalophulid is directed more forward than it is in M<sub>2</sub>, con-

nected to the anterolophulid (8), to the anteroconid (2), or it is interrupted (2). The posterior branch of the protoconid is connected to the base of the metaconid (6), higher to the metaconid (1), or it is long and free (7). The sinusid is always open, narrower and more curved backwards than it is in  $M_2$ . The mesosinusid is open (3), or closed by a cingulum ridge (11). The ectolophid is generally oblique, the mesoconid is absent (11), or weak (1). The mesolophid is absent (5), short (3), of medium length (3), or long (1); the ectomesolophid is absent. The hypolophulid is directed slightly forward (8), or it is transverse (4). The entoconid is absent (3), small (9), or well-developed (1). The posterior branch of the hypoconid is absent (10), or very small (1). The posterosinusid is open (3), or closed by the posterolophid (9). The shape of the molar is a long triangle or trapezoid.

$M^1$  — The anterocone is generally simple, only in two specimens it shows a groove in the anterior wall. The top of the anterocone lies labially of the axis of the molar. The prelobe is rather broad, lingually well set off from the rest of the tooth. A posterior spur on the anterocone may be present (14), or absent (4). In another 9 specimens there is a continuous anterolophule, formed by this spur and the anterior branch of the protocone; this anterolophule is generally a wide curve, almost skimming the antero-lingual corner of the paracone; in 3 specimens the anterocone spur is longitudinal, reaching the paracone, and it is accompanied by a more or less complete anterolophule, which lies more lingually. The anterosinus is almost always closed by a low cingulum ridge. The lingual anteroloph reaches the protocone longitudinally. In cases it forms the border of the molar, but in 24 specimens there is a flat surface, lingually of the anteroloph and in front of the protocone; in some specimens a kind of protostyle is formed. The protolophule is anterior, formed by the anterior branch of the protocone (2), anterior plus a trace of a posterior connection (1), double (5), posterior plus an interrupted anterior connection (9), posterior only (14), or transversely connected to the strongly curved entoloph (2). The mesoloph is absent (1), short (10), of medium length (19), or long (2). The sinus is nearly always open (28), closed by a low cingulum ridge (1), or there is a very small entostyle (3); it is transverse (4), moderately directed forward (14), or strongly forward (13); in 3 of the latter specimens there is an indication of a crest from the protocone to the middle of the entoloph, that would separate the foremost part of the sinus. The mesosinus is open (17), closed by a low cingulum ridge (10), or there is a very small mesostyle (2). The metalophule is anteriorly connected to the entoloph, and in 4 specimens there is a trace of a connection to the lingual part of the posteroloph. In a few specimens there is a spur on the anterior wall of the metacone, that ends freely in the mesosinus, and in a few others such a spur is in contact with the mesoloph. The posterosinus is unreduced, straight, labially open, or closed by the posteroloph. The labial border of the molar is straight (15), or slightly convex (12).

$M^2$  — The lingual anteroloph and the protosinus are developed variably: the protosinus may separate the

anteroloph from the protocone, or the protosinus is absent, making the anteroloph into a flat surface in front of the protocone. The anterior protolophule is always well developed. The posterior protolophule is absent (12), incomplete (18), or complete (2). The sinus is transverse (4), curved forwards (8), or curved strongly forwards (21). The connection between protocone and entoloph is high and continuous (11), low and step-like (12), or interrupted (6); maybe the number of high connections is overestimated, due to the degree of wear. In 7 specimens there is a more or less clear indication of a crest between the posterior part of the protocone and the middle of the entoloph, that tends to isolate the foremost part of the sinus; in 1 specimen a fully developed crest between protocone and hypocone separates the interior part of the sinus as a longitudinal funnel. The sinus is open (18), closed (10), or there is an entostyle (4). The mesoloph is short (6), of medium length (20), or long (6). The mesosinus is open (17), closed (12), or there is a mesostyle (1). The metalophule is anterior (28), or transverse (3). The posterosinus is unreduced, generally closed at a low level. The shape of the tooth is rectangular.

Remark — Especially in the specimens with strongly curved sinus the protocone appears to be rotated  $90^\circ$ : the posterior wall has become the labial wall, and the posterior branch of the protocone (or the entoloph, whatever one wishes to call it) parts from the middle of this wall, in a labial direction. Moreover, there is no longer a gradual transition from cusp to crest, but there is a marked step from the protocone down to the entoloph, and even, in a number of cases, the connection is interrupted. A new, direct, and more lingual connection between protocone and hypocone is indicated in a number of specimens, and in one case this new connection is complete and well developed. See in connection with this development the discussion on the cricetid  $M^3$  in FREUDENTHAL & DAAMS, 1988.  $M^3$  — (For the terminology of the parts of  $M^3$  see FREUDENTHAL & DAAMS, 1988). The protolophule is anterior, directed to the anterior branch of the protocone, or to the small anterocone. The lingual anteroloph and the protosinus are very variable. The axioloph is absent (1), interrupted (9), or complete (3); the centrocone is absent (4), or present (9). A mesoloph is present in 5 specimens, either as a spur on the axioloph, or as a spur on the centroloph. The centroloph is always present, as well as the neo-entoloph, which makes the sinus small.

#### *Eucricetodon* sp. 1

Two specimens from Hoogbutsel are too small for *E. atavus*: the  $M_1$ , no. HB 302,  $13.9 \times 8.9$ , and the  $M^2$ , no. RGM 149046,  $11.7 \times 11.1$ .

The anteroconid of the  $M_1$  is somewhat damaged, the anterolophulid is well developed, the metalophulid is absent, the protosinusid seems to be very small. The posterior branch of the protoconid is high, connected to the metaconid in a slight curve. The mesoconid is weak, the mesolophid short, and there is a well-developed ectomesolophid. The mesosinusid is almost closed, the sinusid

is broad and transverse. The hypolophulid is transverse. The posterior branch of the hypoconid is short.

In the  $M^2$  the lingual anteroloph is vague, and the protosinus almost inexistant. The protolophule is anterior transverse, and there is an interrupted posterior connection. The mesosinus is open; the sinus is open, and strongly curved forward. The mesoloph is of medium length, the metalophule is transverse, slightly curved forward. The specimen is hardly worn. In comparison with unworn specimens of *E. atavus* the top of the crests is less sharp.

By their size these specimens are close to the mean values of *E. moguntiacus* from Heimersheim, but an attribution to this taxon would be hazardous.

#### *Eucricetodon* sp. 2

One specimen from Hoogbutsel is too large for *E. atavus*: the  $M^1$  no. HB 365,  $20,1 \times 13,2$ . See also the remarks under the  $M_2$  of *E. atavus*.

The anterocone is simple and narrow; the border of the tooth between prelobe and protocone makes a sharp angle. The lingual anteroloph ends in a flat surface in front of the protocone. There is no anterolophule. The protophule is double, the anterior one being interrupted. Mesosinus and sinus are open, the sinus is strongly curved forward. The mesoloph is of medium length. The metalophule is obliquely anterior. The posterosinus is large and open. The labial border is slightly convex.

#### Discussion

Among the relatively few papers on *E. atavus* those by VIAENEY-LIAUD (1972) and DIENEMANN (1987) are the most important ones. The topotype material described above, will now be compared with the descriptions by these authors, and with original material from Montalbán. Furthermore a comparison is made with *E. atavus* from Heimersheim, described by BAHLO (1975).

#### COMPARISON WITH GERMAN LOCALITIES

DIENEMANN (1987) described *E. atavus* from a number of German localities. His material shows some differences with the topotype material:

$M_1$  — In Hoogbutsel the posterior branch of the protoconid is always connected to the metaconid; generally this connection is short and transverse, only in one specimen it is somewhat longer and curved. According to Diennemann's description and figures, his material contains more specimens with curved or free posterior branch. The mesolophid seems to be less-developed in Hoogbutsel. The labial posterolophid may be better developed in Hoogbutsel.

$M_2$  — In Hoogbutsel a free protoconid hind arm occurs in 25 % of the cases; in the localities described by DIENE-

MANN the percentages for this feature are much higher. The posterior branch of the hypoconid is less developed in Hoogbutsel.

$M_3$  — In Hoogbutsel a free protoconid hind arm occurs in 50 % of the cases; in the localities described by DIENEMANN the percentages for this feature vary between 75 and 100. The mesolophid is better developed in Hoogbutsel.

$M^1$  — In Hoogbutsel the anterolophule is complete in 40 % of the specimens, in DIENEMANN's material this happens rarely. In Hoogbutsel the anterior protolophule is more frequent. Mesostyles and entostyles are very rare in Hoogbutsel, and the mesosinus and sinus are seldom closed by a cingulum ridge.

$M^2$  — Diennemann stated that in his material the anterior protolophule may be reduced; in Hoogbutsel it is always complete, and even when the protolophule is double, the anterior connection dominates. As for this feature Möhren 20 and Hoogbutsel resemble each other most. In Hoogbutsel the lingual anteroloph never continues backwards beyond the protocone.

Measurements — DIENEMANN measured his material with a WILD-Censor electronic measuring equipment. This system was tested by me some time ago, and proved to produce errors of over 10 % as compared with the LEITZ measuring equipment described by FREUDENTHAL (1966). In the Leitz system the cross-hairs are fixed in the ocular, and the specimen is mounted on a movable table. In the Wild system the actual measuring device contains movable cross-hairs in one of the oculars, and the table is fixed. Since the path of rays is oblique this produces an unacceptable parallax error, especially when the specimen has to be refocused during the measuring pass.

Due to the measuring method a direct comparison of DIENEMANN's measurements with ours is hazardous. Nevertheless it is obvious that the variability coefficient range/mean is rather high in localities like Möhren 20, a fact that may shed some doubt on the homogeneity of these populations. Secondly, even if a statistic deviation due to measuring technique is assumed, the dimensions of the German material are so much greater than the ones found in *E. atavus*, that they cannot represent the same species. Thirdly, DIENEMANN's implication (*op. cit.*, p. 35), that greater size can be linked to stratigraphic age should be treated with greatest care. In fact, a new locality, Montalbán 3C, was discovered recently by Lacomba, Sacristán, and the present author, in the same section as the classical locality of Montalbán, and stratigraphically lower. This locality yielded a good collection of an *Eucricetodon* species, which is — morphologically — quite comparable to the German populations, and which equals *E. atavus* from Hoogbutsel in size. In the classical Montalbán locality, which is stratigraphically higher, the *Eucricetodon* species is smaller, and morphologically more developed (as far as we understand *Eucricetodon*-evolution until now). It is evident, that there are at least two evolutionary lineages among the material that has, until now, been assembled under the name *E. atavus*. Biostratigraphic correlations on the basis of *E. atavus* are unreliable, until these lineages are better understood.

## COMPARISON WITH MONTALBÁN

The mammal locality of Montalbán was discovered by Freudenthal and De Bruijn in 1963. In 1964 Freudenthal and Sondaar returned to the site, and sampled it. It was obvious that the fossiliferous bed was rather thick (about 75 cm), and consisted in fact of two different beds, separated by a bedding plane. Two samples were taken, one from the upper part of the bed (Montalbán C), and one from the lower part (Montalbán B). This material is kept in the collections of the Instituut voor Aardwetenschappen, Utrecht, under locality codes MOB and MOC respectively. It is not known whether the material from Montalbán, described by VIANEY-LIAUD (1972) was taken from bed B or bed C, or maybe from both of these levels. I therefore decided to compare the Hoogbutsel material with the MOB and MOC material, which led to the following results: at least in MOB two species of *Eucricetodon* are found, which are easily distinguished by their size. In MOC the distinction is more difficult, due to the shortage of material. When all the material from MOB and MOC is taken together, there seems to be one single species (apart from the much smaller *Pseudocricetodon*), which by size range and arithmetic means agrees with the values given by VIANEY-LIAUD (1972).

The smaller species from MOB is considerably smaller than *E. atavus* from Hoogbutsel. Morphologically there are considerable differences too. E.g. in the  $M_1$  from Hoogbutsel the metalophulid is present in most specimens, whereas it lacks almost completely in MOB.

The larger species from MOB seems to agree quite well with *E. atavus* from Hoogbutsel, both in size and morphology, but so far the data are inconclusive. Recent excavations in Montalbán, carried out by the present author in collaboration with J.I. Lacomba (Valencia) and A. Sacristán (Madrid) have yielded rich new collections, that will serve to decide whether *E. atavus* occurs in Montalbán or not.

## COMPARISON WITH THE QUERCY

VIANEY-LIAUD (1972) described *E. atavus* from some Quercy fissure fillings, and compared it with Hoogbutsel and Montalbán. Her measurements for the KBIN material from Hoogbutsel are larger than ours for  $M_1$  and  $M_2$ , and almost identical for  $M^1$  and  $M^2$ . The discrepancies may be due to different measuring techniques; unfortunately VIANEY-LIAUD does not define how her specimens were measured. The differences in measurements for Hoogbutsel and Aubrelong, as published by VIANEY-LIAUD, make it clear that these populations cannot belong to the same species. A comparison of Hoogbutsel with Mège is useless, since the measurements for Mège indicate that this population is not homogeneous. Unfortunately no good description of the Quercy material is available. So, for the moment, there is no proof of the occurrence of *E. atavus* in the Quercy.

## COMPARISON WITH HEIMERSHEIM

BAHLO (1975) described the Cricetidae from Heimersheim, among them two species of *Eucricetodon*: *E. moguntiacus* and *E. atavus*. First of all, it must be noted that the size variation of *E. moguntiacus* is very large.  $V'$  — as defined by FREUDENTHAL & CUENCA (1984) — is 30.5 for the length of  $M_1$  and 28.9 for the length of  $M^1$ . These values make it probable that material of various species was assembled under the name *E. moguntiacus*.

Secondly, BAHLO ascribes a number of specimens to *E. atavus*. The  $M_2$  are characterized, according to BAHLO, by the complete absence of the posterior branch of the protoconid. In view of the fact that the posterior branch of the protoconid never fails in Hoogbutsel, it is impossible that this material belongs to *E. atavus*. The same argument is applicable to the  $M_3$ . In the  $M^1$  from Heimersheim the anterior protolophule is missing, whereas in Hoogbutsel it is almost always present. A metalophule connected to the hypocone, and not to the entoloph, as figured in BAHLO, 1975, fig. 25, never occurs in Hoogbutsel. BAHLO states, that the posterior branch of the protocone of  $M^2$  is absent in his *atavus* population, but it is clearly present in his fig. 25, so this feature cannot be evaluated here. Evidently BAHLO's *atavus* material belongs to another species of *Eucricetodon*.

On the other hand, it is certainly not impossible, that *E. atavus* is present in Heimersheim, but in that case it should be found among the *moguntiacus* material, which is too variable for one single species.

Several authors have transferred *E. moguntiacus* to the genus *Pseudocricetodon*. Apart from the cranial structures, described by PARENT (1983), not a single feature is known, that serves to distinguish *Eucricetodon* and *Pseudocricetodon*. Originally the main differences were considered to be size, posterior branch of the hypoconid, and the labial border of the  $M^1$ . When *E. moguntiacus* is transferred to *Pseudocricetodon* the hypoconid branch is no longer a valid criterion for generic distinction. When *E. incertus* is considered to be a *Pseudocricetodon*, size is no longer a valid difference. Nor can the labial border of the  $M^1$  be used, since many specimens of *E. atavus* from Hoogbutsel have a straight labial border. This means that the dental morphology can not be used — at the moment — to distinguish these two genera.

Possibly a good distinctive criterion is the longitudinal connection between metacone and mesoloph, often found in *Pseudocricetodon*, but a decision has to be made on the basis of further research.

On the basis of PARENT's criteria I am convinced *Pseudocricetodon* is a valid genus, but as long as no good arguments for a change of the generic attribution are available, I prefer to respect taxonomic stability and leave *moguntiacus* in the genus *Eucricetodon*, the more so, since the material may be a mixture of two species, one of which might be *E. atavus*.

## Conclusions

Three species of *Eucricetodon* are present in the locality of Hoogbutsel. Among these, only *E. atavus* is sufficiently well represented.

So far, *Eucricetodon atavus* is only known from its type-locality. The specimens described by DIENEMANN (1987) from German localities such as Möhren 13, 20, Ronheim

1, are too large, and morphologically too highly developed, to attribute them to *E. atavus*. In Montalbán two species of *Eucricetodon* occur; the smaller one is definitely too small and "primitive" for *E. atavus*, the larger one might be *E. atavus*, but as yet the material is too poor to permit a decision. The material described from Heimersheim as *E. atavus* certainly belongs to another species. There is no proof of the occurrence of *E. atavus* in the Quercy.

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M. FREUDENTHAL  
Rijksmuseum van Geologie en Mineralogie,  
Hooglandse Kerkgracht 17,  
NL 2312 HS Leiden,  
The Netherlands.

Table 1.  
Literature citations of *Eucricetodon atavus*.

Hoogbutsel	MISONNE, 1957	<i>C. atavus</i>	Ruch	BRUNET <i>et al.</i> , 1977	<i>E. aff. atavus</i>
Malemort	TRIAT <i>et al.</i> , 1971	<i>E. cf. atavus</i>	Alzey	BAHLO & NEUFFER, 1978	<i>E. atavus</i>
Hoogbutsel	VIANEY-LIAUD, 1971	<i>E. atavus</i>	Möhren 16, 19, 20, 21	HEISSIG, 1978	<i>E. atavus</i>
Montalbán	VIANEY-LIAUD, 1971	<i>E. atavus</i>	Haag 2	HEISSIG, 1978	<i>E. atavus</i>
Les Chapelins	VIANEY-LIAUD, 1971	<i>E. atavus</i>	Möhren 13	LAGALLY, 1982	<i>E. atavus</i>
Hoogbutsel	VIANEY-LIAUD, 1972	<i>E. atavus</i>	Pech Desse	COMTE, 1985	<i>E. aff. atavus</i>
Montalbán	VIANEY-LIAUD, 1972	<i>E. atavus</i>	Itardies	COMTE, 1985	<i>E. atavus</i>
Aubrelong	VIANEY-LIAUD, 1972	<i>E. atavus</i>	Burgmagerbein 3	DIENEMANN, 1987	<i>E. atavus</i>
Mège	VIANEY-LIAUD, 1972	<i>E. atavus</i>	Ehingen 10, 11, 14, 15	DIENEMANN, 1987	<i>E. atavus</i>
Pech-Crabit	VIANEY-LIAUD, 1972	<i>E. atavus</i>	Grafenmühle 6, 10	DIENEMANN, 1987	<i>E. atavus</i>
Mas de Got	VIANEY-LIAUD, 1972	<i>E. atavus</i>	Haag 2	DIENEMANN, 1987	<i>E. atavus</i>
Les Chapelins	VIANEY-LIAUD, 1972	<i>E. cf. atavus</i>	Herrlingen	DIENEMANN, 1987	<i>E. atavus</i>
Möhren 13	HEISSIG, 1973	<i>E. atavus</i>	Montalbán	DIENEMANN, 1987	<i>E. atavus</i>
Mas de Got A, B	VIANEY-LIAUD, 1974	<i>E. atavus</i>	Möhren 6, 7, 8, 9, 10	DIENEMANN, 1987	<i>E. atavus</i>
Itardies	VIANEY-LIAUD, 1974	<i>E. atavus</i>	Möhren 13, 19, 20, 21	DIENEMANN, 1987	<i>E. atavus</i>
Can Joanet	ANADON & DE VILL., 1975	<i>E. atavus</i>	Möhren 24, 25, 29, 31	DIENEMANN, 1987	<i>E. atavus</i>
Heimersheim	BAHLO, 1975	<i>E. atavus</i>	Ronheim 1	DIENEMANN, 1987	<i>E. atavus</i>
Montalbán	BAHLO, 1975	<i>E. atavus</i>	Bernloch 1 (B)	DIENEMANN, 1987	<i>E. cf. atavus</i>
Autrelong	BAHLO, 1975	<i>E. atavus</i>	Burgmagerbein 2	DIENEMANN, 1987	<i>E. cf. atavus</i>
Hoogbutsel	BAHLO, 1975	<i>E. atavus</i>	Ehingen 1	DIENEMANN, 1987	<i>E. cf. atavus</i>
Les Chapelins	BAHLO, 1975	<i>E. atavus</i>	Treuchtlingen 1	DIENEMANN, 1987	<i>E. cf. atavus</i>
Bach	BAHLO, 1975	<i>E. atavus</i>	Ehingen 5, 8	DIENEMANN, 1987	<i>E. aff. atavus</i>
Fontaines-de-Vaucluse	BAHLO, 1975	<i>E. atavus</i>			

## PLATE 1

*Eucricetodon atavus*Fig. 1. -  $M^1$  dext., M 1146, Holotype.Fig. 2. -  $M_1$  sin., M 1447.Fig. 3. -  $M_1$  sin., M 1479.Fig. 4. -  $M_2$  sin., M 1482.Fig. 5. -  $M_2$  sin., M 1486.Fig. 6. -  $M_3$  sin., M 1497.Fig. 7. -  $M_3$  sin., M 1500.Fig. 8. -  $M^1$  sin., M 1506.Fig. 9. -  $M^2$  sin., M 1519.Fig. 10. -  $M^2$  sin., M 1521.Fig. 11. -  $M^3$  sin., RGM 149057.Fig. 12. -  $M^3$  sin., RGM 149058.*Eucricetodon sp. 1*Fig. 13. -  $M_1$  sin., HB 302.Fig. 14. -  $M^2$  sin., RGM 149046.*Eucricetodon sp. 2*Fig. 15. -  $M^1$  sin., HB 365.

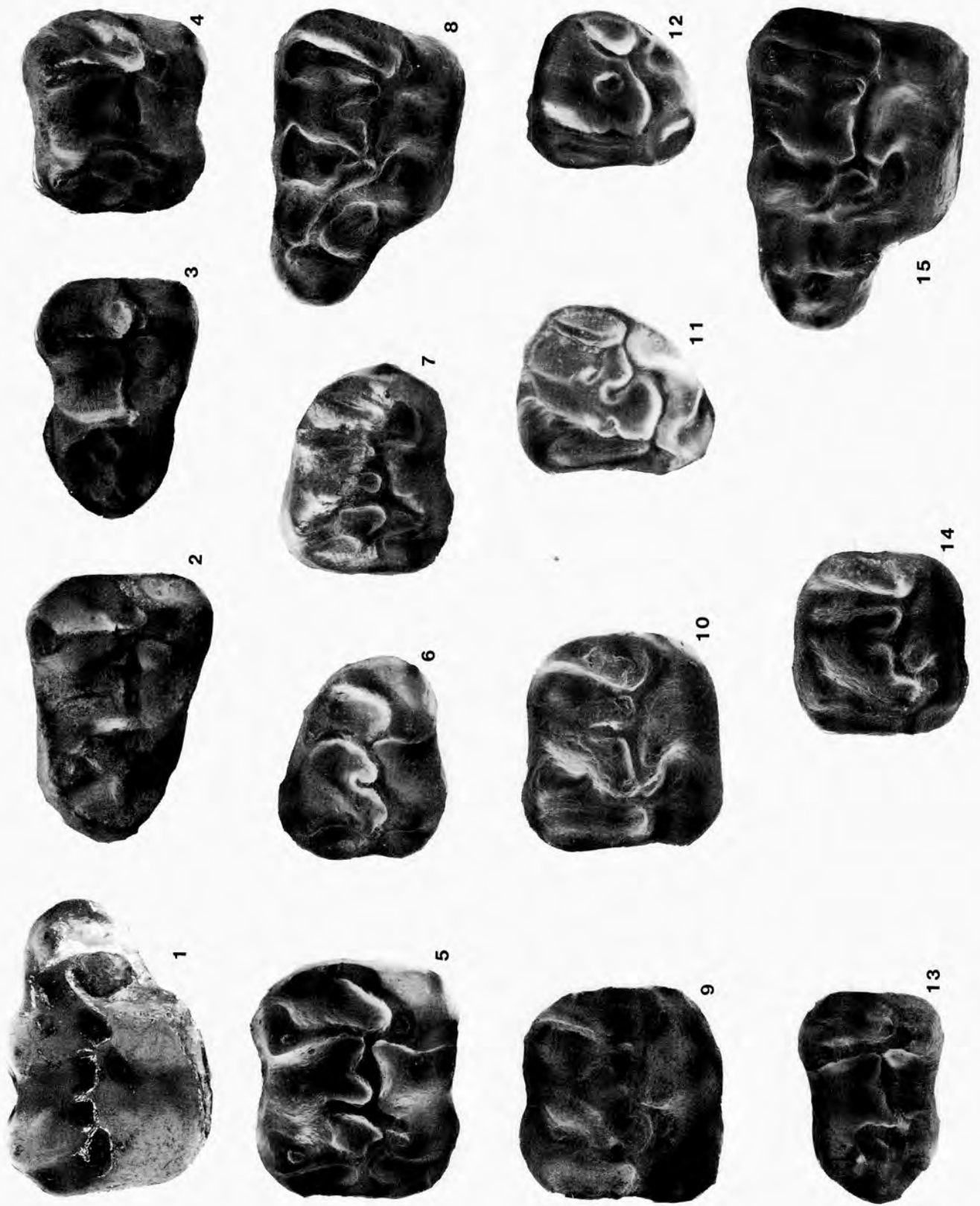


Fig. 1. - Length/width diagrams of the molars of *E. atavus* from Hoogbutsel. ▷



