Erinaceidae and Talpidae (Erinaceomorpha, Soricomorpha, Mammalia) from the Lower Miocene of Merkur-Nord (Czech Republic, MN 3)

by

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Abstract

The Czech locality of Merkur-Nord (MN 3) has yielded one species of erinaceid and five species of talpids. The hedgehogs are represented by a few fossils of *Galerix* only. The talpid assemblage is characterised by a dominance of *Mygalea magna*. The position of *Mygalea* within the Desmaninae, which previously had been open to some doubt, could be ascertained. The excellent preservation of the material, including post-cranial remains, allowed the association of humeri to all of the five talpid species. The position of *Desmanella*, represented by the new species *D. gudrunae*, as a uropsiline talpid is confirmed, as for the first time a *Desmanella* dentition could be associated with a uropsiline type of humerus. Overall, the talpid assemblage shows its greatest similarity with the MN 2 locality of Ulm-Westtangente. However, the presence of *Galerix*, an MN 3 immigrant in European faunas, confirms the assumed age of the locality.

Keywords: Insectivores, new species, Uropsilinae, Desmaninae

Kurzfassung

Die Fauna von Merkur-Nord (Tschechische Republik), die in die Säugetiereinheit MN 3 eingestuft wird, beinhaltet neben vielen anderen Kleinsäugern eine Igel- und fünf Maulwurfarten. Von den Igeln gibt es nur wenige Zähne von *Galerix*. Für die Talpdenfauna ist die Dominanz von *Mygalea magna* kennzeichnend. Die Zugehörigkeit von *Mygalea* zu den Desmaninae, die manchmal zur Diskussion steht, konnte bestätigt werden. Die ausgezeichnete Erhal-

tung der Funde, darunter postcraniale Knochen, gestattete die Assoziation von Humeri mit Gebissresten bei allen fünf Talpidenarten. Erstmals konnte ein *Desmanella*-Gebiss mit einem uropsilinen Humerus assoziiert werde. Dadurch ist die Zugehörigkeit der Gattung *Desmanella* – vertreten durch die neue Art *D. gudrunae* – zu den Uropsilinae bestätigt. Insgesamt zeigt die Talpidenfauna von Merkur-Nord die meiste Übereinstimmung mit jener der MN 2-Fauna von Ulm-Westtangente. Aber die Gegenwart von *Galerix*, der erst zur Zeit, die durch MN 3 repräsentiert wird, eingewandert ist, bestätigt das angenommene Alter der Fauna.

1. Introduction

The locality of Merkur-Nord represents one of the most interesting periods in the Eurasian Neogene, the so-called Cricetid Vacuum. Whereas Muroidea dominate European faunas throughout the Neogene, only the muroid genera *Melissiodon*, *Eucricetodon* and rarely *Neocometes* were present during the Cricetid Vacuum, which roughly coincides with zone MN 3. Merkur-Nord stands out for two reasons, making it one of the most important fossil localities for its timeframe. As it contains fossils from both small and large mammals, it provides a view of the entire mammal fauna (Fejfar et al., 2003). The second reason is the excellent preservation of the micromammal material, often with complete mandibles, as well as fragments of the maxillary with the dentition in place. The availability of such complete material is perhaps even more important for insectivores, the subject of the present paper, than it is for rodents. The taxonomy of insectivores is always based on the combination of characters from different elements and the size ratio between different elements. More often than not, the anterior dentition plays an important role in species identification, and for this the presence of mandibles preserving this dentition is crucial. The taxonomy of fossil Talpidae is not only based on the dentition, but also on the humeri. The presence of a large number of postcranial remains in Merkur-Nord offers opportunities not only to come to detailed descriptions of various talpid humeri, but also to help in associating the different types of humerus with the various dentitions.

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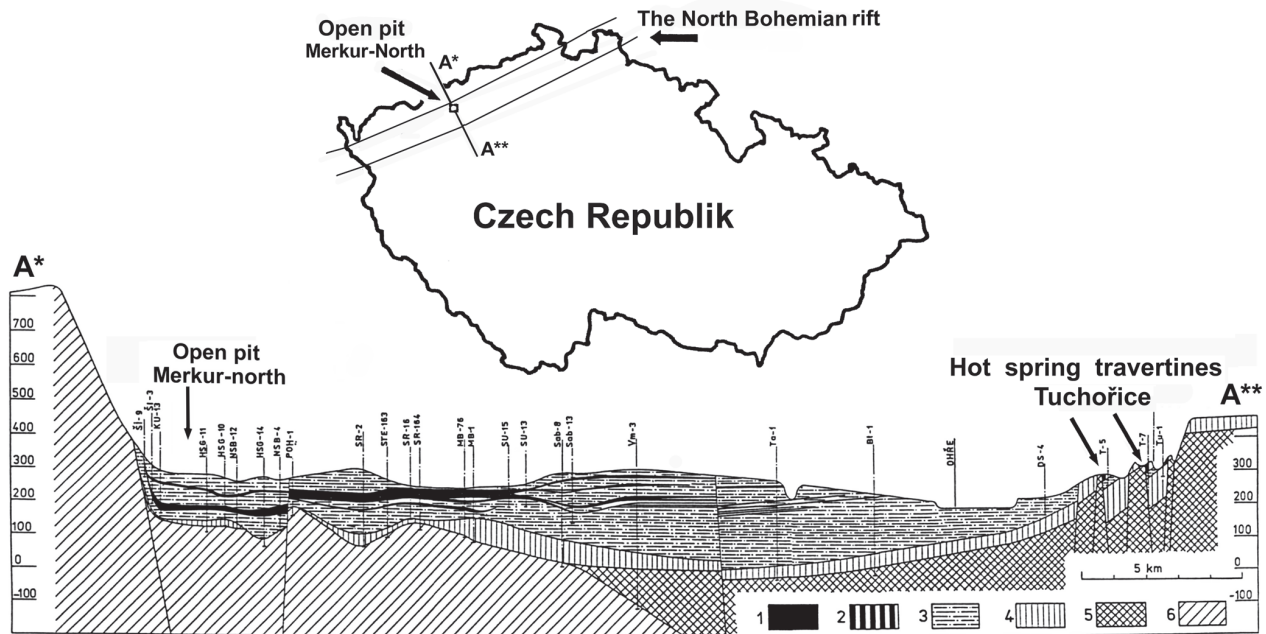
Figure 1: Map of Czech Republik and Geological cross section through the North Bohemian rift structure. Two Early Miocene localities (Merkur-North and Tuchořice) contain mammalian assemblages of the similar age but different palaeoecology. Cross section (line A* – A** in the map) through the North Bohemian Tertiary browncoal basin in the Chomutov-Most region, showing the asymmetrical shape of the rift caused by the volcano-tectonic subsidence (10x heighth exaggeration).
Legend: 1 - the Miocene sequence (brown coal seams, humolitic clays and claystones); the site Merkur-North is on the base of the s.c. „Main seam", 2 - Early Miocene hot spring travertines at Tuchořice and Lipno recorded in the partial tectonic relics (fault blocks) along the tectonic Krušné Hory Mts. and Ohře lines, 3 - Tertiary sands and clays, 4 - Upper Cretaceous sediments, 5 - Permocarboniferous sediments, 6 - metamorphic rocks of the Krušné Hory Mts. (from FEJFAR et al., 2003).

The insectivores from Merkur-Nord were already listed in FEJFAR et al. (2003) and FEJFAR & SABOL (2005). However, these lists were preliminary. In this paper we give extensive descriptions of the erinaceids and talpids from the site. We initially set out to describe the entire insectivore assemblage, but it soon became apparent that this would be too large an enterprise for a single paper. The insectivore assemblage is not only large, but also very diverse. The choice for talpids and erinaceids is a pragmatic one; they represent about half the material. The soricids, dimylids and plesiosoricids from Merkur-Nord will be described in separate papers.

Over the last years, our knowledge of the insectivore faunas from MN 3 has increased considerably, although the record is still scanty. The shrews and dimylids from Wintershof-West, reference locality to the MN-zone, have been described by DOBEN-FLORIN (1964) and MÜLLER (1964), respectively. ZIEGLER (1994) described the remaining insectivores. Earlier, ZIEGLER (1989, 1990a,b) had described Early Miocene insectivores from various southern German localities, including the MN 3 locality Stubersheim 3. But these papers also present the insectivores from older German localities, such as, for instance, the MN 2 locality Ulm-Westtangente. VAN DEN HOEK OSTENDE (2003) described the insectivores from the Ramblian type section in Spain. Two Anatolian MN 3 insectivore faunas have been described, that of Keseköy (VAN DEN HOEK OSTENDE, 2001c) and of Sabuncebeli (DE BRUIJN et al., 2006)

2. Material and methods

The material from Merkur-Nord was collected over a period of more than forty years. Initially material was obtained by screen-washing drilling samples in 1960. Since 1989 fossils were collected in the open pit from the intentionally exposed fossiliferous layer, and by screen-washing material. The collections are stored in the the of the National Museum, Paleontological Department in Prague under the symbol: NMPGPD, Me, FE-Li7408.

The terminology for part of molars of the Erinaceidae and Talpidae follows ENGESSER (1980) and VAN DEN HOEK OSTENDE (1989), respectively. The teeth and humeri were measured using an ocular micrometer on a Wild binocular microscope. The orientation of the teeth while measuring follows DE JONG (1988) for the Erinaceidae and VAN DEN HOEK OSTENDE (1989) for the Talpidae. The humeri were measured according to ZIEGLER (1990b). All measurements are in millimetres. All specimens are illustrated as left ones for better comparison.

3. Systematic palaeontology

Ordo Erinaceomorpha GREGORY, 1910
Familia Erinaceidae FISCHER VON WALDHEIM, 1817
Subfamilia Galericinae POMEL, 1848

Genus *Galerix* POMEL, 1848

Galerix aurelianensis ZIEGLER, 1990
(Plate 1, fig. 1a-c)

Measurements: The measurements are listed in Table 1.

Description:

Maxillary. On piece of maxillary has been preserved, bearing the P1. In front of the premolars there is a large alveole for the canine.

P1 (1) The P1 bears two roots. The outline of the occlusal surface is elliptical. The premolar is much longer than wide. The tip of the paracone lies in the centre of the premolar. At the posterior end there is a small flattening. There are no cingula.

Mandible. Two lower jaw fragments of *Galerix* have been preserved. One of the mandible fragments carries p3-m2, and also shows the alveoles of the p2. The other carries the p4 and m1. From the more complete specimen it is clear that the p2 was longer than the p3. In both specimens there is a foramen mentale under the anterior root of the p4. In one of these, the foramen is exceptionally large and lies at the end of the deep groove.

p3 (1). The outline of the occlusal surface is elliptical. The tip of the main cusp lies in the centre of the premolars. There is a small and low anterior cusp. The p3 is bordered by an indistinct rim at its posterolingual side.

p4 (2). The outline of the occlusal surface is sub-rectangular in one specimen, more or less elliptical in the other. The last lower premolar consists mainly of a robust trigonid which is bordered posteriorly by a narrow flattening. The protoconid is large, the paraconid appears as a conical cusp at the front of the premolar, somewhat to the lingual side. There is no paralophid. The metaconid is a small cusp at the flank of the protoconid, directly lingually of its tip. In the sub-rectangular specimen the posterior flange is bordered at its back by a well-defined ridge; this ridge is much less developed in the other specimen.

m1 (2). The m1 has a sturdy built. The trigonid and talonid are of similar length and width. The paraconid lies at the end of a long paralophid, and is more or less incorporated in that ridge. The talonid basin is lingually bordered by the entoconid only, leaving it half-open. The anterior cingulum is well developed. The posterior cingulum slopes up, and is connected to the posterior arm of the entoconid in one of the two specimens.

m2 (1). The m2 is clearly smaller than the m1. The paralophid is blade-like, and the paraconid is no longer discernible as a separate cusp. The anterior cingulum is well developed. The posterior cingulum slopes up, but does not connect to the entoconid.

Remarks: *Galerix* is generally considered to be an MN 3 immigrant in European faunas (ZIEGLER, 1990a, 2006; VAN DEN HOEK OSTENDE, 2001c). The oldest European species are *G. aurelianensis* in Central Europe (ZIEGLER, 1990a, 1994), and the closely related *G. remmerti* VAN DEN HOEK OSTENDE, 2003 in Spain. Given the earlier occurrence in Anatolian localities (VAN DEN HOEK OSTENDE, 1992), the genus presumably entered Europe from Asia Minor. Ever since its arrival, *Galerix* is a very common element in insectivore assemblages, and is usually quite abundant.

	Length			Width	
	range	mean	N	mean	range
P1		1.81	1	0.77	
p3		1.68	1	0.81	
p4	2.19-2.32	2.26	2	1.32	1.32-1.32
m1	3.10-3.16	3.13	2	2.00	2.00-2.00
m2		2.65	1	1.94	

Table 1: Measurements of the teeth of *Galerix aurelianensis* from Merkur-Nord.

However, it is rare or even absent in lignite deposits such as Hambach 6C (ZIEGLER & MÖRS, 2000), Belchatow (RZEBIK-KOWALSKA, 2005) and Oberdorf (ZIEGLER, 1998). The rarity of the genus in Merkur-Nord thus seems to be part of a pattern, suggesting that at least the species *G. aurelianensis* avoided moist habitats. On the other hand, another species of *Galerix*, *G. symeonidisi*, was actually originally described from a lignite mine, *viz.* the locality of Aliveri in Greece (DOUKAS, 1986), suggesting that there were different ecological preferences within the genus *Galerix*.

Ordo Soricomorpha GREGORY, 1910
Familia Talpidae FISCHER VON WALDHEIM, 1817
Subfamilia Uropsilinae DOBSON, 1883

Genus *Desmanella* ENGESSER, 1972

Desmanella gudrunae nov. sp.
(Plate 2, figs. 1-8)

Synonymy:
1990 *Desmanella* nov. sp. from Ulm-Westtangente, ZIEGLER (1990b, p. 5, pl. 1-9)

Diagnosis: Small species of *Desmanella* (m2 = 1.54). Dental formula complete; all lower molars with two roots. p1>p2<p3«p4. Oblique cristid extends far to the lingual side. Metacristid weak on the m1, present on the m2. Entostylid on m1 and m2 well developed. Mesostyle of the upper molars undivided. Labial wall of the lingual complex of the M1 and M2 without dents between the cusps. Posterior flank of the hypocone rounded.

Holotype: Left mandible with p4-m3 and the alveoles of c-p3 (Me, FE-Li7408-0001, Pl. 2, fig. 7)

Derivatio nominis: It gives us great pleasure to name this species after Dr. Gudrun Daxner-Höck, in recognition of her important work on Miocene rodents.

Type locality: Merkur-Nord, Czech Republic (MN 3).

Differential diagnosis: *Desmanella gudrunae* nov. sp. is among the smallest species of *Desmanella*. *Desmanella engesseri* ZIEGLER, 1985, *D. fejfari* GIBERT, 1975, *D. dubia* RÜMKE, 1976, and *D. storchi* QIU, 1996 are similarly sized, although the molars of the latter two species are wider than those from Merkur Nord. *Desmanella gudrunae* is somewhat smaller than *D. stehlini* ENGESSER, 1972, *D. cingulata* ENGESSER, 1980, *D. sickenbergi* ENGESSER, 1980, and *D. rietscheli* STORCH & DAHLMANN, 2000, and clearly smaller

than *D. crusafonti* RÜMKE, 1974, *D. amasyae* ENGESSER, 1980, and *D. gardiolensis* CROCHET, 1986. Unlike any other species of *Desmanella*, all of the lower premolars of *D. gudrunae* are double rooted (root-formula is not known for *D. stehlini*, *D. fejfari*, and *D. rietscheli*). The cusps of the lingual complex on M1 and M2 are separated by indentations on the lingual side only, a feature otherwise found in *D. engesseri* only. *Desmanella gudrunae* differs from this species in having a rounded posterior side of the hypocone on M1 and M2. Unlike *D. fejfari*, the mesostyle of the M1 of *D. gudrunae* is undivided.

Measurements. The measurements for the dentition are listed in Table 2. The measurements for the humerus are: length 9.30 mm, proximal width 2.70 mm, distal width 4.17 mm.

Description:

P3 (1). The P3 has two roots. It consists of a conical paracone surrounded by a cingulum.

P4 (3). The labial part of the P4 consists of the large paracone, with a rounded anterior face and a long posterocrista. There is a small parastylar flange in front of the paracone. The conical protocone lies on the lingual extension. It is relatively large, though of course much smaller than the paracone. A cingulum is present all around the premolar, with the exception of an interruption on the anterolabial side in one of the three specimens.

M1 (5). The outline of the occlusal surface shows a conspicuous posterior emargination. The lingual complex consists of the protocone, flanked at its back by the hypocone, and at its anterolabial side by the protoconule. Hypocone and protoconule are equally well developed. Folds on the lingual side separate protoconule and hypocone from the protocone. The labial wall of the lingual complex does not show any sign of such dents ('Wülste' in German literature). The anterior arm of the protoconule connects to the parastyle via a ridge. The posterior flank of the hypocone is smooth. The mesostyle is undivided, with the two cuspules standing directly adjacent to one another. The posterior arm of the metacone is somewhat longer than the posterior arm of the paracone.

A small cusp at the base of the hypocone (absent in one of the five specimens) forms the starting point of the posterior cingulum. The lingual cingulum is interrupted at the base of the protocone. The somewhat wider labial cingulum is interrupted at the mesostyle.

M2 (4) The posterior emargination is far less conspicuous than in the M1. The protocone is the largest cusp of he lingual complex, with the two side cusps placed slightly more labially. The hypocone is somewhat larger than the protoconule. Clear folds in the lingual wall separate the three cusps, but as in the M1 the labial side of the complex is smooth. The lingual complex makes up about one third of the width of the M2.

The labial cusps are of similar size. The mesostyle is undivided, but the separate cusps are discernible. The anterior arm of the paracone and the posterior arm of the metacone bend slightly at their ends to form a small parastyle and metastyle, respectively. The anterior arm of the protoconule continues along the flank of the paracone

	Length		N	Width	
	range	mean		mean	range
P3		0.45	1	0.39	
P4	1.16-1.39	1.27	3	1.05	1.03-1.06
M1	1.74-1.90	1.86	5	1.41	1.26-1.48
M2	1.23-1.55	1.39	4	1.74	1.61-1.84
M3	0.84-1.03	0.94	2	1.34	1.26-1.42
p1		0.81	1	0.45	
p2		0.55	1	0.35	
p3		0.68	1	0.39	
p4	0.90-1.10	0.99	3	0.57	0.55-0.58
m1	1.29-1.55	1.39	8	0.99	0.90-1.03
m2	1.26-1.62	1.54	15	0.95	0.84-1.13
m3	1.10-1.42	1.24	2	0.74	0.68-0.90

Table 2: Measurements of dentition of *Desmanella gudrunae* nov. sp. from Merkur-Nord.

and connects to the parastyle, thus forming the anterior cingulum. The posterior cingulum runs along the flank of the metacone and ends against the rounded posterior side of the hypocone. A second ridge starts lingually at the base of the hypocone and rounds the lingual bulge in the outline, ending near the point where the other part of the posterior cingulum starts. Small patches of lingual cingulum are present in the dents between the lingual cusps. Short pieces of labial cingulum can be found along the anterior arm of the paracone and the posterior arm of the metacone, respectively.

M3 (2) In contrast to the M1 and M2, the lingual part of the M3 consists largely of the protocone only. In an unworn specimen, the protoconule can still be discerned as a small thickening just in front of the protocone. The hypocone lies at the end of the posterior arm of the protocone, lingually of the tip of the metacone. The anterior arm of the paracone is somewhat longer than the posterior arm. It bends slightly at its end. The mesostyle is undivided. The anterior arm of the protocone extends to the anterolingual corner of the M3, forming the anterior cingulum along the flank of the paracone. There is a narrow labial cingulum along the anterior arm of the paracone.

Mandible and anterior dentition: The anterior dentition can be reconstructed from two mandible fragments, one carrying the p1, the other p2 and p3. The position of the various dental elements is correlated on the basis of the anterior foramen mentale, which lies under the p1/p2, and the sizes of the alveoles. The premolars in front of the p4 have a very similar morphology, differing only in size. All three unicuspids are two-rooted. The tip lies in the front part of the premolar. There is a faint centerocristid. The premolars are surrounded by a cingulum. As the fragment bearing p2 and p3 has six alveoles in front of the p2, and two of these certainly belong to the p1, we assume that the three incisors and the canine were all present and single-rooted. The symphyse reaches up to below the posterior root of the p1. Apart from these anterior fragments of the mandible, several fragments of the ramus horizontalis bearing molars have been preserved. These show that the

posterior foramen mentale lies between the roots of the p4 and m1, or below the anterior root of the m1. The built of the lower jaw is slender.

p4 (3). The available specimens are worn. The wear facet of the protoconid extends to the posterolingual corner of the premolar. In the most worn specimen a small ring of enamel betrays the former presence of a cusplet. In another specimen the wear facet also has a small bulge to the anterolingual side, suggesting the presence of a cusplet there. The p4 is surrounded by a cingulum.

m1 (9). The trigonid is somewhat longer and clearly narrower than the talonid. In moderately worn specimens the paraconid forms a spur, connecting to the narrow lingual cingulum bordering the trigonid basin. The oblique cristid ends far to the lingual side at about two-thirds of the protoconid-metaconid crest. The talonid basin is bordered by a very small metacristid and a somewhat larger entocristid. The entostylid is very well developed. The cingulum is well developed on the anterior, labial and posterior side, narrow and patchy on the lingual side.

m2 (15). The trigonid and talonid of the m2 are of similar length and width. The oblique cristid ends more lingually than on the m1, reaching the metaconid just short of the metacristid. The latter is better developed on the m2 than on the m1. The cingulum development of the two first lower molars is similar, although the lingual cingulum bordering the trigonid basin is better developed on the m2.

m3 (7). The talonid of the m3 shows relatively little reduction, being only somewhat narrower than the trigonid. There is no entostylid, but the m3 does have a posterior cingulum. As in the m2 the lingual cingulum is well developed near the trigonid basin.

Humerus (1) The built of the humerus is very slender. The bicipital groove is wide and open throughout. The shape of the caput is oval. It is not nearly as narrow as that of the other talpid humeri of the locality. The axis of the caput is set at an angle of *c*. 35 degrees with respect to the shaft. The deltoid tuberosity reaches to about 30 % of the shaft length. The greater tuberosity is small. The lesser tuberosity lies laterally of the caput and is poorly developed. The pectoral ridge is wide and very pronounced. It reaches to about one-third of the length of the humerus, ending at the lateral side. Medially of the end of the pectoral ridge lies the teres tubercle, which has a semi-circular facet. The humerus is widest on its distal end. The ectepicondyle forms a large flange. The entepicondyle is much smaller than the ectepicondyle. The entepicondylar foramen is elliptical. Both the supratrochlear fossa and the olecranon fossa are shallow.

Remarks: The *Desmanella* assemblage from Merkur-Nord agrees in size well with both *Desmanella engesseri* from Petersbuch 2 (Ziegler 1985) and the assemblage from Ulm-Westtangente, which Ziegler (1990b) classified as *Desmanella* n. sp. The main reason for distinguishing the latter form from *D. engesseri* was the configuration of the posterior arm of the hypocone ('Metaconulus' in Ziegler 1985, 1990b). In *D. engesseri* this arm connects to the posterior cingulum, whereas it is next to absent in Ulm-Westtangente. In this feature our material is identical

to Ulm-Westtangente. Another character used to distinguish between *D. engesseri* and the Ulm-Westtangente *Desmanella* was the m1/m2 ratio. The m1 is shorter than the m2 in *D. engesseri*, whereas the two elements are of similar length in Ulm-Westtangente. Based on the data from Ziegler (1990b), the m1/m2 ratio for *D. engesseri* from Petersbuch 2 is 0.95, where that assemblage from Ulm-Westtangente gives a value of 1.02. As the m1/m2 ratio for *Desmanella* from Merkur-Nord is 0.90, the assemblage shows in this respect a greater similarity to *D. engesseri*. However, the reliability of such ratios are very much dependant on the sample size, and from Ulm-Westtangente only three m2 of *Desmanella* have been retrieved. Comparison with the other Early Miocene species, *D. fejfari*, is more difficult. By modern standards the Spanish species is poorly defined. When it was defined by Gibert (1975), the size difference alone was sufficient to distinguish it for the other known species. Unpublished material from Alto de Ballester confirms that the mesostyle of *D. fejfari* is somewhat more divided than that of *D. gudrunae*. Nevertheless, more material of the Spanish species would be needed to make an accurate comparison.

Ziegler (1990b) considered the *Desmanella* assemblage from Ulm-Westtangente too small to define a new species. Although the assemblage from Merkur-Nord is not much bigger, we feel it provides enough characteristics to name the species. Apart from the morphology of the molars, the presence of part of the anterior dentition and mandible fragments the alveoles of the incisors and canine not only shows us that the dental formula was complete, but also that all of the lower premolars have two roots. Although the anterior dentition of *D. engesseri* is not known in detail, it is clear that it was reduced with respect to *D. gudrunae*. *Desmanella engesseri* had only 7-8 alveoles in front of the p4, two of which belong to the p3. So even if the species also had a complete dental formula, it would imply that in contrast to *D. gudrunae* the p1 and p2 were single-rooted.

The number of roots for the lower premolars was included in the diagnosis of *Desmanella* by Rümke (1974), in order to make a clearer distinction between *Desmanella* and *Asthenoscaptor*. She considered the presence of two roots in all of the lower premolars typical for the latter genus. With the description of *D. gudrunae*, this difference is no longer applicable. This leaves us with two options: placing the new species in *Asthenoscaptor*, or expanding the diagnosis. Placing the most primitive members of *Desmanella* in *Asthenoscaptor* was already suggested by Qiu (1996). He did so without reservation for *D. fejfari*, and remarked that *D. engesseri* also seemed to fit the diagnosis of *Asthenoscaptor*. We recognise that the Early Miocene species of *Desmanella* show a greater resemblance to *Asthenoscaptor* than the younger species do. However, the differences in molar morphology are still very clear. Although the separation between the lingual cusps of the M1 and M2 is not as pronounced in *D. gudrunae* and *D. engesseri*, the cusps are still separated by folds from the lingual side. They certainly do not form a straight ridge as they do in *Asthenoscaptor*. We therefore feel that these

species are better placed in *Desmanella*. The presence of double-rooted lower premolars in *D. gudrunae* is considered a retained plesiomorphic character, which, however, is already lost in *D. engesseri*.

Qiu (1996) also remarked that a humerus that could be reliably associated with the *Desmanella* dentition had not yet been found, a conclusion that was endorsed by Storch & Dahlmann (2000). The Merkur-Nord assemblage has finally yielded a type of humerus that can comfortably be attributed to this uropsiline talpid (see section 'association of the talpid dentitions and humeri from Merkur-Nord' below).

Subfamilia Desmaninae Mivart, 1871

Genus *Mygalea* Schreuder, 1940

***Mygalea magna* Ziegler, 1990**
(Plate 3, figs 1-7; Plate 4, figs 1-3)

Measurements: The measurements are listed in Tables 3 and 4.
Description:
P2 (2). The P2 consists of a large conical paracone, with a faint posterocrista on its posterior face. In the front, there is a small, triangular flange, and at the back a thick cingulum. There are two roots.
P3 (6). The P3 consists mainly of the large, conical paracone. There is a very faint posterocrista on the back of this cusp. In front of the paracone lies a tiny parastyle on an anterior flange. The development of the lingual flange varies. In one specimen it is no more than a cingulum, in the others it is well developed, even bearing a very small protocone. The anterior and lingual flanges are connected via a very narrow cingulum. The back of the premolar is surrounded by a well-developed cingulum, connecting to the lingual flange and at the labial side ending against the flank of the paracone. The P3 has three roots.
P4 (9). The outline of the occlusal surface is sub-triangular. The paracone is voluminous. Its tip lies in the middle of the premolar. There is a faint posterocrista, which curves slightly near its end. In front of the paracone lies a low parastyle, which usually is crescent-shaped, but is conical in one specimen. The protocone lies on a well-developed lingual flange, lingually of the tip of the paracone. It is a low, crescent-shaped cusp. Its anterior arm connects to the lingual arm of the parastyle via the anterolingual cingulum. This cingulum is wide in all but one of the P4. The lingual flange extends to the back of the molar, in some specimens taken the form of the posterolingual cingulum, remaining wide throughout in others. The labial cingulum is wide at its front and its back, but very narrow or even interrupted in the middle, labially of the tip of the paracone.
M1 (14). The cusps of the M1 are very robust. The lingual side of the molar is rounded, the anterior side concave due to the presence of a well-developed parastylar flange. The tip of the protocone lies lingually of that of the paracone. The protoconule lies directly adjacent to the tip of the

protocone, but even with moderate wear remains discernable as a separate cusp. The hypocone lies at the end of the posterior arm of the protocone, lingually of the base of the metacone. It is a well-individualised cusp, rising sharply above the posterior arm of the protocone. The hypocone is somewhat larger than the protoconule. In most specimens there is a faint ridge at the back of the hypocone, which slopes sharply down and connects to the posterior cingulum. In four specimens the back of the hypocone is rounded. The anterior arm of the protoconule slopes down steeply and continues as a low ridge, connecting to the crescent-shaped parastyle.
The posterior arm of the paracone is long and curved. The division of the mesostyle is generally incomplete, though in three specimens the two cusps are completely separated. The trigon basin is wide and deep. The posterior arm of the metacone is only somewhat longer than its anterior arm. The posterior cingulum is narrow. There is a large cingulum labially of the tip of the paracone, which is more or less a continuation of the parastylar flange.
M2 (9). The M2 has a very robust appearance. The outline of the occlusal surface is nearly symmetrical. The lingual side is rounded. The protocone is a very large cusp, with its tip just in front of the middle of the molar. The protoconule lies directly in front of the tip of the protocone, and is separated from it by constrictions from both the labial and the lingual side. The posterior arm of the protocone ends low against the hypocone, which is a small cusp lingually of the base of the metacone. It is usually separated from that cusp by a narrow valley, but the separation is incomplete in some specimens. The labial cusps are of similar size. The anterior arm of the paracone is invariably shorter than the posterior arm. In the metacone the anterior arm is usually longer than the posterior arm, but the difference in length is less than in the paracone. The division of the mesostyle is incomplete. There is a large parastyle, which is either separated from the paracone by a narrow valley, or connected to it at the labial side. It is connected to the anterior arm of the protoconule by the anterior cingulum, which is wide at its labial end, but very narrow near the base of the paracone. In one specimen it is even interrupted at this point. The posterior cingulum is narrow throughout, and connects to the base of the hypocone.
M3 (2). The outline of the occlusal surface almost forms half a circle. The lingual part of the molar is rounded. It consists of the large protocone. Its anterior arm ends against the base of the paracone. In one unworn specimen the protoconule is discernable as a small thickening directly in front of the tip of the protocone. The posterior arm of the protocone ends low against the hypocone. The latter is a small cusp that lies against the lingual flank of the metacone.
The two arms of the paracone are of the same length. There is a thick parastyle. The anterior cingulum is well developed. It runs along the anterior flank of the paracone, nearly connecting to the anterior arm of the protocone. The mesostyle is slightly divided.
Mandible. A large number of mandible fragments has been preserved, mostly of the ramus horizontalis. The

	Length		N	Width	
	range	mean		mean	range
P2	1.10-1.10	1.10	2	0.68	0.68-0.68
P3	1.26-1.43	1.32	6	0.93	0.77-1.00
P4	1.74-1.94	1.85	9	1.32	1.29-1.39
M1	2.39-2.71	2.51	14	1.72	1.61-1.84
M2	1.77-2.05	1.93	8	2.08	1.94-2.19
M3	1.23-1.42	1.33	5	1.76	1.65-1.87
c	0.90-1.10	0.99	3	0.46	0.45-0.48
p1	0.83-1.03	0.97	4	0.52	0.52-0.52
p2	0.97-1.10	1.05	7	0.53	0.45-0.57
p3	1.13-1.35	1.22	10	0.65	0.58-0.74
p4	1.35-1.68	1.56	25	0.82	0.71-0.97
m1	2.00-2.32	2.16	52	1.32	1.16-1.48
m2	1.87-2.26	2.08	60	1.37	1.23-1.52
m3	1.58-1.87	1.71	37	1.13	0.97-1.29

Table 3: Measurements of the dentition of *Mygalea magna* from Merkur-Nord.

mandible has a relatively slender built. There are two foramina mentalia. A large one below the posterior root p4/ anterior root m1. The front foramen mentale is smaller and lies in the upper part of the ramus horizontalis under the canine.

i3 (1). The incisor has a low crown. The tip of the cusp lies in front of the centre of the tooth, to the labial side. The centrocristid is better defined in front of the tip than at the back. There are strong cingula along the labial and posterior sides. Lingually the cingulum is equally strong, but ends halfway the tooth, next to the tip. There is one stout root under the posterior part of the tooth. This root is directed obliquely backwards.

c (4). The tip of the cusp lies in front of the middle of the canine, to the labial side. There is a sharp centerocristid, which remains at the level of the tip of the cusp in front of it, but slopes steeply down at the back. The posterocristid ends near the posterolabial side of the tooth. The postero-lingual side of the canine is occupied by a flange. The tooth has one root, which is directed obliquely backwards.

p1 (4). The premolar is only somewhat longer than wide. The crown is low. The tip lies in the front part of the tooth. There is a sharp centerocristid. The labial cingulum is well developed; the lingual cingulum is strong. The two roots are nearly fused and are directed backwards.

p2 (7). The premolar is much longer than wide. The crown is clearly higher than the preceding dental elements. The tip of the protoconid lies just in front of the centre of the p2. The centerocristid is sharp. The cingulum is better developed on the lingual side than on the labial side. The anterior root is positioned under the main cusp; the posterior root is directed obliquely backwards.

p3 (10). The outline of the occlusal surface is sub-elliptical, with a somewhat pointed anterior side. The tip of the protoconid lies just lingually of the centre. The cusp is conical. The centerocristid is much less pronounced than in the preceeding elements. At the front of the premolar there is a minute cuspule. The p3 is nearly surrounded by

a cingulum, which is widest at the back, but is interrupted at the lingual and anterolabial flanks of the protoconid. The premolar has two slightly diverging roots.

p4 (25). The outline of the occlusal surface is sub-elliptical. The tip of the protoconid lies just lingually of the centre of the premolar. There is a faint centerocristid. The labial side of the protoconid is rounded, the lingual side rather straight. There is a bulge ('Metaconidknospe' in Ziegler, 1990b) on the posterolingual side of the protoconid. The development of this bulge varies. There is a low cuspule on the anterolingual corner of the p4. The back of the premolar is formed by a flattening, which slopes down towards the labial side. This flattening is bordered by a more or less distinct ridge. The labial cingulum is continuous, although it is very narrow at the base of the protoconid. Lingually there is a small cingulum between the anterior cuspule and the base of the protoconid.

m1 (49). The talonid is *c*. 50% wider than the trigonid, but is of similar length. The two arms of the protoconid are straight, and stand at a relatively large angle, leaving an open trigonid basin. The development of the paraconid varies from nearly conical to more elongated. The oblique cristid bends just before reaching the protoconid-metaconid crest. Usually it ends against the middle of this crest, but in some specimens it may even connect to the metaconid. The metacristid appears as a spur along the posterior side of the metaconid. The entocristid is much better developed. It ends low against the metacristid, forming a labial notch. The talonid basin is wide. In part of the material, the anterior cingulum curves around the base of the paraconid, and continues as the lingual cingulum, which ends against the metaconid. In some specimens this cingulum even develops as a small parastyle. However, often the cingulum in interrupted near the paraconid. The lingual cingulum is well developed, but becomes very narrow near the bases of the protoconid and hypoconid. The posterior cingulum is rather narrow and ends as the well-developed entostylid.

m2 (61). The talonid is somewhat longer and clearly wider than the trigonid. The two arms of the protoconid stand a more acute angle than in the m1, making the trigonid basin narrower. The metacristid is better developed than in the m1, but is still very short. The oblique cristid is directed towards the middle of the protoconid-metaconid crest, but just before reaching it bends sharply and ends against the metaconid, or in some cases even against the metacristid. The entocristid is well developed. Partly it is high, remaining at the height of the entoconid before sloping down and meeting with the metacristid. The talonid basin is wide, despite the lingual termination of the oblique cristid. The anterior cingulum is –very- narrow. It rounds the paraconid and continues as the lingual cingulum, ending against the metaconid. There is a labial cingulum bordering the re-entrant valley. The posterior cingulum is rather narrow. There is a well-developed entostylid.

m3 (35). The talonid is longer than the trigonid, and usually somewhat wider. The paraconid is placed somewhat more labially than the metaconid, leaving the anterior arm of the protoconid shorter than its posterior arm. The

angle between the two arms is similar to that on the m2. The oblique cristid usually ends against the middle of the protoconid-metaconid crest, but reaches more lingually in some specimens, even up to the metaconid. The meta-cristid appears as a faint spur along the posterior flank of the metaconid. The entocristid is very well developed and closes the talonid basin almost completely at the lingual side, only leaving a sharp notch open just before reaching the metacristid. The entoconid and hypoconid are only slightly reduced. The anterior cingulum rounds the base of the paraconid. The labial cingulum is short, ending at the paraconid, but sometimes reaching the metaconid. The re-entrant valley is bordered by a lingual cingulum. In some rare cases, there is a narrow posterior cingulum; a small entostylid is usually present.

Humerus (47) The humerus is build slenderly. The bicipi-tal groove is covered by the pectoral crest, which does not fuse with the lesser tuberosity for most of its length. Only directly behind the caput, the tunnel is closed completely. The caput is elliptical. Its axis is set at an angle of *c.* 25 degrees with respect to the shaft. The greater tuberosity lies laterally to the caput. The deltoid process reaches to about the same level as the caput. The lesser tuberosity is somewhat smaller that the greater tuberosity. The pectoral process is bordered at its back by a strong pectoral ridge. There is no clear pectoral tubercle, but its function may have been taken over by the anteriorly directed distal part of the pectoral ridge. The entepicondyle is relatively small; the entepicondylar foramen is elliptical. The ectepicondyle is large. The supratrochlear fossa is large and deep; the olecranon fossa is very shallow.

Remarks: Even though few, if any, will dispute the alloca-tion of *Mygalea* to the Desmaninae, we want to make some remarks on it. It is clear that there is discourse on which genera should be allocated to the subfamily, but there has been little discussion on the choices made by various authors. The disagreement mainly involves genera such as *Desmanella*, *Asthenoscaptor*, and *Mygatalpa*, which are considered to be Uropsilinae by some authors (VAN DEN HOEK OSTENDE, 2001b and references therein). The latter two are, however, often cited as desmans, whereas *Des-manella* is listed as Talpid/nae incertae sedis by STORCH & DAHLMANN (2000) and ZIEGLER (2006).

RÜMKE (1985) gathered characteristics of the desmanine dentition from literature, and come to the following fea-tures;

1. dental formula complete
2. p2 and P2 longer or at least as long as p3 and P3, respectively
3. i2 the largest of the incisors
4. c small and incisiform
5. p4 often with metaconid or metaconal rib
6. oblique cristid ends against the tip of the metaconid or against the protoconid-metaconid crest
7. m3 little reduced.

Notably, all these characters involve the lower dentition, whereas generally the upper dentition is very characteris-tic. In the genera RÜMKE (1985) included in the Desmani-

	N	range	mean
Length	44	11.8-13.1	12.5
Proximal width	47	4.1-4.7	4.4
Distal width	41	6.0-6.8	6.5

Table 4: Measurements of the humeri of *Mygalea magna* from Merkur-Nord.

nae, there is always a large lingual complex, consisting of a protocone with both a protoconule and a hypocone, and the mesostyle is invariably divided. Just how typical these characters are considered to be is clear from confusing names as *Desmanella* (named for the invariable presence of protoconule and hypocone) and *Desmanodon* (named for the sturdy cusps and divided mesostyle).Still, the com-bination of robust cusps, a large lingual complex with both side cuspules and a divided mesostyle seems to be unique for the Desmaninae sensu RÜMKE, 1985.

Based on the seven characters listed above, RÜMKE (1985:15) concluded that the genera *Asthenoscapter, Desmanella*, *Mygatalpa* and *Mygalea* did not fit into the subfamily. The first three genera indeed seem better classified as uropsiline talpids (VAN DEN HOEK OSTENDE, 2001b). However, the exclusion of *Mygalea* from the Des-maninae by RÜMKE was somewhat surprising. At the time, the genus was known only from Sansan, and the species *M. antiqua*. RÜMKE was a bit tentative about excluding the genus, stating that it might be ancestral to the desmans. But in her opinion it did not fulfil the requirements 2 and 4 listed above. The p2 and P2 are indeed shorter than the p3/P3. Her assumption that the lower canine was conical rather than incisiform seems to be based on the descrip-tion provided by SCHREUDER (1940). She had noted: "The fossil lower canine is known only in *D. pontica* and in *Myg. antiqua*. In both species it is one-rooted, and has a conical crown with a convex outer, and a flat inner, side" (SCHREUDER, 1940:246). From this quote it is clear that Schreuder considered the canine of *Mygalea antiqua* similar to that of *Desmana* [= *Archaeodesmana*] *pontica*. The addition that the crown had a flat inner side indicates that it is certainly not truly conical. Indeed, in the material from Merkur-Nord the canine has a morphology closer to the incisors than to the premolars.

The morphology of the lower canine thus does not with-stand including *Mygalea* in the Desmaninae. The p2/p3 and P2/P3 ratio seems to be an insufficient character to make a distinction at the subfamily level in insectivores. The relative size of the p3 with respect to the p2 is for in-stance used to distinguish between genera in the erinaceid tribe Galericini (VAN DEN HOEK OSTENDE, 2001a). The rela-tive size of the i2 is not known. The i2 certainly appears to be enlarged in *Mygalea antiqua* (BAUDELOT, 1972, fig. 67), but unfortunately the i1 of the species in not known. On the other hand ZIEGLER (1990b) noted that the alveole for the first incisor in *M. magna* is larger than that of the i2 and i3. The other characters listed by RÜMKE (1985) are certainly applicable to *Mygalea*. The dental formula is complete. The p4 has a clear metaconal rib in *M. magna*. It seems to be absent in the other species. One has to bear

in mind, however, that these are known from limited material only, and that the character is variable. The rib is even missing in some of the younger Desmaninae assemblages. The oblique cristid has the typical bend shape also found in the Late Neogene assemblages. It is directed towards the middle of the protoconid-metaconid crest, but because of a sharp bend ends against the metaconid on the m2, and often labially of that point in the m1. The m3 is little reduced. However, the most important reason for including *Mygalea* in the Desmaninae is the typical shape of the upper molars (divided mesostyle, strong lingual complex), as was already pointed out by Rzebik-Kowalska (2005).

In a recent overview of the recent mammals the desmans were downgraded from a subfamily to a tribe (Hutterer, 2005). This was done on the basis of a study of mitochondrial DNA, which showed that the desmans nested within the Talpinae, being more advanced than the Eurasian Urotrichini (Shinohara et al., 2003). This was corroborated by a cladistic analysis of the moles, which showed the same pattern (Sánchez-Villagra et al., 2006). Here we still use the traditional classification of the desmans as a subfamily. Including *Mygalea* in the Desmaninae sensu Rümke, 1985 extends the stratigraphic range of the group considerably, showing that the desmans have a long, separate evolution. Although there is no consensus on which fossil genera to include, the debate focuses on the distinction between early desmans and uropsilines, not between desmans and talpines. So in a classification on molar morphology, there would be little ground to include the desmans as a tribe within the Talpinae. Nevertheless, we recognise that the work by Shinohara et al. (2003) and Sánchez-Villagra et al. (2006) provide important elements in the discussion on talpid classification. An overall classification of the talpids should, however, apart from molecular and morphological data, also take the fossil record into account.

Subfamilia Talpinae Fischer von Waldheim, 1817

Genus *Myxomygale* Filhol, 1890

Myxomygale minor Ziegler, 1990
(Plate 5, figs 1-8)

Measurements: The measurements are listed in Tables 5 and 6.
Description:
Maxillary. A piece of maxillary carrying the P3 and P4 has been preserved, with eight alveoles in front of the P3. Presumably a ninth alveole was present. The four alveoles directly in front of the P3 suggest that the corresponding premolars were similar-sized as the third upper premolar. The fifth and sixth alveole, however, are much larger, with the fifth still containing a very stout root. We therefore assume the presence of a large upper canine. The alveoles belonging to the incisors are again small.
P4 (1). The last upper premolar consists mainly of the high and narrow paracone. Its tip lies in front of the centre of the premolar. There is a sharp, slightly curved posterocrista. The protocone does not lie on a lingual flange, but

	Length			Width	
	range	mean	N	mean	range
P3		0.71	1	0.32	
P4	1.23-1.29	1.26	2	0.81	0.77-0.85
M1	1.87-2.03	1.94	4	1.24	1.19-1.29
M2	1.29-1.45	1.34	3	1.58	1.48-1.65
M3	0.94-1.03	0.99	2	1.39	1.35-1.42
p3		0.84	1	0.42	
p4	1.00-1.00	1.00	2	0.56	0.55-0.57
m1	1.35-1.55	1.43	7	0.87	0.74-0.97
m2	1.42-1.61	1.47	6	0.86	0.77-0.90
m3	1.10-1.35	1.25	6	0.74	0.68-0.90

Table 5: Measurements of the dentition of *Myxomygale minor* from Merkur-Nord.

appears as a conical cusp attached directly to the side of the paracone. The two cusps are separated by a narrow valley. There is a faint centrocrista running over the tip of the protocone. In front of the paracone lies a small parastyle, which again does not lie on a flange. There are narrow cingula along all flanks of the paracone with the exception of the anterolingual side.

M1 (5). The outline of the occlusal surface is irregularly quadrangular. The protocone lies in the anterolingual corner of the molar. The protoconule lies directly adjacent to the tip of the protocone on its anterolabial side. It is well developed in two specimens, a mere thickening in the arm of the protocone in two others. The fifth specimen is too worn to judge this character. If the protoconule is well developed, a clear dent separates the protocone and protoconule. This dent is far less conspicuous in the other specimens. The anterior arm of the protoconule connects to the parastyle, which is small and protrudes only slightly. The hypocone, somewhat larger but lower than the protoconule, lies anterolingually of the base of the metacone, at the end of the posterior arm of the protocone. The posterior arm of the hypocone connects to the posterior cingulum, extending to the posterolabial corner of the M1. The paracone has a long, S-curved posterior arm. It connects to the undivided mesostyle. The posterior arm of the metacone is only 20-30% longer than its anterior arm. Only the posterior cingulum is well developed. A weak labial cingulum is found at the base of the posterior arm of the metacone and a weak lingual cingulum may be present between the protocone and the hypocone.

M2 (5). The outline of the occlusal surface has a reversed bell-shape. The symmetry is slightly put off by the position of the protocone, just in front of the middle. The protoconule lies directly adjacent to the protocone, but is separated from it by sharp dents between the two cusps from both the lingual and the labial sides. The anterior arm of the protoconule ends against the anterior flank of the paracone, near the base of the latter cusp. In contrast to the M1, the hypocone is somewhat smaller than the protoconule. It lies lingually of the base of the metacone at the end of the posterior arm of the protocone. The posterior arm of the hypocone ends against the posterior flank of the metacone near the base

of that cusp. The labial cusps are of similar size, producing a symmetrical W-shaped ectoloph. The anterior arm of the paracone and the posterior arm of the metacone bend to form the parastyle and metastyle, respectively. The mesostyle is undivided. There are no cingula.

M3 (2) The outline of the occlusal surface is semicircular. The anterior arm of the paracone is somewhat longer than the posterior arm, and bends at its end to form a small parastyle. Just in front of the protocone there is a small constriction forming a protoconule. Its anterior arm ends against the paracone near the base of that cusp. There is a tiny hypocone, lingually of the base of the metacone, at the end of the posterior arm of the protocone. The mesostyle is undivided.

Mandible. The ramus horizontalis has a slender build. Two small foramina mentalia are found between the alveoles of the p4 and the p1, respectively. Twelve alveoles have been preserved in front of the m1, suggesting that all of the premolars had two roots. The alveole that presumably belongs to the canine is somewhat enlarged. The symphysys reaches up to below this alveole. The alveoles belonging to the premolars increase in size from front to back.

p3 (1). The premolar has two roots. It is set somewhat obliquely in the jaw. The tip of the cusp lies in the middle of the p3, somewhat to the lingual side. The cusp is slightly concave at its back. The labial side is slightly convex; the lingual side is straight. A small cuspule at the front of the p3 forms the starting point of a wide lingual cingulum. There is no cingulum on the labial side.

p4 (2). The main cusp is triangular in cross-section. It tip lies in the front part of the premolar to the lingual side. The labial side of the cusp is convex, the lingual side it rather straight. The back of the cusp is straight in one specimen, concave in the other. At the edge between the lingual and posterior sides a small bulge is present. At the front there is a small lingual cusplet. In one specimen this is the starting point of a marked lingual cingulum. Such a cingulum is not present in the other p4. The back of the premolar is formed by a posterior flattening, bordered by a sharp ridge at its back.

m1 (7). The trigonid is shorter and clearly narrower than the talonid. The paraconid is positioned to the front of the molar at the end of a curved paralophid, leaving the trigonid basin wide and open. The oblique cristid ends against the middle of the protoconid-metaconid crest. The wide talonid basin is closed lingually by the entocristid only, which ends against the posterior side of the metaconid. The enamel boundary curves up slightly below the protoconid. There is a narrow anterior cingulum. The labial cingulum borders the re-entrant valley. The narrow posterior cingulum connects to the small and slightly protruding entostylid. A weak lingual cingulum may be present near the paraconid.

m2 (6). The talonid is only somewhat wider and longer than the trigonid. In contrast to the m1, the paralophid is straight. The oblique cristid ends more lingually, connecting to the metaconid. The metacristid is usually small, but in one specimen it is well developed. The entocristid is shorter than in the first molar. The enamel boundary

	N	range	mean
Length	4	6.4-6.8	6.7
Proximal width	4	2.7-2.8	2.7
Distal width	3	3.3-3.4	3.3

Table 6: Measurements of the humeri of *Myxomygale minor* from Merkur-Nord.

is less curved than in the m1. Cingular development is similar, but the anterior cingulum is somewhat stronger and reaches further lingually.

m3 (4). The trigonid resembles that of the m2, but is smaller. The development of the talonid varies. In three specimens it is only somewhat narrower than the trigonid, in the fourth it is more reduced. The oblique cristid ends against the metaconid. A tiny metacristid can sometimes be observed. Cingula can be found on the anterior side and along the re-entrant valley.

Humerus (12) The humerus is slenderly built. The bicipital groove is closed by a fold of the pectoral process. As this fold is often broken, in most specimens the bicipital groove appears to be open. The caput is elliptical. Its axis is set at an angle of *c.* 30 degrees with respect to the shaft. The greater tuberosity lies laterally to the caput, the deltoid process reaching to about the same level as the caput. The lesser tuberosity is about the same size as the greater tuberosity. The pectoral process forms a wedge-shaped area, and is bordered by a strong pectoral ridge. The teres tubercle is rather large, with a medially directed, elliptical surface. The pectoral tubercle lies laterally of the teres tubercle in the anterior half of the shaft. It protrudes sharply. The entepicondyle is relatively small. The entepicondylar foramen is drop-shaped, with the tip pointing distally. The ectepicondyle is much larger than the entepicondyle. The supratrochlear fossa is large and deep; the olecranon fossa is very shallow.

Remarks: Our material agrees well in both size and morphology with the molars described as *Myxomygale minor* from Ulm-Westtangente by ZIEGLER (1990b). No mandible fragments with the dentition in front of the p4 or its alveoles were found in the type locality. In Merkur-Nord we not only have one p3 preserved in a mandible, but also a complete ramus horizontalis with twelve alveoles in front of the m1. This indicates that all of the lower premolars had two roots. This is rather surprising, since the original diagnosis of *Myxomygale* indicates that the p1-p3 have one root only, as indeed was demonstrated for *Myxomygale hutchisoni* (ZIEGLER, 1985). It was assumed that these premolars were also single-rooted in the other species of the genus, *viz. M. engesseri* and *M. minor*, although the premolars of these species were actually unknown. As turn out, at least the premolars of *M. minor* were double-rooted.

Genus *Talpa* LINNAEUS, 1758

Talpa tenuidentata ZIEGLER, 1990
(Plate 6, figs. 1-5, 7)

	Length		N	Width	
	range	mean		mean	range
P4		1.48	1	1.06	
M1	2.00-2.13	2.06	4	1.16	1.10-1.23
M2	1.39-1.68	1.53	7	1.63	1.48-1.71
M3	1.00-1.03	1.01	3	1.55	1.48-1.61
p1		0.90	1	0.32	
p2		0.65	1	0.29	
p3		0.71	1	0.31	
m1		1.68	1	0.90	
m2	1.55-1.71	1.63	4	0.86	0.81-0.90
m3		1.42	1	0.71	

Table 7: Measurements of the dentition of *Talpa tenuidentata* from Merkur-Nord.

	N	range	mean
Length	8	9.3-10.2	9.8
Proximal width	8	6.6-7.6	7.2
Distal width	9	5.2-6.3	5.8
Midshaft width	10	2.2-2.5	2.4

Table 8: Measurements of the humeri of *Talpa tenuidentata* from Merkur-Nord.

Measurements: The measurements are listed in Tables 7 and 8.

Description:

m2 (4). The trigonid is somewhat longer and wider than the talonid. The cusps, particularly of the trigonid, are high. The paralophid is slightly curved; the protoconid-metaconid crest is straight. The oblique cristid ends against the metaconid, close to the metacristid. The latter is poorly developed in one specimen, short but distinct in the others. The entocristid is triangular in lingual view, closing the talonid basin on its lingual side. The hypoconid and entoconid are relatively small. There is a wide anterior cingulum, rounding the paraconid and ending against the base of the cusp. A narrow labial cingulum borders the re-entrant valley. There is no posterior cingulum, but a small entostylid is present.

M1 (4). The protocone lies in the anterolingual corner of the molar. There is neither a protoconule nor a hypocone. The anterior arm of the protocone connects to the parastyle, which is a small cusplet on the protruding parastylar flange. The posterior arm of the protocone slopes down, and connects to the posterior cingulum. The posterior arm of the paracone is slightly curved. The posterior arm of the metacone is twice as long as the anterior arm. The mesostyle is undivided. The only cingulum is the posterior one. In one of the four specimens there is a protruding metastyle. In the other specimens the metastyle is less conspicuous.

M2 (2). Most of the occlusal surface of the M2 consists of the labial cusps, the lingual complex being very narrow. The arms of the protocone form very sharp ridges. There is no protoconule. The hypocone is usually formed by a thickening in the posterior arm of the protocone. In unworn specimens a small elevation in the arm can be seen in lingual view. The anterior arm of the paracone is somewhat shorter than the posterior arm. It bends at its end, thus forming a small parastyle. The mesostyle is undivided, with the arms of the paracone and metacone standing at an acute angle. The posterior arm of the metacone is clearly longer than the anterior arm. It bends at its end to form a small metastyle.

M3 (3). The outline of the occlusal surface is sub-trian-

gular. The lingual side is pointed. The anterior arm of the protocone ends against the base of the paracone in one specimen. In another it continues as a very narrow anterior cingulum, almost to the anterolabial side of the molar. There is neither a protoconule nor a hypocone. In one specimen the posterior arm of the protocone runs along the lingual border before ending against the base of the metacone. In the other, it ends just anteriorly to that point. The anterior arm of the paracone is longer than the posterior arm. The mesostyle is undivided, with the arms of the paracone and metacone standing at an acute angle.

Humerus. The humerus has a robust build, with a particularly strongly developed proximal part. The caput is elliptical. Its length axis runs parallel to the axis of the shaft. There is a clear scalopine ridge. The greater tuberosity is not very large. The deltoid process reaches only somewhat further distally than the caput. The lesser tuberosity is separated from the greater tuberosity by a clear notch. The pectoral process forms a wide V-shape on the anterior side of the humerus. It ends in a very small pectoral tubercle. The pectoral ridge is long, running over half the proximal width of the humerus. It is separated from the teres tubercle by the bicipital groove. The teres tubercle is elongate, and bears a marked ridge on its posteromedial edge. The entepicondyle is well developed. The entepicondylar foramen is elliptical. The supratrochlear fossa is small. The olecranon fossa is large, but rather shallow.

Remarks: *Talpa tenuidentata* is one of the rare fossil mole species, for which the association of the dentition and the humerus is absolutely certain. The holotype from Ulm-Westtangente is an association of bones in matrix, including the mandibles and the humerus (Ziegler, 1990b). The proximal part is missing in all of the humeri from the type locality. Merkur-Nord has yielded several well-preserved humeri. From these it come apparent that *Talpa tenuidentata* shows a peculiar mixture of characteristics. The caniniform p1 links it to the Talpini. However, the humerus shows a clear notch between the head and the proximal edge of the lesser tuberosity, and there is a clear scalopine ridge. These characters are found in the Scalopini (Campbell, 1939; Hutchison, 1968). Possible explanation for this peculiar combination could be:

1. The humerus and dentition do not belong together
2. The species *tenuidentata* is not referable to *Talpa*
3. The scalopine ridge and proximal notch are not restricted to the Scalopini.

Since both the morphology of the dentition and that of the humeri agrees closely with the material from the type lo-

cality (in which the association of the two is certain), there can be no doubt that the two belong together. Furthermore, we see no alternatives for the association of these molars and humeri in the Merkur-Nord material itself.

If we were to consider *tenuidentata* a scalopine mole on the basis of its humerus –and therefore exclude classification as *Talpa*- the genus *Proscapanus* would at first sight appear a viable alternative. The humerus certainly resembles that of *P. intercedens* (Ziegler, 1985: fig. 4), and the molars have a similar appearance. Both in *Talpa* and in *Proscapanus* the protoconule and hypocone are poorly developed or absent, the lingual complex is narrow and the mesostyle is poorly divided at the most. However, in *Proscapanus* the p1 is not enlarged and is even the smallest premolar in *P. intercedens,* whereas it is hardly larger than the p2 in *P. sansaniensis* (Baudelot, 1972: fig. 54). The enlargement of the p1 in *tenuidentata* was already noticed by Ziegler (1990b), and is confirmed by the material from Merkur-Nord (Pl. 6. fig. 1).

The differences between the talpini and the scalopini humerus were noted by Campbell (1939). He correlated the presence of a scalopine ridge and a proximal notch with the larger brachialis fossa in the Talpini. These characters seem to be largely controlled by functional morphology. A generally stronger development of the proximal part of the humerus would lead to a larger lesser tuberosity, which would close the notch between the tuberosity and the caput. Thickening of the shaft, or the development of a larger brachialis fossa would decrease and eventually annihilate the change in plane on either side of the scalopine ridge. Even though the humerus of *Talpa tenuidentata* is clearly of the fossorial type, it is not as strongly developed as, *e.g.*, the humerus of *Geotrypus* or *Talpa europaea*. This is the reason why its humerus is similar to that of other fossorial moles with a similar degree of adaptation, such as *Proscapanus intercedens*. As the similarity in humeri seems to be a matter of stage in evolution rather than kinship, we believe that the species is indeed best classified as a *Talpa*.

<div align="center">

Talpini gen. et sp. indet.
(Plate 6, figs. 5, 6)

</div>

Measurements: m2; L = 1.84, W = 1.13 / m2; L = 1.74, W = 1.13 / m3; L = 1.48, W = 1.00. The measurements for the humeri are listed in Table 9.

Description:

m2 (2). The molar is very high-crowned. The talonid is slightly longer and narrower than the trigonid. The two arms of the protoconid are slightly curved. The trigonid basin is narrow and deep. The oblique cristid ends against the well-developed metacristid. The re-entrant valley is wide and very deep. It is bordered by a labial cingulum. The anterior cingulum is well developed, and bears at its lingual end a low parastylid.

m3 (1) The triginid valley is very narrow, as a result of the two arms of the protoconid standing close together. The oblique cristid ends against a well-developed metacristid. The re-entrant valley is very wide and deep. The anterior

	N	range	mean
Length	2	11.7-11.8	11.8
Proximal width	2	9.4-9.7	9.6
Distal width	1		7.4
Midshaft width	6	3.5-3.7	3.6

Table 9: Measurements of the humeri of Talpini gen. et sp. indet. from Merkur-Nord.

cingulum is well developed. A labial cingulum is present along the re-entrant valley

Humerus (2). The humerus is very robust. The caput is elliptical. Its axis is slightly directed towards the midline of the shaft. The greater tuberosity is large. The deltoid process reaches clearly below the level of the caput. The lesser tuberosity lies well above the caput. The pectoral crest is long and very well developed. The area of the pectoral process is deepened. The pectoral tubercle is obtuse and little pronounced. The teres tubercle is elongate. It proximal part lies under the pectoral crest, and is separated from it by the bicipital groove. In posterior view there is a wide ridge along the edge of the teres tubercle. There is no scalopine ridge, but a ridge running obliquely with respect to the caput. The entepicondyle is large; there is a circular entepicondylar foramen. The supratrochlear fossa is large. The olecranon fossa is wide and deep.

Remarks: This is the rarest of the Merkur-Nord talpids, being represented by a mandible with m2-m3, an isolated m2, two complete humeri and some humeri fragments only. The heavily build humerus is of the strongly fossorial type found in Talpini. The molars, which are high-crowned and have sharp ridges, are in agreement with this. Two Talpini genera are known from the Early Miocene, *Geotrypus* and *Talpa*. Most of the species of *Geotrypus* are much larger than the species from Merkur-Nord. The only species that comes close in size is *Geotrypus* n.sp. from Wintershof-West (Ziegler, 1994). However, the m2 of this species has in contrast to the molars from Merkur-Nord no metacristid, and the oblique cristid ends more labially than in the Czech locality. *Talpa* is represented by *T. tenuidentata*, which is also found in Merkur-Nord, and *T. minuta*. The humerus is, however, of a far heavier build than that of the latter species. Given the paucity of the material, it cannot be identified any further than Talpini gen. et sp. indet.

4. The association of talpid humeri and dentitions

4.1. General remarks

As a rule, postcranial elements play a minor role only in the taxonomy of fossil small mammals. The Talpidae are a notable exception to the rule. Their (semi-)fossorial way of life is reflected in the skeleton, particularly in the morphology of the humerus. Especially in fossorial forms as the Scalopini and Talpini, the humerus is highly characteristic.

However, in order to use the humerus in the classification of fossil talpids, it has to be linked to the corresponding dentition. This is often not easy, as becomes clear, *e.g.*, from the discussions on the humerus of *Desmanella*. Although molars of this genus are very common in Miocene faunas, there seems to be no consensus on which humerus should be associated with the dentition.(Storch, 1978, Ziegler, 1985, Storch & Dahlmann, 2000, this paper), leading to different classifications from Uropsilinae (Ziegler, 1985, 1990b, Van den Hoek Ostende, 2001b) to Talpid/nae incertae sedis (Storch, 1978, Storch & Dahlmann, 2000, Ziegler 2007).

There are several methods for associating talpid humeri and dentitions with a fossil assemblage. The safest way is finding the dentition and humerus of a single individual together. Such finds are rare, but they provide us with an important starting point for further associations. Once one combination is established, the next become easier. Two our knowledge only two such partial skeletons are known: *Mygalea jaegeri* from Viehausen (Seemann, 1938, therein as *Scaptonyx jaegeri*) and *Talpa tenuidentata* from Ulm-Westtangente (Ziegler, 1990b). Both fossils have direct bearing on the study of the talpids from Merkur-Nord, as the genus *Mygalea* and the species *Talpa tenuidentata* are present in the Czech locality.

The second best way of associating humeri and dentitions is finding localities in which only one or two species of talpid are present. When Engesser (1980) described the genus *Desmanodon*, he combined molars and humeri from the type species *D. major* from Yeni-Eskihisar. He argued that this combination was a near certainty, as the humeri clearly did not belong to *Desmanella*, the only other talpid in the locality. Theoretically, of course, the humeri and dentitions could belong to different species, one represented only by humeri, the other by molars. However, such a scenario is highly unlikely, and Engesser's association of the *Desmanodon* humerus and dentition has since been proven, as the same combination was found also in European faunas in other species of the genus (Ziegler, 1985, Van den Hoek Ostende, 1997).

If there are only two moles in a fauna, it is not a very big problem to find the corresponding post-cranial elements with the molars. But things get more and more complicated, when the diversity is higher. In Merkur-Nord we have found five types of talpid dentition and five type of humerus. This means there are 25 possible combinations, not counting the possibility that one or more species are represented by the humerus and/or dentition only. In Early Miocene localities such as Stubersheim 3 and Petersbuch 2 mole diversity is even higher than in Merkur-Nord, and the number of possible combinations is even much larger.

In order to find the correct combinations in a diverse assemblage, we can make use of size. Although the largest molars are not necessarily connected to the largest post-cranial elements, a number of possible combinations can be excluded on the basis of size. Abundance may be another criterion, but again the largest number of dental elements cannot be directly linked to the most abundant type of humerus. The robust humeri of the fossorial Talpini are more readily preserved than those of moles less adapted to a burrowing way of life. Even when they are preserved, the shrew-like humeri of the Uropsilinae may not be recognised, causing another bias towards the heavily built humeri. Of course, links can also be made on basis of the taxonomy. In a Pliocene site it is logical to combine a desmanine humerus with a desman dentition. However, in order to prevent circular reasoning, it is preferable to use taxonomy as a confirmation of an association based on, *e.g.*, size, rather than start with combining elements based on taxonomy only.

4.2. Association of the talpid dentitions and humeri from Merkur-Nord

As we mentioned in the introduction, the excellent preservation of post-cranial material in Merkur-Nord was believed to help in the association of Early Miocene talpid humeri and dentitions. Five different types of dentitions and an equal number of humeri were found, and these could comfortably be linked to one another. However, our results for some taxa disagree with humeri/dentition associations from literature. Thus, instead of simply giving our results, we deemed it wise to explain how the various elements of Merkur-Nord were linked.

By far the most abundant mole in the Merkur-Nord assemblage is *Mygalea magna*. The association of humeri and dentitions is certain. Not only is the abundance reflected in both the post-cranial and dental elements, but the combination was also already established by the partial skeleton of *M. jaegeri* from Viehausen (Seemann, 1938). The second most abundant type of humerus, is the moderately fossorial one that can be attributed to *Talpa tenuidentata*. This link was also already firmly established from the type localitiy of the species (Ulm-Westtangente), in which the humerus and dentition of a single individual were found together. The humeri from Merkur-Nord are better preserved than those from Ulm-Westtangente, which led to the remarkable conclusion that the species had several Scalopini-like features. The rarest talpid from the Czech locality is Talpini gen. et sp. indet. For this species there also seem to be little trouble in finding the associated humerus. Next to *Mygalea* it is the only large talpid in the assemblage, and the large fossorial humerus fits well with the typically talpini dentition.

The problem lies in the remaining two moles, the *Desmanella* and the *Myxomygale*. Initially we had attributed the same type of humerus to *D. gudrunae* as Ziegler (1985) did to *D. engesseri*. Storch & Dahlmann (2000) pointed out that this is not a typical uropsiline humerus. However, Ziegler had described the bicipital canal as being open, a character that is considered typical for the Uropsilinae (Campbell, 1939; Van den Hoek Ostende, 2001b). Our initial observations confirmed Ziegler's observation. However, a very well-preserved specimen showed that in fact the bicipital canal was covered by a thin fold of the pectoral process. Furthermore, in the unsorted material we found a humerus with a truly uropsiline morphology. This made a far better candidate for association with the

Desmanella dentition, and thus the somewhat more robust humerus belongs to *Myxomygale*.

Finding a uropsiline humerus together with a dentition of *Desmanella* settles a long discussion. Although the genus was already placed in the Uropsilinae by Rümke (1974) and Engesser (1980), doubt had arisen as Storch (1978) associated the *Desmanella* dentition from Dorn-Dürkheim with a talpine type of humerus. When the species from the German locality was finally named by Storch & Dahlmann (2000), they revoked the earlier attribution. However, they pointed out that the humerus that has been associated with *Desmanella engesseri* was not typically uropsiline either, and still referred to the genus as Talpidae incertae sedis. Now that a uropsiline humerus is found in Merkur-Nord that can comfortably be associated with *Desmanella*, the systematic position within the Uropsilinae can no longer be refuted. It does, however, create a new problem. Because it makes clear that the humerus associated with *Desmanella engesseri* from Petersbuch 2 (Ziegler, 1985) should now be allocated to a different genus. In the same paper Ziegler described *Palurotrichus hutchisoni*, which was later transferred to the genus *Myxomygale*. As in Merkur-Nord this type of humerus is associated with *M. minor*, it is logical to combine the former *D. engesseri* humerus with *M. hutchisoni*. This is also in accordance with the holotype of *M. gracilis*, which is a similar type of humerus (Ziegler, 2003: fig. 9D). Of course, this means that the humerus originally allocated to *M. hutchisoni* should now also be referred to a different dentition. This, however, falls outside the scope of this study. It seems advisable to restudy the Petersbuch 2 assemblage, and at the same time search the material for a uropsiline type of humerus that can be attributed to *D. engesseri*. After all, this almost shrew-like type of humerus is not readily recognisable as a talpid (Storch & Dahlmann, 2000).

5. Conclusions

As we have only studied part of the insectivore assemblage, our conclusions should be considered preliminary. Still, a number of things become already clear from studying the talpids and erinaceids only. For one, it is remarkable that Merkur-Nord shares a number of species with the German MN 2 locality Ulm-Westtangente. Both localities contain *Desmanella gudrunae*, *Mygalea magna*, *Myxomygale minor*, and *Talpa tenuidentata*. Three of these genera are also known from the German MN 3 localities of Stubersheim 3 and Wintershof-West, but they are represented by different species. *Desmanella* is represented by *D. engesseri*, *Myxomygale* by *M. hutchisoni* and *Talpa* (in Wintershof-West only) by *T. minor* (Ziegler, 1990b, 1994). In fact, the only species of the insectivores described in this paper that is shared by Merkur-Nord and the German localities is *Galerix aurelianensis*. From a stratigraphical point of view this is an important faunal element, since *Galerix* is generally recognised as an MN 3 immigrant in the European faunas (Ziegler, 1990a, 2006; Van den Hoek Ostende, 2001c, 2003).

Palaeoenvironmental conclusions should be drawn on the fauna as a whole, and not on just two families. The facies of the locality – a lignite –, its palaeobotanical remains and its fauna indicate that Merkur-Nord represents a wet palaeoenvironment (Fejfar et al., 2003). The high number of talpid species, and particularly the abundance of desmans are in agreement with this. Having established from various sources that the palaeoenvironment was indeed humid, Merkur-Nord can be used to test ideas on the ecology of some of its inhabitants. One remarkable aspect is the scarcity of *Galerix* remains, a genus that is otherwise usually abundant in late Early and Middle Miocene faunas. As we noted above, this seems to be part of a larger pattern, as *Galerix* is also absent or rare in other lignite seams, such as that of Hambach 6C (Ziegler & Mörs, 2000), Belchatow (Rzebik-Kowalska, 2005) and Obersdorf (Ziegler, 1998). Ziegler (1983) already concluded that *G. exilis* lived in relatively dry environments, and this conclusion was endorsed by Van den Hoek Ostende & Doukas (2003). The latter authors indicated, however, that *G. symeonidisi* preferred more humid environments, so it is clear that there is no single habitat preference for all of the species of the genus. Van den Hoek Ostende & Doukas also suggested that *G. aurelianensis* might have even a stronger preference for wet ecosystems, as a drop in the humidity curve based on Spanish rodent faunas from the Ramblian and Aragonian type sections (Van der Meulen & Daams, 1992) coincides with the demise of the large *Galerix* from the Ramblian. However, both the findings of Van der Meulen & Daams (1992) for the Ramblian and the presumed wet ecology for the Ramblian *Galerix* were refuted by Van den Hoek Ostende (2003). *Galerix remmerti*, which is basically a smaller version of *G. aurelianensis*, proved to be absent in the only locality that contained beavers, suggesting a relatively dry ecology for the species. This is in line with the rarity of the Ramblian *Galerix* species in Merkur-Nord, and seems also more logical, as *G. aurelianensis* and *G. remmerti* are morphologically close to *G. exilis*, which most likely had a relatively dry ecology.

A notable absentee in Merkur-Nord is *Desmanodon*. It has still not been established with certainty whether *Desmanodon* or *Paratalpa* was present in the European MN 3 faunas, as the humerus, which is needed to distinguish the Early Miocene species of the two genera, has not yet been found (Van den Hoek Ostende, 1989; Ziegler, 1990b). We follow, however, the assumption of Van den Hoek Ostende (2003) that *Desmandon* was already present. This type of mole is found in all of the localities of the Ramblian type section (Van den Hoek Ostende, 2003) and is also known from Stubersheim 3, and various German MN 4 faunas. Ziegler (2006) noted that desmans and *Desmanodon* seemed to be mutually exclusive, and suggested that *Desmanodon* might take over the ecological niche otherwise occupied by desmans. An alternative suggestion is the *Desmanodon* had a markedly different ecology. It presence as nearly the only talpid in MN 3- MN 4 faunas from the inlands of Spain (Van den Hoek Ostende, 1997) does suggest that in contrast to desmans it was capable to deal with relatively dry environments.

As we noted before, more detailed ecological conclusions can only be drawn if we look at the assemblage as a whole. In the case of the Merkur-Nord insectivores, this means that the first step will be to describe the dimylids, shrews and plesiosoricid. So it is clear that the work on this highly interesting fauna is to be continued.

5. Acknowledgements

6. References

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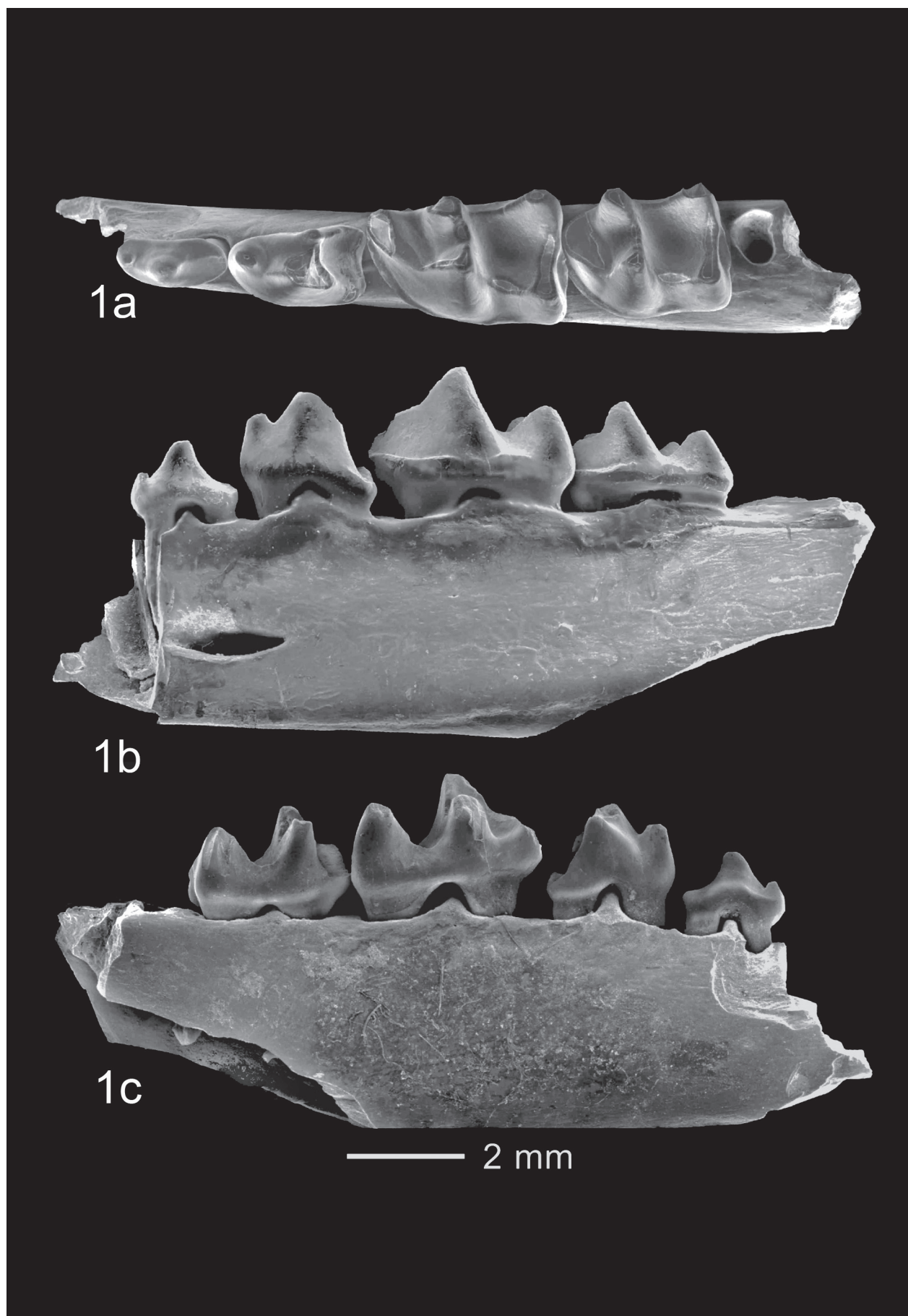
PLATE 1

Galerix aurelianensis Ziegler, 1990 from Merkur-Nord

Fig. 1   Mandible with p3-p4 (Me, FE-Li7408-00034); a. occlusal view; b. labial view; c. lingual view.

PLATE 1

1a

1b

1c

2 mm

PLATE 2

Desmanella gudrunae n.sp. from Merkur-Nord

Fig. 1   Maxillary fragm. with P4-M1 (Me, FE-Li7408-0002)

Fig. 2   M1 (Me, FE-Li7408-0003)

Fig. 3   M2 (Me, FE-Li7408-0004)

Fig. 4   M3 (Me, FE-Li7408-0005)

Fig. 5   Maxillary fragm. with P3-P4 (Me, FE-Li7408-0006)

Fig. 6   Mandible fragm. with p1 (Me, FE-Li7408-0007)

Fig. 7   Mandible with p4-m3 (Me, FE-Li7408-0001; holotype); a. occlusal view; b. labial view.

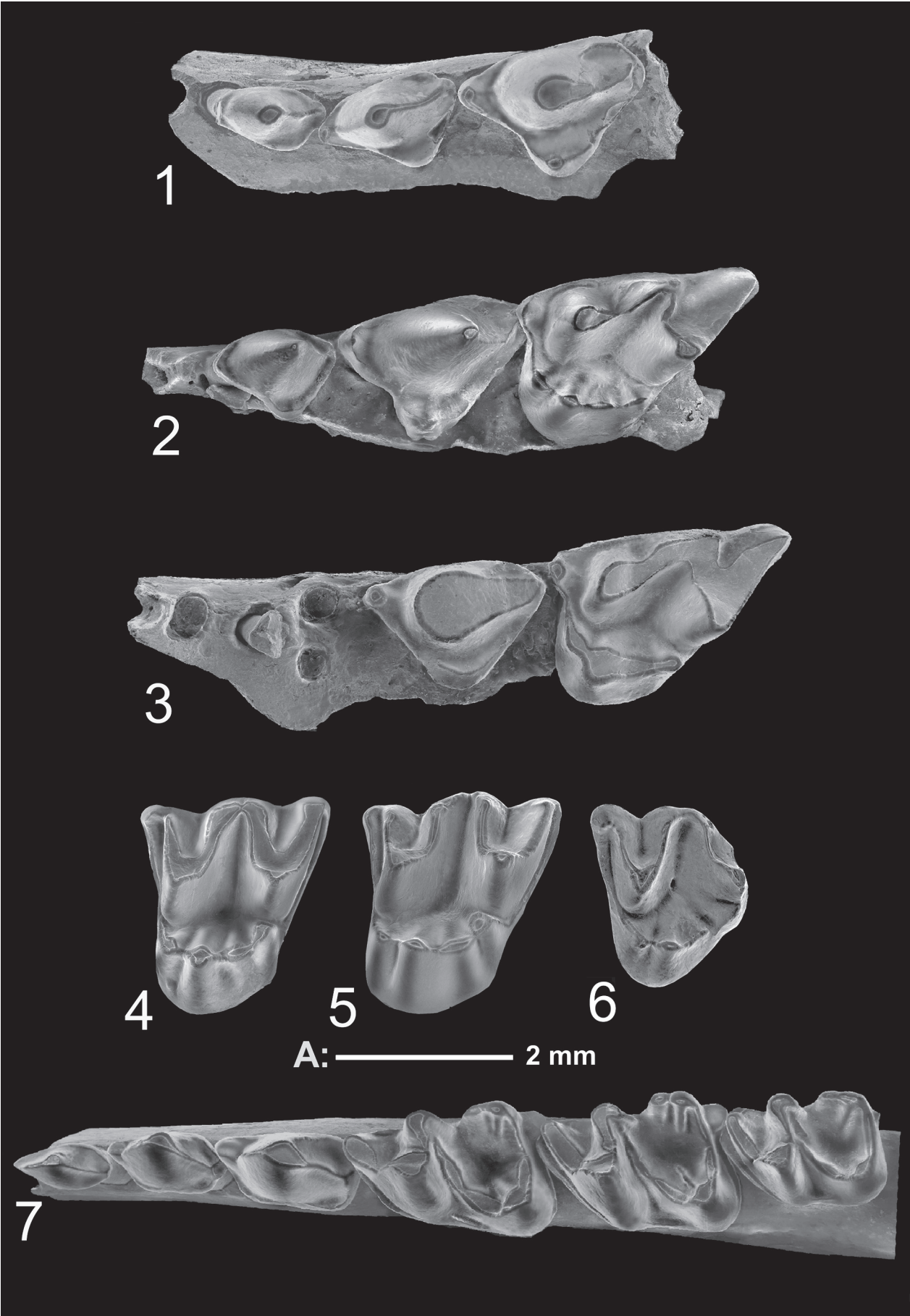Fig. 8   Humerus (Me, FE-Li7408-0008); a. posterior view; b. anterior view; c. medial view

PLATE 2

PLATE 3

Mygalea magna Zɪᴇɢʟᴇʀ**, 1990 from Merkur-Nord**

Fig. 1   Maxillary fragm. with P2-P4 (Me, FE-Li7408-0009)

Fig. 2   Maxillary fragm. with P3-M1 (Me, FE-Li7408-00010)

Fig. 3   Maxillary fragm. with P4-M1 Me, FE-Li7408-00011)

Fig. 4   M2 (Me, FE-Li7408-00012)

Fig. 5   M2 (Me, FE-Li7408-00013)

Fig. 6   M3 (Me, FE-Li7408-00014)

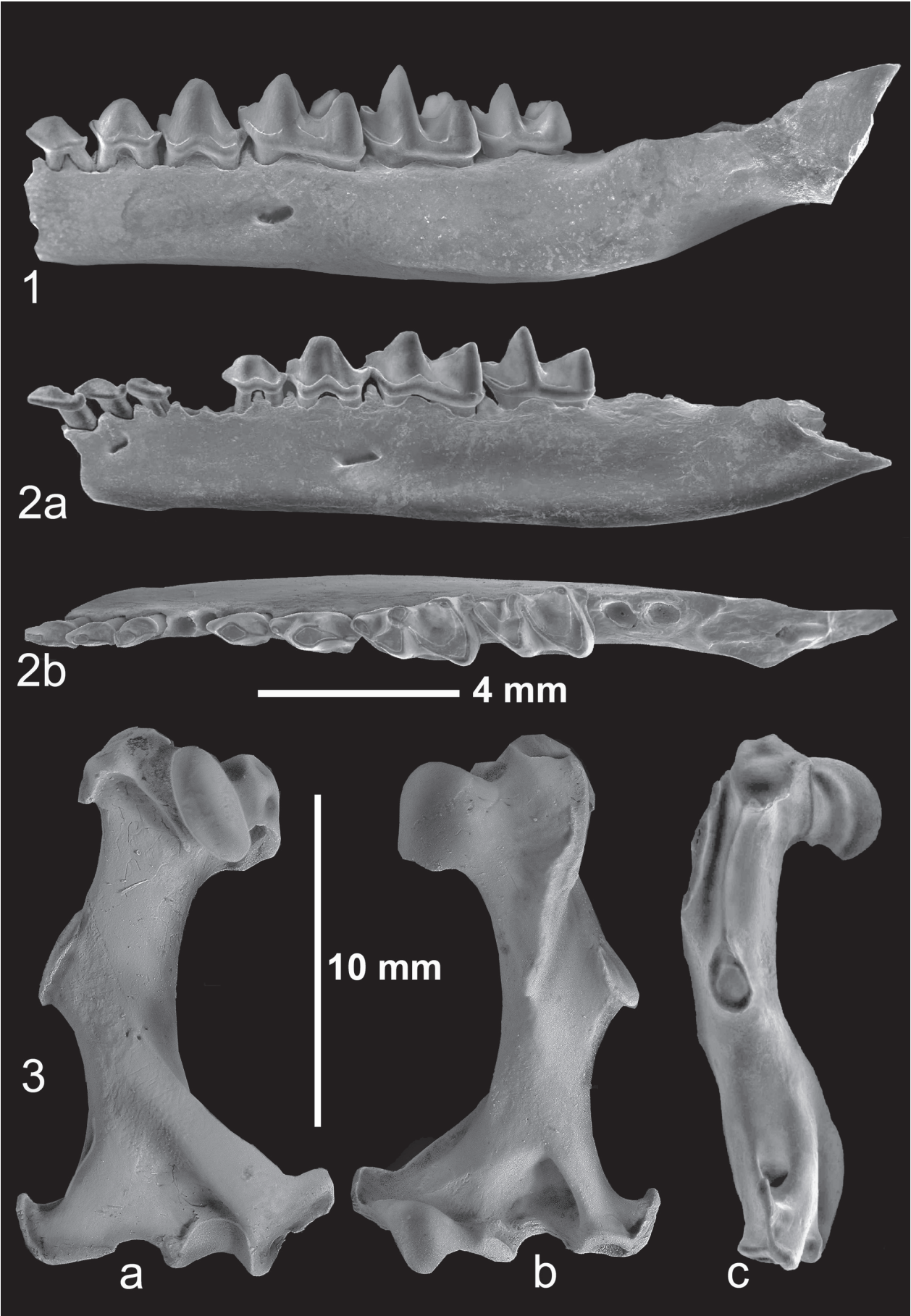Fig. 7   Mandible p2-m3 (Me, FE-Li7408-00015), occlusal view

PLATE 3

PLATE 4

***Mygalea magna* ZIEGLER, 1990 from Merkur-Nord**

Fig. 1   Mandible p2-m3 (Me, FE-Li7408-00016), labial view

Fig. 2   Mandible i3-p1, p3-m2 (Me, FE-Li7408-00017); a. labial view; b. occlusal view.

Fig. 3   Humerus (Me, FE-Li7408-00018); a. posterior view; b. anterior view; c. medial view

PLATE 4

4 mm

10 mm

PLATE 5

Myxomygale minor ZIEGLER**, 1990 from Merkur-Nord**

Fig. 1   Maxillary with P3-P4 (Me, FE-Li7408-00019)

Fig. 2   M1 (Me, FE-Li7408-00020)

Fig. 3   Maxillary fragm. with M2-M3 (Me, FE-Li7408-00021)

Fig. 4   m1 (Me, FE-Li7408-00022)

Fig. 5   m2 (Me, FE-Li7408-00023)

Fig. 6   m3 (Me, FE-Li7408-00024)

Fig. 7   Mandible p3-m2 (Me, FE-Li7408-00025); a. labial view; b. occlusal view

Fig. 8   Humerus (Me, FE-Li7408-00026); a. posterior view; b. anterior view; c. medial view

PLATE 5
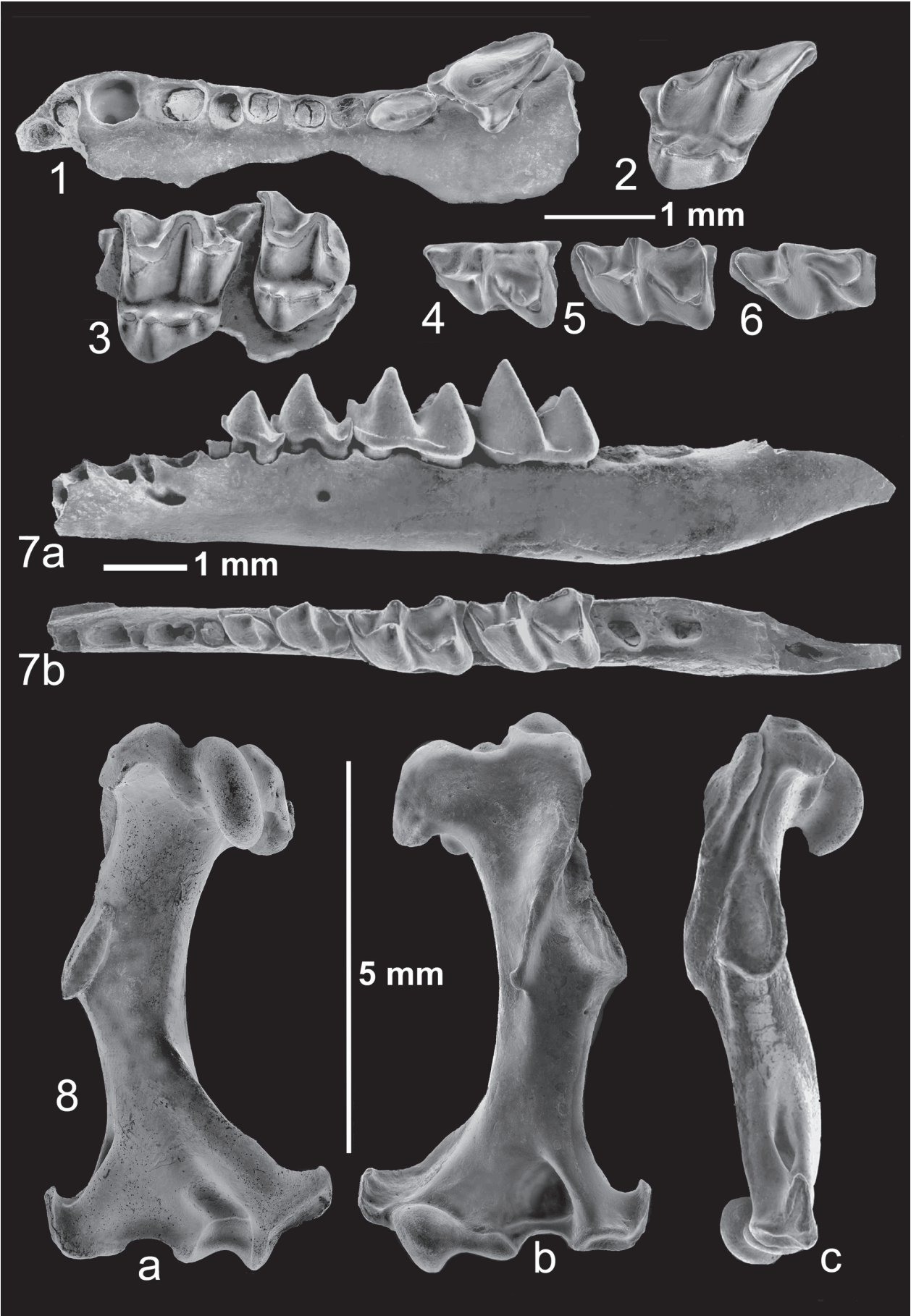
PLATE 6

Talpa tenuidentata ZIEGLER**, 1990 from Merkur-Nord**

Fig. 1   Mandible fragm. with p1-p3 (Me, FE-Li7408-00027); a. labial view; b. occlusal view

Fig. 2   M1 (Me, FE-Li7408-00028)

Fig. 3   M2 (Me, FE-Li7408-00029)

Fig. 4   m2 (Me, FE-Li7408-00030)

Fig. 7   Humerus (Me, FE-Li7408-00031); a. posterior view; b. anterior view

Talpini gen. et sp. indet.

Fig. 5   Mandible fragm. with m2-m3 (Me, FE-Li7408-00032)

Fig. 6   Humerus (Me, FE-Li7408-00033); a. posterior view; b. anterior view

PLATE 6

<small>1 mm</small>

<small>4 mm</small>