

Insectivores (Mammalia) from the earliest Oligocene (MP 21) of Belgium

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Abstract

Insectivore remains are not common in the Lower Oligocene of Europe. For this reason, the study of the earliest Oligocene insectivore fauna (MP 21) from Boutersem and Hoogbutsel, all together yielding nine species, representing five families, constitutes an important progress in the knowledge of the Late Eocene and Early Oligocene insectivore evolution. Some of the genera discovered in Belgium are known from upper Eocene sites (*Saturninia*, *Amphidozotherium*, *Euronyctia*, *Eotalpa*), whereas others are not known before the Oligocene (*Butselia*, *Tetracus*, *Heterosoricinae* ind.). The co-occurrence of primitive species of Nyctitheriidae with modern forms belonging to the Plesiosoricidae, Talpidae and Erinaceidae at the Eocene-Oligocene boundary suggests a transition fauna. Between the Priabonian (Late Eocene) and the Rupelian (Early Oligocene), the endemic European insectivores were in competition with the new immigrants. This faunal turnover is generally accepted as the 'Grande Coupure' event (the MP 21 event).

Keywords: Belgium, insectivores, Lower Oligocene, Mammalia

Introduction

Three localities yielded terrestrial vertebrates in the Lower Oligocene from Belgium: Hoogbutsel (Glibert & de Heinzelin de Braucourt, 1952), Hoeleden (Glibert & de Heinzelin de Braucourt, 1954) and Boutersem TGV (Fig. 1). The Hoogbutsel and Hoeleden localities are known since half a century. Fifteen papers were written on both localities (Smith, 2003). The third locality was discovered on a temporary exposure of lowermost Oligocene (Early Rupelian) during the HST railway construction in 1999 and yielded abundant vertebrate remains of fishes, amphibian, reptiles (turtles, lizards, snakes, crocodiles), birds (Mayr & Smith, 2001) and mammals. The preliminary study of the mammal remains revealed the presence of at least 22 taxa including the following families: Didelphidae (Marsupialia); Nyctitheriidae, Plesiosoricidae, Soricidae

(Soricomorpha); Erinaceidae (Erinaceomorpha); Vespertilionidae (Chiroptera); Theridomyidae, Gliridae, Cricetidae, Eomyidae (Rodentia). The record consists mainly of isolated teeth and a few jaw fragments. The vertebrate beds occur at the base of a fluvio-lacustrine complex, known as the Boutersem Member, which belongs to the Borgloon Formation (Tongeren Group, previously known and mapped as upper 'continental' Tongrian Tg2).

The importance of the three localities lies with the many vertebrate taxa they yielded from the oldest continental levels of the Lower Oligocene near the 'Grande Coupure' (Stehlin, 1909). The faunas of these levels are correlated with the reference level MP 21 of the mammalian biochronological scale for the European Paleogene (Schmidt-Kittler, 1987; Aguilar et al., 1997) defined on the fauna of Soumaillies (Aquitaine Basin, France).

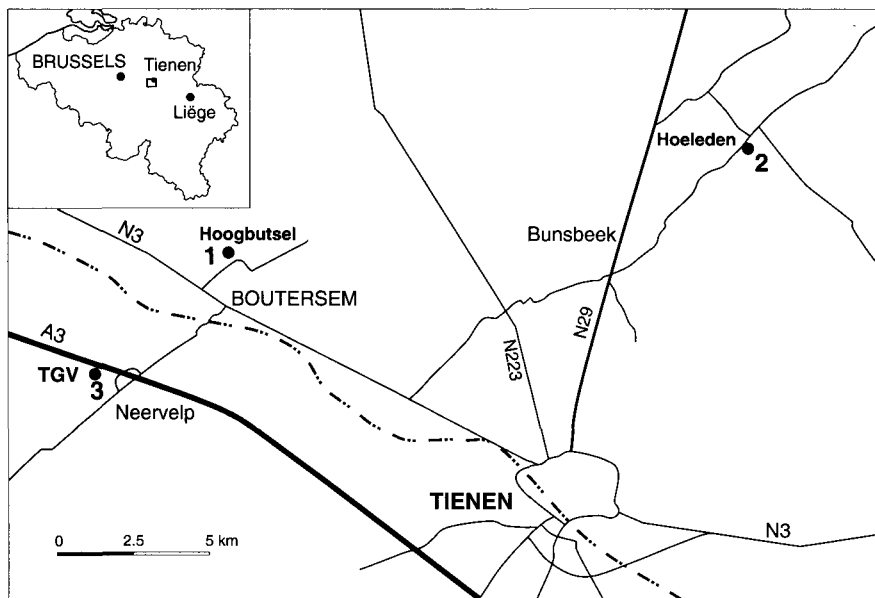


Fig. 1. Location of the localities from the earliest Oligocene (MP 21) of Belgium. 1. Hoogbutsel; 2. Hoeleden; 3. Boutersem TGV.

With the exception of *Butselia biveri* described by Quinet & Misonne (1965), no insectivore was previously published from the Lower Oligocene of Belgium. Full descriptions of the forms introduced here will follow elsewhere.

Methods and materials

The fossils discovered at Hoogbutsel are housed in the Royal Belgian Institute of Natural Sciences (IRSNB). The specimens from Boutersem TGV are in the collection of the author. No insectivore teeth recorded from the Hoeleden locality are present in the IRSNB collection. The new insectivore material in this paper comes from the locality Boutersem TGV, only the teeth of *Tetracus nanus* (Aymard, 1846) are recorded from Hoogbutsel.

The mammal systematic classification used here is that proposed by McKenna & Bell (1997). The terminology used for dental crests and cusps is based on that defined by Van Valen (1966).

The new discoveries in the lower Oligocene from Belgium

In Belgium, the erinaceid *Tetracus nanus* (Pl. 1, Fig. 9) is only known from Hoogbutsel. A few teeth are present in the IRSNB collection. M1/, and M1-M/3 were recognised. Compared to the M1/ from the Oligocene locality of Garouillas (Quercy, MP 25) described by Crochet (1995, fig. 6), the Belgian M1/ seems to be somewhat larger labio-lingually, the cusps somewhat weaker and the labial edge more oblique. Based on only one specimen it is not possible to decide whether the differences result from intraspecific variation or these characters have a specific significance. The lower

teeth from Hoogbutsel are similar in morphology to those of the French localities. *Tetracus nanus* is known from MP 21 to MP 26 (Crochet, 1995).

The family Talpidae (Pl. 1, Fig. 6) is up to day only present in Boutersem TGV. Sixteen isolated teeth of *Eotalpa* n. sp. are recorded. This new species is recognised on the basis of P4/, M1/, M2/, M/1, M/2, M/3. Sigé et al. (1977) previously described the genus *Eotalpa* represented by the monospecific taxa *Eotalpa anglica* from the Lower Headon Beds of the Wight Island, London Basin.

The plesiosoricid *Butselia biveri* (Pl. 1, Fig. 7) was described by Quinet & Misonne (1965) on the basis of five isolated teeth from Hoogbutsel. The new material from Boutersem TGV is composed by one mandible fragment with P4-M/1, one maxilla fragment with P3-P4/ and 32 isolated teeth. The following positions have been identified: DP4/, P3-M3/, P4-M/3. The species is characterized by a reduced P3/. The semi-molariform P4/ is as wide as the M1/, with a considerable development of the metastylar lobe and a very long postmetacrista labio-posteriorly orientated. M1-M3/ and M/1-M/3 are gradually smaller. M1/ has a preparacrista and a postmetacrista labially orientated and shows two very strong stylocone and D cusps; the styler shelf is very large; the postcingulum is broad; the conules are absent on all the upper cheek teeth. DP4/, M1/ and M2/ have precingulum and postcingulum with small hypocone. On the lower molars, the trigonid is very strong; the talonid is low; the cusps of the talonid are weak. *B. biveri* has only been recovered from MP 21 in a few localities from Europe.

The nyctitherid *Saturnimia gracilis* Stehlin, 1940 (Pl. 1, Fig. 4) is represented by one left mandible with P3-

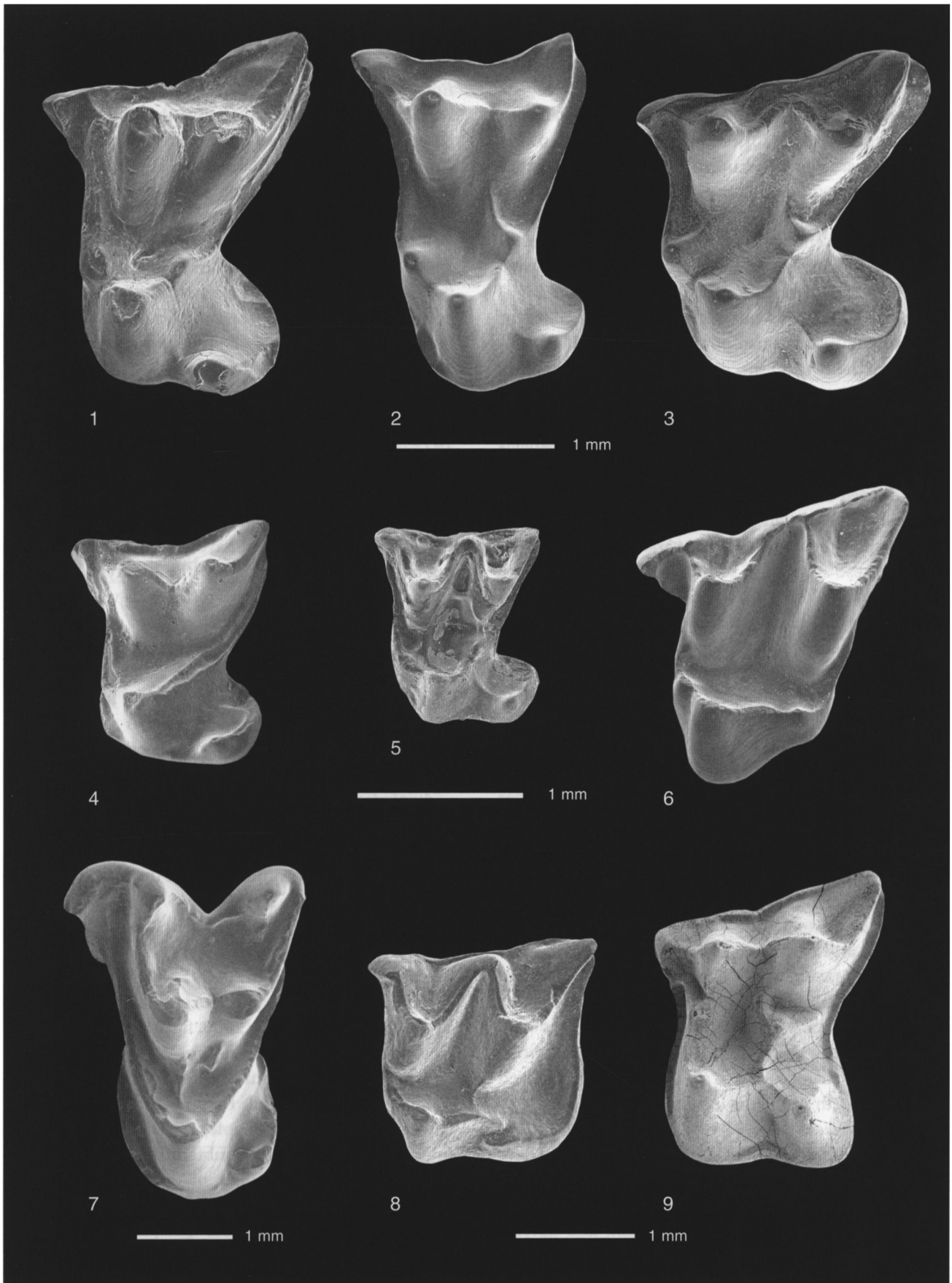


Plate 1. Fig. 1. *Amphidozotherium cayluxi* Filhol, 1876; Fig. 2. cf. *Saturninia* n. sp.; Fig. 3. *EuroNyctia* n. sp.; Fig. 4. *Saturninia gracilis* Stehlin, 1940; Fig. 5. cf. *EuroNyctia* n. sp.; Fig. 6. *Eotalpa* n. sp.; Fig. 7. *Butselia biveri* Quinet & Misonne, 1965; Fig. 8. Heterosoricinae ind.; Fig. 9. *Tetracus nanus* Aymard, 1846. All M1/ in occlusal view. Locality: all from Boutersem TGV, except Fig. 9 from Hoogbutsel. Scale bars are 1 mm.

M/3, three other mandible fragments with teeth, and 27 isolated teeth. The specimens from the Lower Oligocene of Belgium show some differences from those of the types of the Priabonian locality of Gösgen-Kanal (MP 18, Canton Soleure, Switzerland) and from La Débruge (France) (Stehlin, 1940). The teeth are somewhat smaller. The upper molars bear a larger talon, and the precingulum is shorter and more prominent. The lower teeth are shorter and narrower with more slender cusps. The antero-labial cingulum is longer and extended below the protoconid.

S. gracilis has been recorded from MP 16 until MP 21 (Sigé, 1976), but this genus represents different lineages and causes a taxonomical problem. The comparison of the Belgian specimens with those of Stehlin's collection housed at the Naturhistorisches Museum from Basel shows that there is a mixing of two different taxa in the specimens from La Débruge. Some specimens really belong to *S. gracilis* but some others must be attributed to the genus *Euronyctia* (R. Smith, pers. obs.). Sigé (1976) figured different specimens of lower teeth to show the morphological variability of *S. gracilis*. Among these specimens some are to be attributed to another taxon (*Euronyctia?*): figs. 7c, e, f, g, 9d. The diagnosis of the genus *gracilis*, G.C. 879 (Sigé, 1976) do not bear an ascendant oblique crest until the apex of the metaconid as it is the case in *Euronyctia*. Many other species assigned later to the genus *Saturninia* bear an ascendant oblique crest and have probably to be assigned to another genus. Therefore the genus *Saturninia* has probably a shorter extension than thought to-day (Table 2).

Five mandible fragments with teeth and 59 isolated teeth are referred to cf. *Saturninia* n. sp. (Pl. 1, Fig. 2). It is a medium-large size nyctitherid. The metacone of P4/ is reduced. The upper molars are short, labiolingually elongated, with a medium developed talon. Both M1/ and M2/ have a well-developed precingulum and hypocone. M/3 and M3/ are not reduced. The lower teeth show an oblique crest that ascends on the distal wall of the metaconid.

Euronyctia n. sp. (Pl. 1, Fig. 3) is represented by two mandibles bearing each P/4 and M/2, and 34 isolated teeth. The teeth of the new species are close in size to those of *E. tobieni* (Sigé, 1976). Both upper and lower cheek teeth show an important dilambdodonty. There is a mesostyle and a little precingulum on the upper molars. P4/, M1/, M2/ have a broad rounded talon with a medium-sized hypocone. Postcingulid and antero-labial cingulid are well developed. On the lower molars the prominent oblique crest reaches the apex of the metaconid. A notch is present in the oblique crest at one third of the height. The postero-lingual border of the talonid on M/1 and M/2 forms an angle of about

90°. There are clear morphological differences between *E. tobieni* and the new species (Smith, in prep.).

Seventeen isolated teeth are attributed to cf. *Euronyctia* n. sp. (Pl. 1, Fig. 5). It is a very small species. The molars are very dilambdodont. The post-paracrista and premetacrista are connected to a strong mesostyle. The paraconule is protruded as the metaconule and the premetaconule crista is strong. There is a little precingulum on both M1/, M2/. The well-developed talon bears a small but well-distinct hypocone. On the lower molars, the hypoconulid and the entoconid are close together. The hypoconulid is projected posteriorly from the talonid. The angle between the lingual and the posterior borders of M/1 and M/2 is at least 130° at the level of the entoconid.

There is a taxonomical problem between the genera *Euronyctia* Sigé, 1997 and *Paradoxonycteris* Revilliod, 1922. Sigé (1997) described the taxon *Euronyctia montana* n. gen, n. sp. He included *Saturninia grisollensis* and *S. tobieni* in this new genus. Hooker & Weidmann (2000) recombined *Euronyctia tobieni* (Sigé, 1976) with *Paradoxonycteris* and gave an emended diagnosis for this genus. Unfortunately, the holotype and only specimen of *Paradoxonycteris soricodon* is very damaged and most of the diagnostic characters are not visible on this specimen. The emended diagnose is thus more based on specimens belonging to *E. tobieni* and other *Euronyctia* species. In this situation, it should be preferable to consider *Paradoxonycteris soricodon* as a nomen nudum (dubium?) and to keep *Euronyctia* for the species *grisollensis*, *tobieni* and *montana*.

Amphidozotherium cayluxi Filhol, 1876 (Pl. 1, Fig. 1) is represented by a left mandible with M/2-M/3 and 46 isolated teeth. On P4/-M2/ from Boutersem TGV the hypocone is more prominent as on the teeth recovered from the Quercy. It lacks on M3/. The ratio length/width is different on M1/ from Belgium and France. The lower teeth are very similar to those figured and described by Sigé (1976, fig. 95-96) from the Upper Eocene of the Quercy (France) and with those figured by Hooker & Weidmann (2000, fig. 41) from the Upper Eocene of Mormont (Canton Vaud, Switzerland). *A. cayluxi* is known from MP 19 to MP 21.

One M1/ is referred to an unknown genus of Heterosoricinae Viret & Zapfe, 1951 (Pl. 1, Fig. 8). The only known genus of the subfamily Heterosoricinae, in Europe, from the age of Boutersem TGV is *Quercysorex* Engesser, 1975. Up to day, three species of this genus are described: *Qu. primaevus* (Filhol, 1882) from Lamandine in Quercy (old collections), *Qu. herrlingensis* (Palmowski & Wachendorf, 1966) from Herrlingen 1 (MP 22) and *Qu. ulmensis* Ziegler, 1998 from Herrlingen 8-9 (MP 28). The two first species are only based on lower jaws and teeth

(Engesser, 1975). With some lower jaws, Ziegler (1998) described and figured a M2/ of *Quercysorex ulmensis*. Differences in size and morphology are observable between the upper molars of *Qu. ulmensis* and the specimen from Boutersem TGV. It is clearly impossible to determine this specimen more precisely at the moment.

Discussion

The insectivore faunas of Hoogbutsel and Boutersem TGV show some differences (Table 1). Among the most significant differences between both faunas are: the presence of *Tetracus nanus*, a representative of the family Erinaceidae at Hoogbutsel, and the presence of the family Talpidae at Boutersem. Comparison of the avian faunas between these two sites leads to a similar situation (Mayr & Smith, 2001, 2002). The differences in the faunal composition are probably due to palaeoecological reasons.

Table 1. Insectivore species from MP 21 level from Belgium, recorded in both localities Hoogbutsel and Boutersem TGV.

Taxon	Hoogbutsel	Boutersem TGV
<i>Tetracus nanus</i> Aymard, 1846	+	
<i>Butselia biveri</i> Quinet & Misonne, 1965	+	+
<i>Saturnimia gracilis</i> Stehlin, 1940	+	+
<i>Saturnimia</i> n. sp.	+	+
<i>Euronyctia</i> n. sp.	+	+
cf. <i>Euronyctia</i> n. sp.	+	+
<i>Amphidozotherium cayluxi</i> Filhol, 1876	+	+
Heterosoricinae ind.	+	+
<i>Eotalpa</i> n. sp.		+

Table 2 is based on several publications (Crochet, 1995; Sigé, 1976; Sigé, 1997; Sigé et al., 1977; Leduc, 1996; Ziegler, 1998) and personal observations of the author. Except for the genus *Saturnimia*, Table 2 shows the level MP 21 is a limit between two different insectivore faunas. The first one, with the genus *Euronyctia*, *Eotalpa*, *Amphidozotherium*, *Saturnimia* is the oldest fauna living in Europe during the Upper Eocene. The second one, with the genus *Tetracus* and Heterosoricinae ind. is the fauna of the new immigrants. As discussed before, *Saturnimia* probably includes different genera and therefore needs a revision. With a new genus name, a part of the taxa presently known as '*Saturnimia*' will also be ranged as new immigrants.

Conclusion

Paleogene insectivores are rare throughout Europe but the Belgian Lower-Oligocene localities (MP 21) yielded many remains of insectivores. On the nine taxa discovered in Belgium two are recorded before MP 21 (*Saturnimia gracilis* and *Amphidozotherium cayluxi*) and two others after MP 21 (*Tetracus nanus* and *Heterosoricinae* ind. sp.). But none is known at the same time before and after MP 21. Nevertheless *Tetracus nanus* was recorded in Coyrou 1-2 (Quercy, France) in an intermediate level between MP 20 and MP 21 (Legendre et al., 1995). If we only consider the genera (Table 2) four taxa are recorded before MP 21 and two are known after MP 21. This situation could be explained by the fact that few insectivores were recovered from the Quercy sites, which yielded most of the mammal material from this age. But it could also be explained by the fact that MP 21 is just the moment of a faunal turnover. The endemic European insectivores were at the same moment in competition with the new immigrants. This hypothesis comes close to what was suggested by Legendre et al. (1995) and must be confirmed by the study of a more complete mammal assemblage. The different new taxa notes herein will be named and described soon by the author in separate papers.

Table 2. Distribution of the insectivore genera recorded in the Lower Oligocene from Belgium in European localities from MP 16 to MP 26.

Taxon	MP16	MP17	MP18	MP19	MP20	MP21	MP22	MP23	MP24	MP25	MP26
<i>Euronyctia</i>	+	+	+		+	+					
<i>Eotalpa</i>			+			+					
<i>Amphidozotherium</i>				+	+	+					
<i>Butselia</i>						+					
<i>Saturnimia</i>	+	+	+	+	+	+	+	+	+	+	+
<i>Tetracus</i>						+	+	+	+	+	+
Heterosoricinae ind.						+	?	?	?	?	?

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