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New record of Early Miocene (MN3a) mammals in the open brown coal pit Merkur, North Bohemia, Czech Republic

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A review of two paleoecologically different but contemporaneous early Miocene mammal faunas, Merkur-North and Tuchorice, of northern Bohemia is given. Statistics of faunal assemblages and updated faunal lists of the sites are presented. Outlines of paleobotanical record are evaluated in relation to the different environmental conditions. Some typical finds of mammalian forms are briefly introduced. Comparison of the two faunas and floras stress the complex problems of paleoecology

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INTRODUCTION

The tectonical rift structure in north-west Bohemia at the foot of the Krusné hory Mountains was formed as a result of volcano-tectonic subsidence. Two distinct tectonic lines in the south and north produce the main geological limit of the rift. Five Tertiary sedimentary cycles are distinguished from the Eocene until the Plio-Pleistocene (Fig. 1). Rich records of floras and vertebrate faunas are known since the seventeenth century (Fejfar & Storch 1994). The third cycle contains browncoal seams. The early Miocene (early phase of the Zone MN3a) so-called 'Main seam member' with two seam levels is most productive (thickness of the seam [20-40 m] is of secondary origin: tectonically based slides of organic masses).

Close to the southern margin of the Chomutov-Most browncoal basin several isolated fault blocks of freshwater limestones occur, known as the 'Limestones of Tuchorice'. According to the mammalian and molluscan fauna (Reuss 1860, Suess 1861, Slavík 1869, Schlosser 1901, Wenz 1917) the limestones represent slightly younger equivalents of the Main seam member. They belong to the third cycle of the sedimentary sequence of the basin but they are now separated due to younger tectonic movements and subsequent

denudation displaying sunken blocks exposed as relics. Two different facies can be distinguished in the freshwater limestones of Tuchorice and Lipno as products of thermal mineral springs along the southern tectonic lines of the rift.

The North Bohemian browncoal basin (1400 km^2, two-thirds of which contain exploitable brown coal seams) is situated in the central part of the rift. The 600-700 m thick fill of the basin is fluviatile and limnic, in the lower part of the section mostly volcanic (tuffs, basaltic flows and intrusions). The base of the seam, the dark grey calcareous marls, consists of reworked volcanic ash masses; the littoral facies near the original shoreline usually contain rich limnic and terrestric molluscs (e.g., the characteristic genus *Nystia*; Reuss 1852, Wenz 1917). This horizon proved to be the most productive source of vertebrate fauna in the underground browncoal mines at Skyrice: Marianna and Prokop (Schlosser 1901, 1910, Schlosser & Hibsch 1902). In 1960, the same fossiliferous layer was recovered in boreholes southwest of Chomutov (Ctyroky *et al*. 1962). Since 1980, the surface of the horizon area that was exposed in the open pit Merkur-North is protected by federal law as a 'Paleontological site'. A landslide affected the site in the spring of 2000, and the whole outcrop collapsed 160 m down to the bottom of the pit. The team of the Paleontological Institute of the Charles University intends to start the detailed description of the geology, flora and fauna.

THE EARLY MIOCENE MAMMALIAN FAUNAS OF MERKUR AND TUCHORICE

The mammalian fauna in the main brown coal seam in the open pit Merkur and in the travertine of Tuchorice was produced during intensive collections (1960-2000): by screenwashing of the drilling samples in 1960

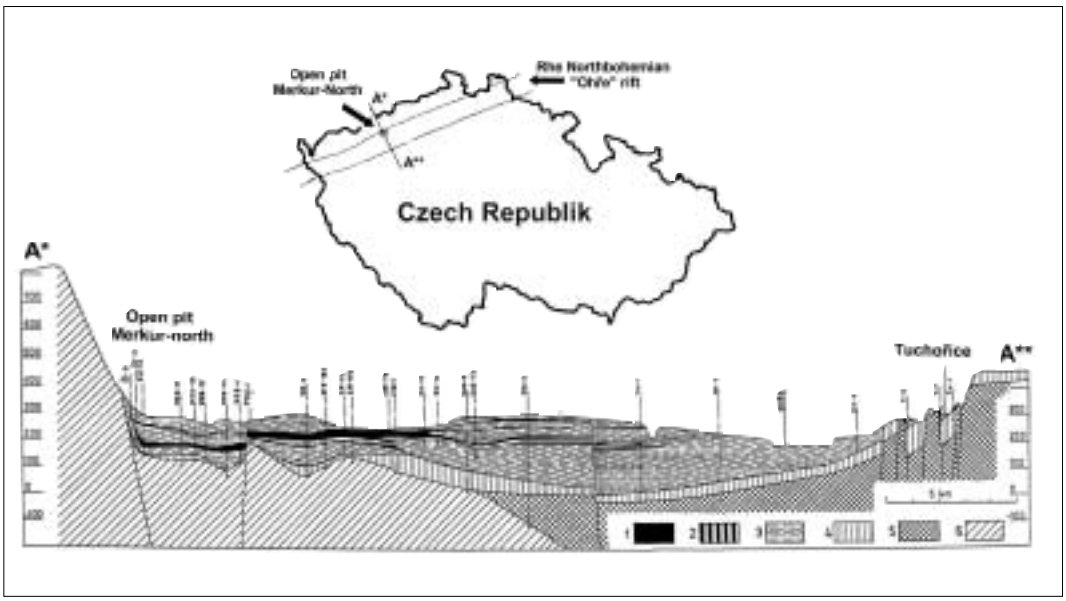

Figure 1 Geological cross section through the North Bohemian Ohre rift with the Tertiary browncoal basin. Cross section (line A*-A** in the map) through the North Bohemian Tertiary browncoal basin in the Chomutov-Most region, showing the asymmetrical shape of the Ohre rift caused by the volcano-tectonic subsidence (10x height exaggeration). **1** - the Miocene sequence (browncoal seams, humolitic clays and clay-stones); **2** - Lower Miocene freshwater limestones at Tuchorice and Lipno recorded in the partial tectonic relics (fault blocks) along the tectonic Krusné Hory Mountains and Ohre lines; **3** - Tertiary sands and clays; **4** - Upper Cretaceous sediments; **5** - Permocarboniferous sediments; **6** - metamorphic rocks of the Krusné Hory Mountains.

(some of them produced an extremely rich concentration, later never reached in outcrops), by collecting fossils on the intentionally exposed surface of the fossiliferous layer in the sections of the open pit (since 1989), and by large scale screen-washing during 30 years.

Open pit Merkur-North: base of the seam

In the highly diversified small mammalian fauna from the base of the brown coal seam in Merkur-North (Fig. 2) four groups are prevailing: Eomyids (column 10; dominant *Pseudotheridomys* [64%]); Glirids (column 5; dominant *Myoglis* and *Microdyromys*); Aplodontids (column 1; the brachyodont *Plesispermophilus* prevailing); and Melissiodontids (column 6). As usual in the MN3 Zone the true cricetids are missing; the aberrant genus *Melissiodon* is well recorded but relatively rare. *Melissiodon* is getting frequent in the following MN4 Zone in the faunas from Dolnice 1-3 in the western part of the rift (Cicha *et al*. 1972, Fejfar & Kvacek 1993) shortly before it disappears from the European Miocene. Five genera of rodents are represented with single finds, the glirid *Heteromyoxus*, the two aplodontids *Paracitellus* and *Ameniscomys* and the group of the apeomyid eomyids (*Apeomys* and *Megapeomys*: Fejfar *et al*. 1998).

Large mammalian remains from Merkur-North are rare but well preserved. Striking abundance of partial individuals of carnivores (Amphicyonidae, Hemicyonidae, Ursavidae, Mustelidae) and ungulates (Rhinocerotidae and Cervidae, two forms of Chalicotheriidae, *Anchitherium*; frequent remains of *Propalaeochoerus* in contrast to the unique record of *Tapirus*). Two to three individuals of the chalicotheriid genus *Schizotherium* were recorded. In the early 2001 an unusually big typically synossified PH I/II was found, apparently record of another much larger yet unidentified form.

Many bone fragments are intensively fragmented and gnawn at by middle-sized rodents, or by carnivorous predators. The smaller sized artiodactyls are dominant; typical is the abundant presence of highly variable complete antlers of the genus *Procervulus*. The assemblage of vertebrate remains on the intentionally exposed surface of the fossiliferous horizon is apparently result of predatory activities of carnivores: many bones display diversified gnawing traces. Among smaller carnivores the genera *Ursavus, Ballusia* and *Palaeogale* are most frequent. Rare finds of larger carnivores (*Cynelos*, *Hemicyon*) belong to young individuals with less worn dentition.

Travertines/limestones of Tuchorice hot spring cascades

In contrast to the brown coal seam facies, the small mammalian fauna from the freshwater limestones/travertines has extremely low diversity (Fig. 3); abundance of carnivore predators is produced due to the supposed 'trapping affect' of the CO2-rich exhalations of the hot mineral springs. Sciuromorphs (column 1: 48%) are prevailing; the record of the large form described also from Wintersof-West as '*Ratufa*' *obtusidens*; eomyids (column 3: 31%) with dominant *Pseudotheridomys* (56%); glirids (column 2; represented by very rare genus *Miodyromys* only); lagomorphs are represented only by *Ptychoprolagus*; *Amphilagus* is absent as well as the aplodontids and *Melissiodon*.

In this fossiliferous direct 'hot-spring' facies of the travertine cascade remains of large mammals are well preserved, while mollusc shells are totally absent. This is in contrast to the bedded 'secondary' facies of limnic limestones (exposed 300 m in distance in the near old quarry): here the mammalian remains are very rare and freshwater molluscs are rich and diversified. Typical in the spring travertines is the abundance of well preserved carnivores: Amphicyonidae, Tomocyonidae and Hemicyonidae, in lesser amount Ursavidae and Mustelidae. Ungulates are represented by diversified Rhinocerotidae (4 species!), and by the unique record of the

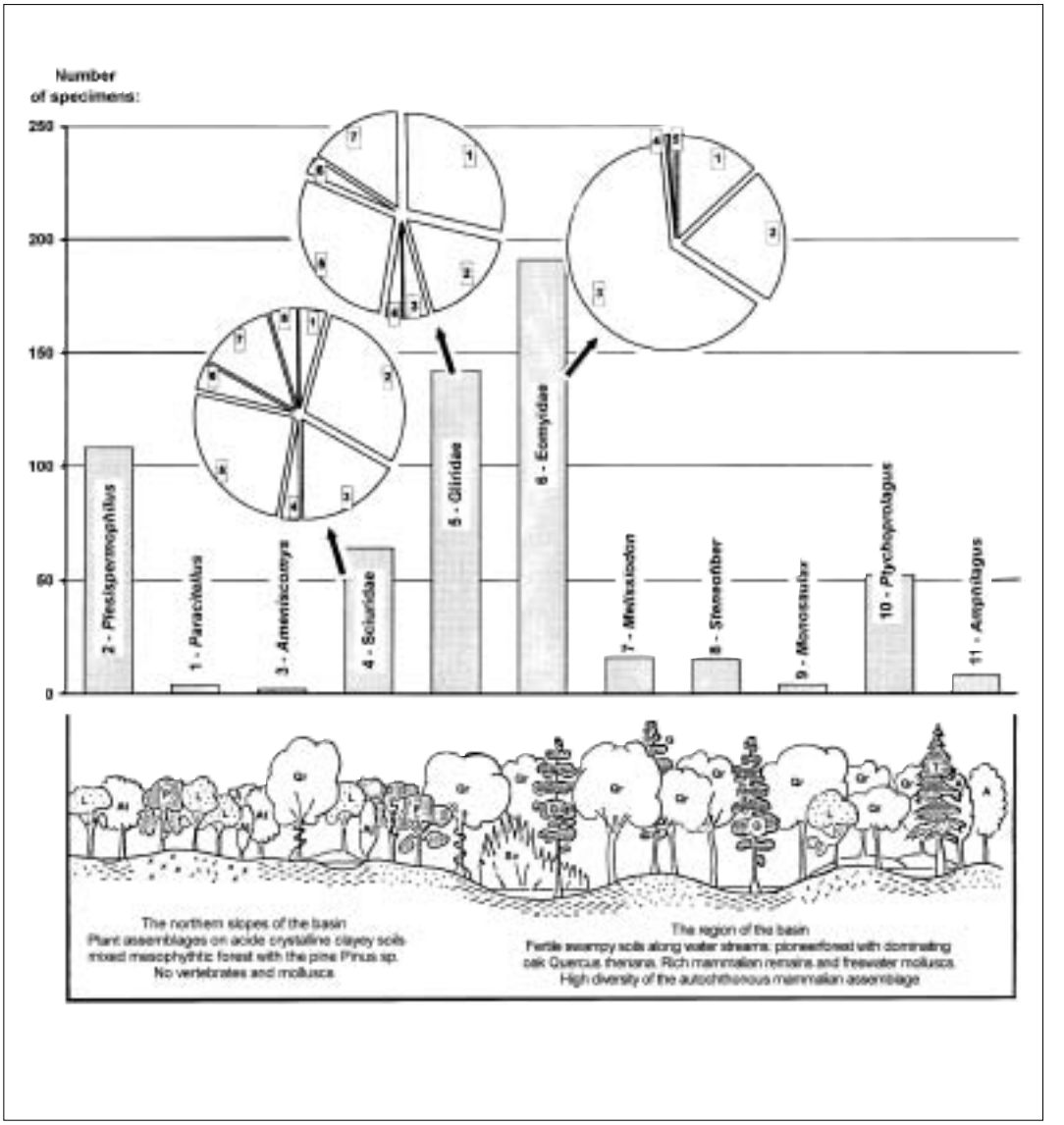

Figure 2 **Above**: Statistics of the frequency of the high diversified small mammalian assemblage in Merkur-North: **1** - *Plesispermophilus descendens*; **2** - *Paracitellus eminens*; **3** - *Ameniscomys selenoides*; **4** - *Sciuridae*; **5** - Gliridae; **6** - *Melissiodon dominans*; **7** - *Monosaulax minutus*; **8** - *Steneofiber depereti*; **9** - Eomyidae; **10** - *Ptychoprolagus* sp.; **11** - *Amphilagus ulmensis*. **Sciuridae**: **1** - *'Sciurus' giganteus* (= *Ratufa ? obtusidens*) 5%; **2** - *Blackia miocaenica* 28%; **3** - *Palaeosciurus sutteri* 17%; **4** - *Heteroxerus* cf. *vireti* 3%; **5** - *Spermophilinus besanus* 25%; **6** - *Miopetaurista dehmi* 5%; **7** - *Forsythia gaudryi* 12%; **8** - *Oligopetes-Hylopetes-Pliopetes* group 5%. **Gliridae**: **1** - *Myoglis antecedens* 29%; **2** - *Glirudinus gracilis* 17%; **3** - *Paraglis* sp. 4%; **4** - *Bransatoglis* sp. 3%; **5** - *Microdyromys praemurinus* 29%; **6** - *Paraglirulus* sp. 3%; **7** - *Miodyromys* sp. 15%. [The unique record (lower m 1-2) of the species *Heteromyoxus schlosseri* Dehm comes from a drilling sample of the same area]. **Eomyidae**: **1** - *Pentabuneomys* sp. I and II 13%; **2** - *Ligerimys lophidens* 21%; **3** - *Pseudotheridomys* sp. 64%; **4** - *Apeomys tuerkheimae* 1%; **5** - *Megapeomys lavocati* 1%. **Lagomorpha**: *Ptychoprolagus* sp. 87% and *Amphilagus* 13%. **Below**: Assemblage scheme of the flora of the seam: Abbreviations of the plant species: **1** - Browncoal swamps: *Quercus rhenana* (**Qr**) und *Glyptostrobus* (**G**); **2** - Riparian elements: *Taxodium* (**T**), *Acer* (**At**), *Alnus* (**A**), Lianas *Toddalia* (**To**) and Lauraceae *Laurophyllum pseudoprinceps*, *Laurophyllum pseudovillense*, *Daphnogene polymorpha* (**L**); **3** - Sandy soils on crystalline rocks - mesophytic forest: *Acer tricuspidatum* (**At**), *Alnus julianiformis* (**Aj**), *Laurophyllum pseudoprinceps*, *Pinus* sp. - (**P**) (Buzek *et al.* 1987, 1990; Fejfar & Kvacek 1993).

stratigraphically important antracotheriid *Brachyodus onoideus*. Remains of *Propalaeochoerus* are abundant; chalicotheriids and *Anchitherium*, in contrast to Merkur-North, are absent. We explain the unusual high percentage of large carnivores with *Propalaeochoerus* and different species of rhinos as a result of the 'trapping effect' of CO_2 in the close vicinity of the mineral hot springs. Other differences in comparison with the Merkur fauna are due to the unlikely environmental condition, well expressed by different floral assemblages.

Below is given the mammalian fauna of Merkur-North (M) and Tuchorice (T); occurrences in both sites are indicated with MT (Figures 4-10 and Plates 1-5):

Marsupialia
Didelphidae: *Amphiperatherium frequen*s MT

Insectivora
Talpidae MT: *Myxomygal*e cf. *minor*,
Paratalpa cf. *micheli*, *Desmanella engesseri*
Dimylidae: *Pseudocordylodon* sp., *Chainodus* (= *Cordylodon*) *intercedens*, *Plesiodimylus hürzeleri*
Metaconodontidae: *Plesiosorex* cf. *soricinoides*
Soricidae: '*Sorex*' *pusilliformis*, *Soricella discrepans*, *Paenelimnoecus micromorphus*, *Sorex stehlini*
Heterosoricidae: *Heterosorex neumayrianus*

Rodentia
Aplodontidae: *Plesispermophilus descendens* T, *Ameniscomys selenoides* T, *Paracitellus eminens* T
Petauristidae: *Miopetaurista* cf. *dehmi*, *Blackia miocaenica* MT
Sciuridae: *Palaeosciurus giganteus* (= *Ratufa ? obtusidens*) MT, *Blackia miocaenica* M, *Palaeosciurus sutteri* MT, *Palaeosciurus costatus* T, *Heteroxerus* cf. *vireti* MT, cf. *Spermophilinus besanus* MT, *Miopetaurista dehmi* M, *Oligopetes-Hylopetes-Pliopetes* group MT, *Forsythia gaudryi* MT, Sciuridae sp.I.(*Tamias*?) T
Castoridae: *Steneofiber depereti* MT, *Monosaulax minutus*
Eomyidae: *Pentabuneomys* sp. I.und II. MT, *Ligerimys lophidens* MT, *Ligerimys* cf. *antiquus*, *Pseudotheridomys* aff. *parvulus* MT; *Apeomys tuerkheimae* in M only; *Megapeomys lavocati* in M only
Gliridae: *Miodyromys* cf. *biradiculatus* T, *Heteromyoxus schlosseri*, *Myoglis antece dens*, *Glirudinus modestus*, *Glirudinus gracilis*, *Glirulus diremptus*, *Microdyromys praemurinus*, *Peridyromys murinus*, *Bransatoglis* sp., *Paraglis* sp.
Cricetidae: *Melissiodon dominans* in M only!

Lagomorpha
Ochotonidae: *Ptychoprolagus* sp. MT, *Amphilagus ulmensis* M.

Carnivora
Mustelidae MT: *Martes laevidens*, *Broiliana nobilis*, *Stromeriella franconica*, *Plesictis humilidens*, *Laphyctis vorax*
Viverridae: *Palaeogale hyaenoides*, *Semigenetta elegans*
Ursidae: *Ballusia elmensis* MT, *Ursavus isorei*, *Hemicyon stehlini*
Amphicyonidae mainly in T: *Amphicyon steinheimiensis bohemicus*, *Amphicyon major* only, *Cynelos schlosseri*, *Megamphicyon giganteus*
Hemicyonidae: *Hemicyon* cf. *stehlini* MT
Tomocyonidae: *Tomocyon* nov. sp. T, *Cynelos helbingi/acutidens* MT

Perissodactyla
Rhinocerotidae: *Protaceratherium minutum* MT; in T only: *Diaceratherium* aff. *douvillei*, *Prosantorhinus* nov. sp., *Mesaceratherium* sp.
Chalicotheriidae in M only: *Schizotherium* cf. *wetzleri*, since 2001 another much bigger form: Chalicotheriidae indet.
Equidae in M only: *Anchitherium aurelianense*
Tapiridae: very rare *Tapirus intermedius*

Artiodactyla
Palaeomerycidae MT: *Palaeomeryx kaupi*

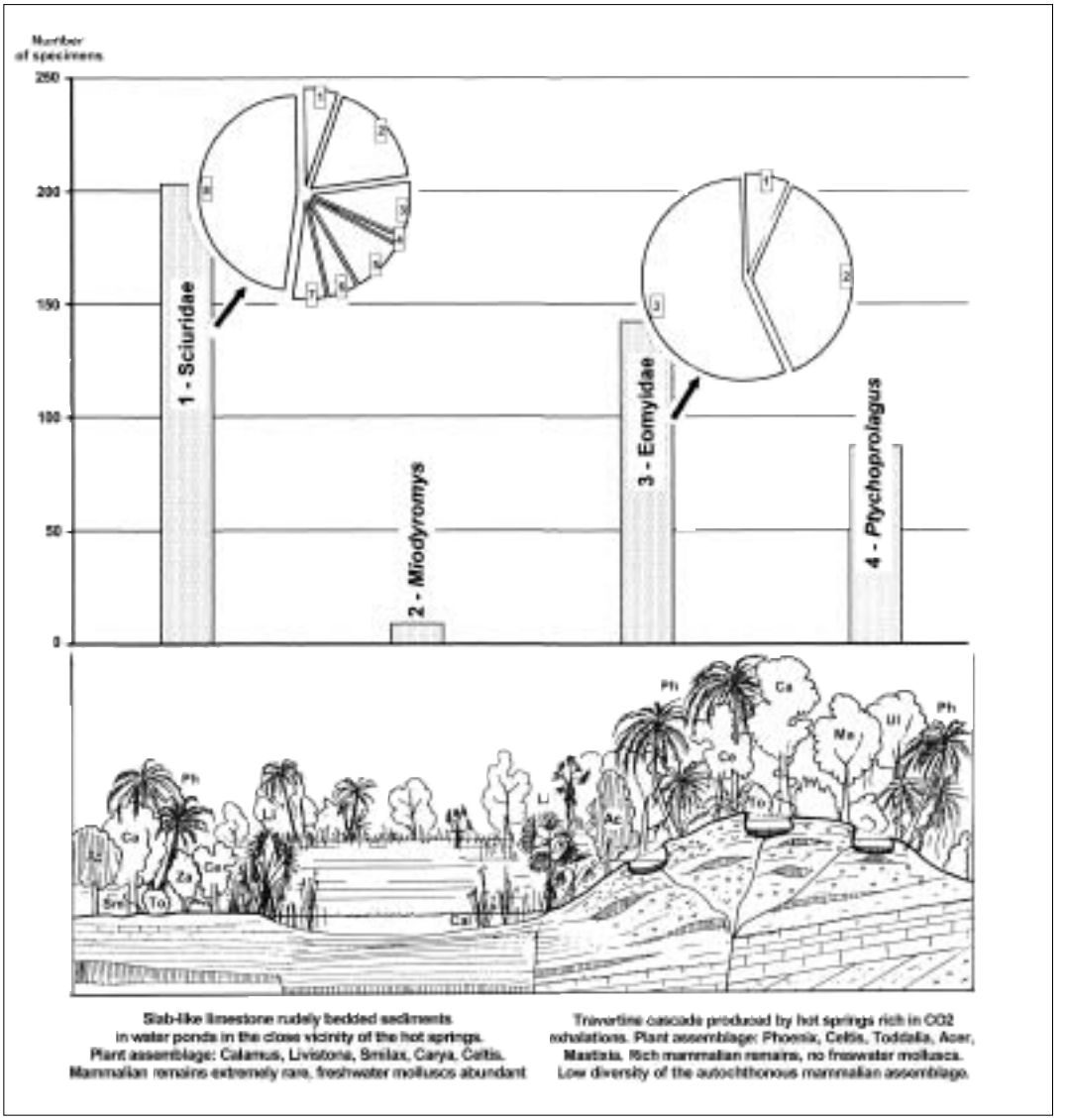

Figure 3 **Above**: Statistics of the frequency of the low diversified small mammalian assemblage in the freshwater limestones of Tuchorice: **1** - Sciuromorpha, **2** - Gliridae, **3** - Eomyidae, **4** - Lagomorpha. **Sciuromorpha**: **1** - *Palaeosciurus giganteus* (= *Ratufa ? obtusidens*); **2** - *Palaeosciurus sutteri* 18%; **3** - *Palaeosciurus costatus* 9%; **4** - *Heteroxerus* cf. *vireti* 1%; **5** - cf. *Spermophilinus besanus* 9%; **6** - *Forsythia gaudryi* 5%; **7** - Sciuridae (*Tamias?*) sp. 5%; **8** - *Oligopetes-Hylopetes-Pliopetes* group 48%. **Gliridae**: represented only by *Miodyromys*. **Eomyidae**: **1** - *Pentabuneomys* sp I and II 7%; **2** - *Ligerimys lophidens* 37%; 3 - *Pseudotheridomys* sp. 56%. **Lagomorpha**: represented only by *Ptychoprolagus* sp. **Below**: Assemblage scheme of the flora of the freshwater limestones of Tuchorice: In close environs of the hot springs a dense riparian forest spread: maples *Acer tricuspidatum* (**Ac**), Juglandaceae *Carya* (**Ca**), Ulmaceae *Ulmus* sp. (**Ul**), *Zelkova* sp., *Celtis lacunosa* (**Ce**), and palms *Phoenix bohemica*, *Livistona macrophylla* (**Li**). Beside palms also some rare thermophilous elements occurred: ?Mastixiaceae (**Ma**) and ?Coriariaceae. Shrubs were represented by lianas *Smilax* (**Sm**), *Toddalia* cf. *turovensis* (**To**). Coaly facies that underlies the limestone yielded remnants of a *Glyptostrobus*-swamp forest with dispersed Rutaceae *Zanthoxyllum* sp. (**Za**), Ulmaceae *Celtis lacunosa* (**Ce**) and in undergrowth with Zingiberaceae *Spirematospermum* wetzleri and water plants *Stratiotes kaltennordheimensis*. In spite of its poor representation, the flora of Tuchorice shows a warming trend or increasing mean annual temperature. However, the warming optimum is situated much higher in the overlying clays in the basin centre. The occurrence of date palm (*Phoenix*) means that the mean annual temperature might not fall below 18o C (Buzek *et al.* 1987, 1990; Fejfar & Kvacek 1993).

Amphitragulidae: *Amphitragulus boulangeri*
Cervoidea: *Lagomeryx praestans*,
Procervulus cf. *praelucidus*
Suidae: *Aureliachoerus aurelianensis*
Anthracotheriidae: *Brachyodus onoideus* T

THE FLORA OF MERKUR-NORTH AND TUCHORICE

The floral assemblage of the main seam in Merkur-North

The clay sediments directly underlying the 'in Seam' and bearing faunal remains are poor in plant megafossils. At that time lowland swamp forest with an evergreen oak [*Quercus rhenana* (Weyl. & Kräus.) Knobloch & Kvacek] and *Glyptostrobus prevailed* representing an early stage of browncoal swamps. Much more rarely, riparian elements (*Taxodium, Acer, Alnus, Toddalia*) or Lauraceae occur. A more mesophytic forest with pines and evergreen Lauraceae covered sandy soils on crystalline rocks of the Krusné Hory periphery. Later on vast areas of the basin transformed into mires that expanded due to steady high level of the underground water table. They were covered by dispersed stands of *Glyptostrobus* and other coal-forming trees within marshes with canebrakes (*Calamus*), patches of Zingiberaceae (*Spirematospermum*) and water plants. The forest on mineral swamps of the periphery were prevailingly deciduous, more varied in composition, with *Salix*, *Nyssa*, *Alnus*, *Acer*, *Fraxinus*, *Taxodium*. Like in modern vegetation of such a kind, dense lianas and vines overgrew trees forming impenetrable thickets.

The floral assemblage of the Freshwater Limestones of Tuchorice

In close environs of the hot springs a dense riparian forest spread: maples *Acer tricuspidatum* Bronn (Ac), Juglandaceae *Carya* (Ca), Ulmaceae *Ulmus* sp. (Ul), *Zelkova* sp., *Celtis lacunosa* (Reuss) Kirchheimer (Ce), and palms *Phoenix bohemica*, *Livistona macrophylla* (Li). Beside palms also some rare thermophilous elements occurred: ?Mastixiaceae (Ma) and ?Coriariaceae. Shrubs were represented by lianas *Smilax* (Sm), *Toddalia* cf. *turovensis* (To). Coaly facies that underlies the limestone yielded remnants of a *Glyptostrobus*-swamp forest with dispersed Rutaceae *Zanthoxyllum* sp. (Za), Ulmaceae *Celtis lacunosa* (Ce) and in undergrowth with Zingiberaceae *Spirematospermum wetzleri* and water plants *Stratiotes kaltennordheimensis*. In spite of its poor representation, the flora of Tuchorice shows a warming trend or increasing mean annual temperature. However, the warming optimum is situated much higher in the overlying clays in the basin centre. The occurrence of date palm *Phoenix* means that the mean annual temperature might not fall below 18 °C.

THE AGE OF THE FAUNAS

The faunal assemblages show strong affinities to the faunas of the locality Maigen in the range of the stratotype of the stage Eggen-burg (Molter and Loibersdorfer Formations; Mein 1989) and karst-fillings in Wintershof-West (Dehm 1950, 1953), i.e. the earlier part of the Early Miocene (Eggenburgian), lower Orleanium, Mammalian Neogene biozone MN3.

Both facies of the freshwater limestones of Tuchorice were considered as the equivalent of the underlying marls of the Main browncoal seam of the North Bohemian Tertiary basin. Detailed new collections and comparisons of similar mammalian taxa proved more advanced character of some species (e.g., *Ursavus*, *Ballusia*, Eomyidae), i.e. somewhat higher level in the interval of the Miocene mammalian biozone MN3 (?MN3b). The limestones are either contemporaneous with the Main browncoal seam or even somewhat younger.

SUMMARY

In the last few decades, the long known occurrences of the early Miocene mammal faunas were substantially completed by huge outcrops of several open brown coal pits in the north bohemian tectonical structure along of the local river Ohhre (the so-called 'Ohhre rift'). Due to the extensive volcanic (basaltic) activity, the sequence of the late Cenozoic strata rich on brown coal seams was alkali-

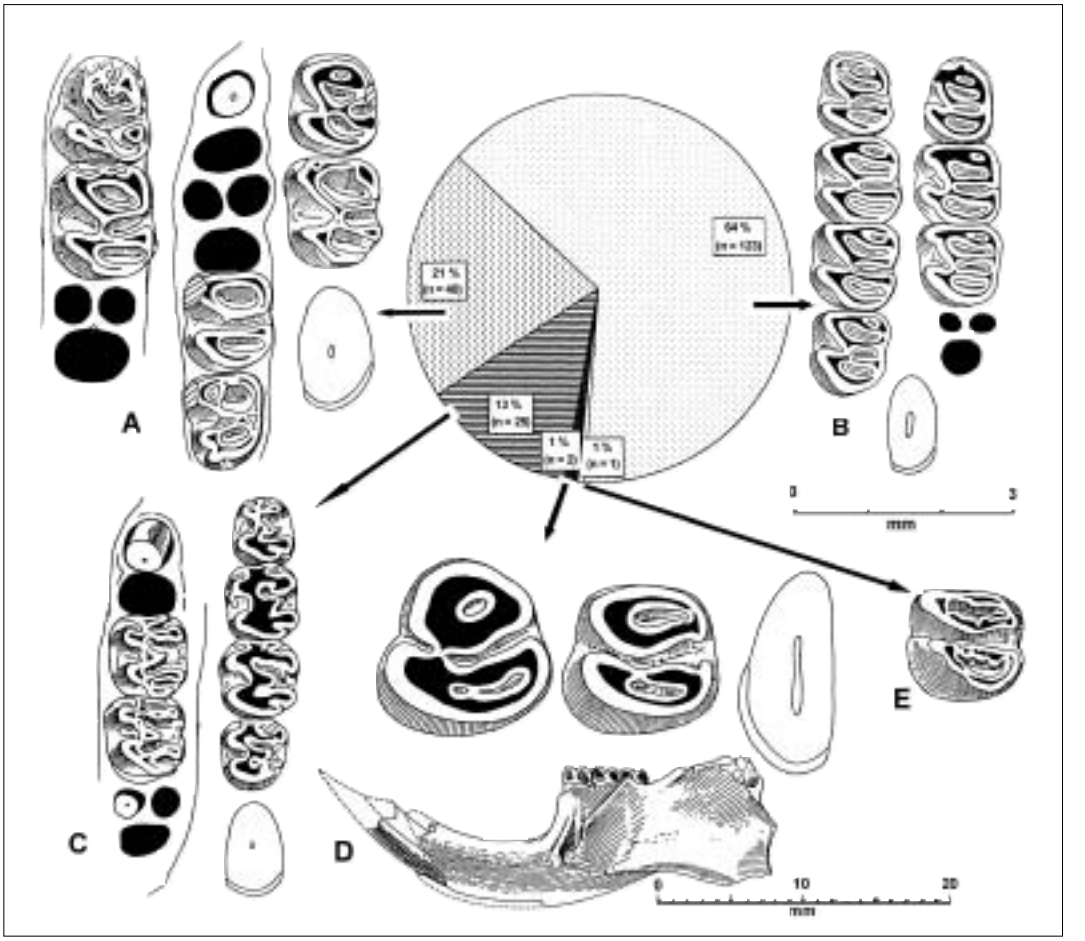

Figure 4 Schematic presence of the Eomyids in Merkur-North. Examples of the lower left dentitons of Eomyids (the scale for all specimens under B): **A** - *Ligerimys lophidens* DEHM, 1950; **left**: p4 and m1 and alveolus of m2; **centre**: m2, m3 and alveolus of p4 and m1, **right**: p4, m1, **below**: cross section of the lower incisor; **B** - *Pseudotheridomys* (sp.) SCHLOSSER, 1926; **left**: p4 – m3, **right**: p4-m2 and alveolus of m3; **below**: cross section of the lower incisor; **C** - *Pentabuneomys* sp. ENGESSER, 1990; **left**: m1, m2 and alveolus of p4 and m3; right: p4 – m3, **below**: cross section of the lower incisor; **D** - *Megapeomys lavocati* FEJFAR *et al*., 1998; **upper row**: two lower p4, the right one of the type specimen, cross section of the type incisor; **below**: left lower jaw, the type specimen the scale below right. **E** - *Apeomys tuerkheimae* FAHLBUSCH, 1968 (m1-2).

zed. This produced sedimentary conditions favorable for preservation of vertebrate remains often associated with paleobotanical record.

In this paper, two nearly contemporaneous localities are compared. Both sites are quite different in environmental conditions and produced quite different autochthonous both faunal and floral assemblages. The first one, an layer in the base of the brown coal seam alkalized by volcanic ashes in the open pit Merkur-North, represents a mammalian fauna very rich in small forms, inhabitants of the swampy riparian lowland swamp forest with prevailing evergreen oak *Quercus rhenana* and *Glyptostrobus*. This assemblage is extremely diversified, some groups – e.g., the insectivores (talpids, dimylids) and the rodents (eomyids, glirids, etc.) – display very high individual occurrence of different genera. Taphonomically, this site represents a littoral environment as drinking place inhabited

and visited frequently by all groups of vertebrates. The high number of the cervoids (antlers of *Procervulus*) is characteristic, the record of the strange hippomorph chalicothere (*Schizotherium*) is a top rarity. The presence of small and large predators is proved by numerous gnawing traces in highly fragmented bones; the gnawing is produced by different rodents as well. Numerous middle-sized coprolites (? smaller carnivores, e.g. *Ursavus*, *Laphyctis*) include dermal bones of ophisaurids, small seeds and impression of wing-case of beetles. The autochthonous inhabitants were the frogs, turtles, chamaeleons and small alligators. The avian remains produced water birds, woodpeckers, owls and one species of a small parrot.

The second site, the 'Tuchorice limestones', two facies of thermal spring travertine-like deposits, displays different conditions. Dense riparian forest with maples, Juglandaceae, Ulmaceae, two palms and several lianas shows an increasing mean annual temperature. Extensive screen washing produced only a monotone and taxonomically poor assemblage of small mammalian species, rich in individual numbers: the sciuriform rodents, which were extremely rare in the fossiliferous bed of Merkur, are here the dominating group. Taphonomically, the large mammals document a chain of the 'trapping effect': large predators as amphicyonids, hemicyonids and tomocyonids were attracted by frequent middle sized ungulates (the suid *Propalaeochoerus*) killed by carbon dioxide exhalations. Also here, the turtles are frequent. Typically for travertines, the birds are documented by two well preserved endocranial casts of birds of pray (*Accipiter*); in some cases, too, incrusted water beetles (e.g., *Hydrous*) were collected.

This comparison of the two nearly contemporaneous sites, both in terms of paleomammalogy and paleobotany, reveals an important source of evidence in the European early Miocene. A detailed analysis of both floral and faunal assemblages is in preparation.

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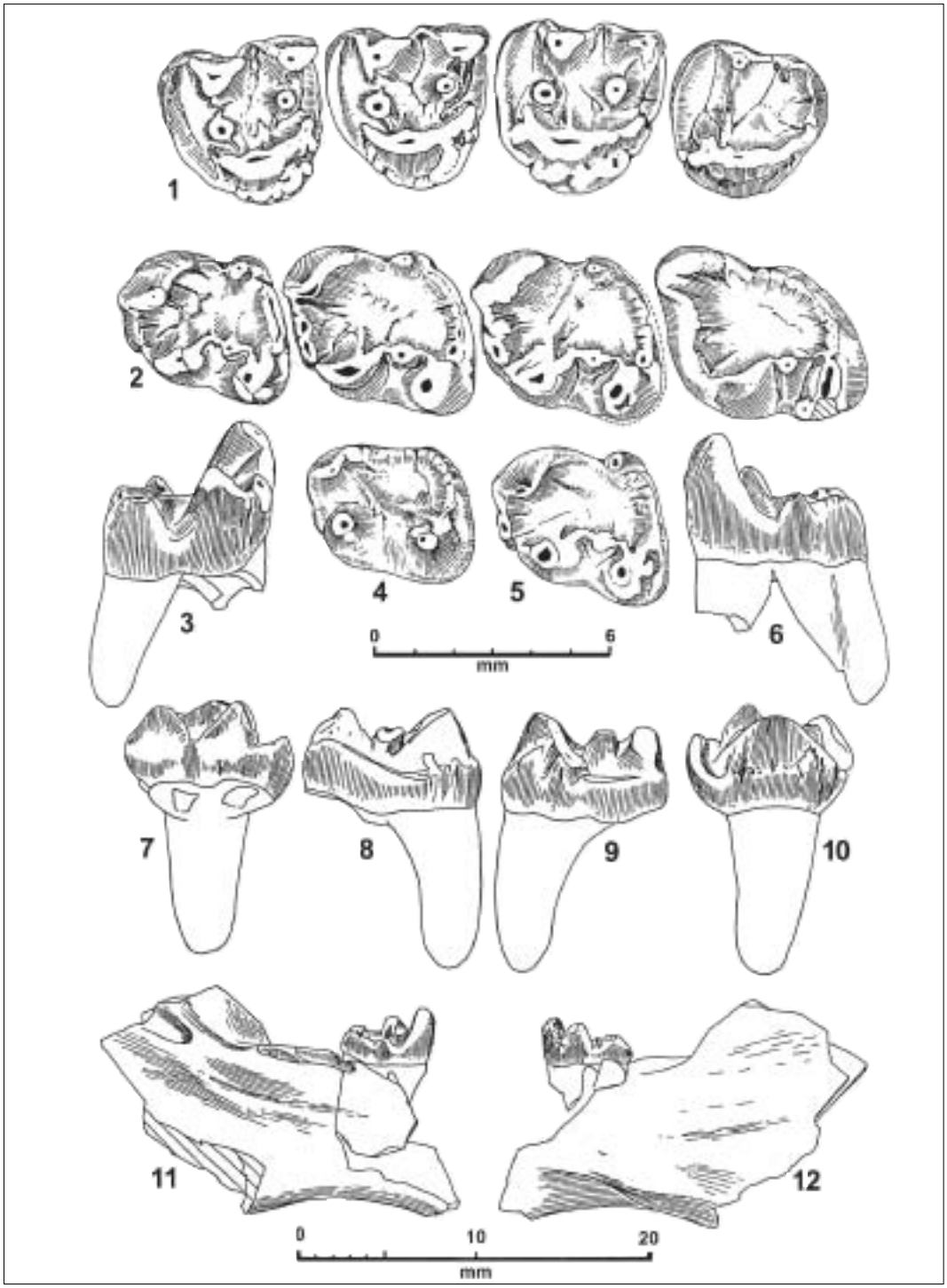

Figure 5 *Paracitellus eminens* DEHM, 1950 from Merkur-North. **1** - Upper left P4 - M3; **2** - lower left p4 - m3; **3**, **5**, **6** - lower m1, buccal (**3**), occlusal (**5**) and lingual (**6**) views; **4** - left deciduous Dp; **7** - **10**: upper M2 buccal (**7**), mesial (**8**), distal (**9**) and lingual (**10**) views; **11**, **12**: fragment of the left lower jaw with m2 in situ. Collection of Z. Dvorák.

Figure 6 Lower jaws of *Chainodus intercedens* (ZIEGLER, 1990) from Merkur-North **1**: with p4 and m1; **2**, **6**: with p4; **3**-**5**: - with p4 - m2; **7** - **10**: left lower jaw with p3 - m2, note the medially inflexed processus angularis (**7**, **10**) and a straight longitudinal structure at the symphysis (**10**) which could represent a sub-kinetic joint (usually, the lower jaws of other cordylodontid insectivores, e.g., Metacordylodon, have co-ossified symphysis). (**1** - **6**, **8**: occlusal views, **7**: ventral view, **8**: lateral view and **10**: medial view).

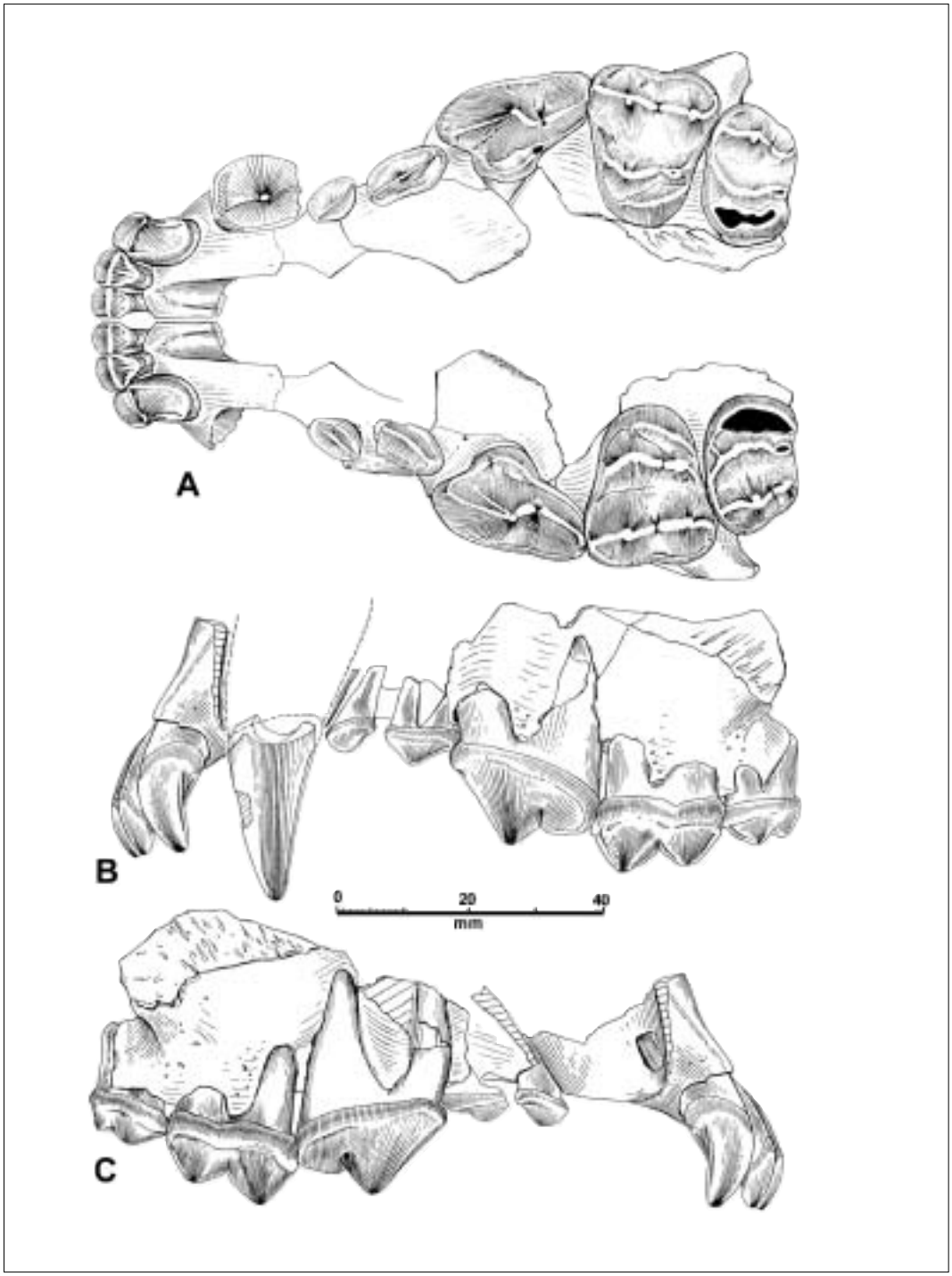

Figure 7 *Hemicyon stehlini* (HÜRZELER). Upper dentition in a partial skull record of a single young individual in the base of the brown coal seam at Merkur-North; abundant presence of Hemiconids (? two forms) is also in Tuchorice. - **A**: occlusal view; **B**, **C**: buccal views of the left (**B**) and right (**C**) side. Collection of Z. Dvorák.

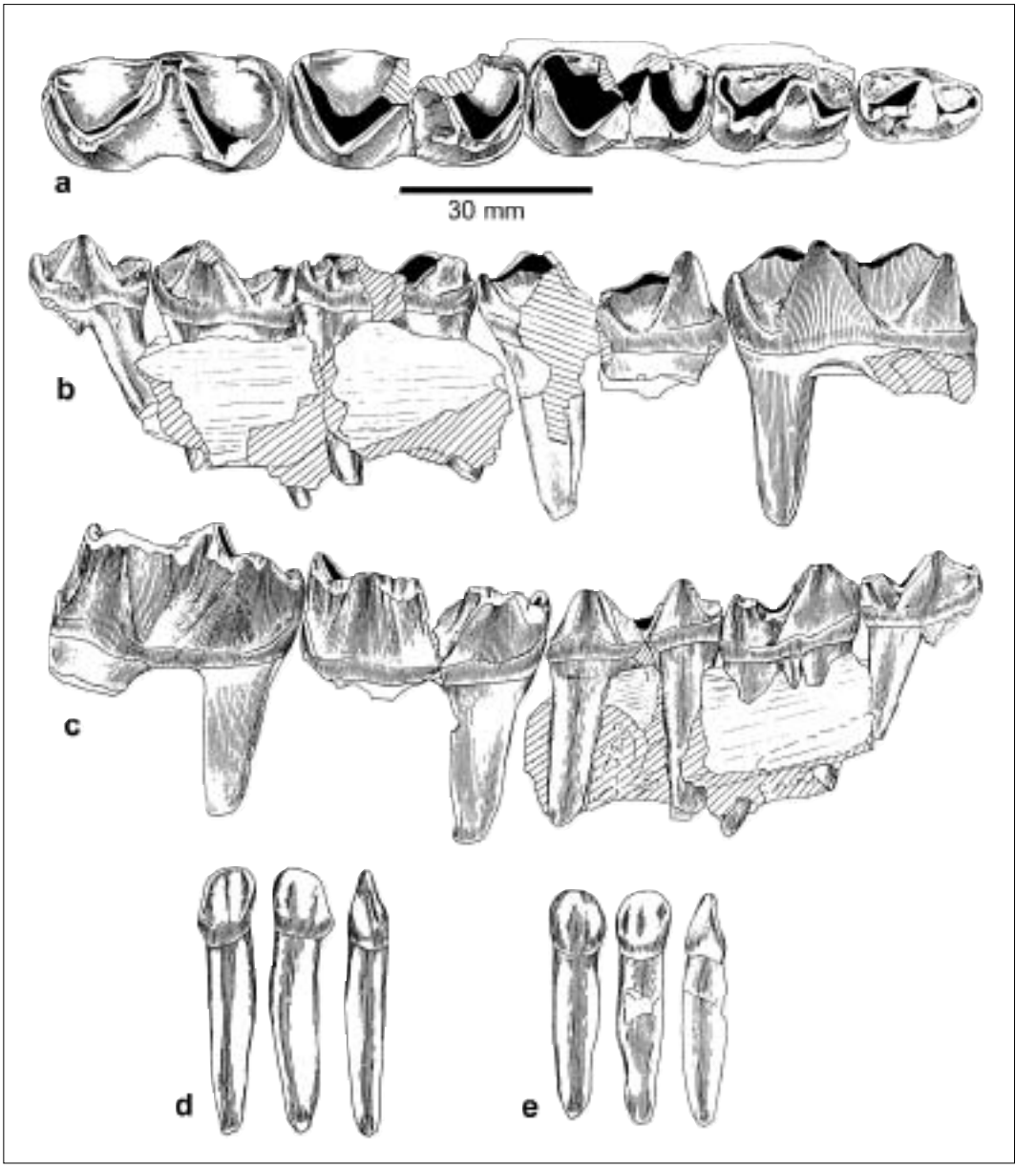

Figure 8 *Metaschizotherium* cf. *wetzleri* (KOWALEWSKI, 1883). Lower p3-m3 (3, 4) dentition of a single individual in the seam base from Merkur-North. **a**: occlusal view; **b**: lingual view; **c**: buccal view. **d**: third lower left incisor (lingual, labial, lateral views), **e**: second lower left incisor (lingual, labial, lateral views). Collection of Z. Dvorák

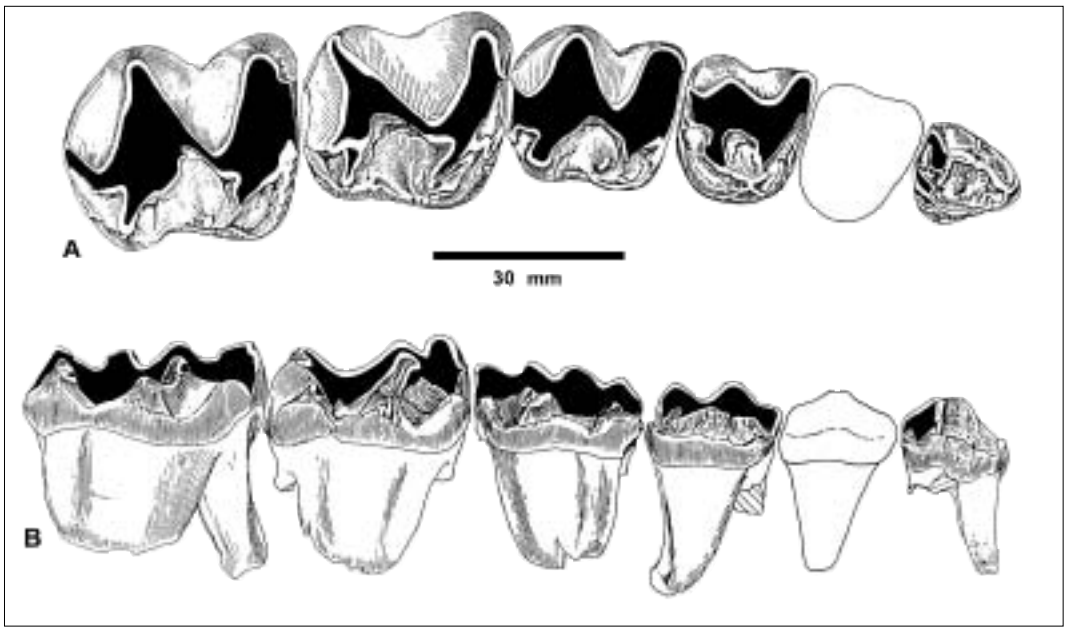

Figure 9 *Metaschizotherium* cf. *wetzleri* (KOWALEWSKI, 1883). Upper P2 - M3 (1, 2; the P3 is missing) in the seam base from Merkur-North. **A**: occlusal view; **B**: lingual view; Collection of Z. Dvorak.

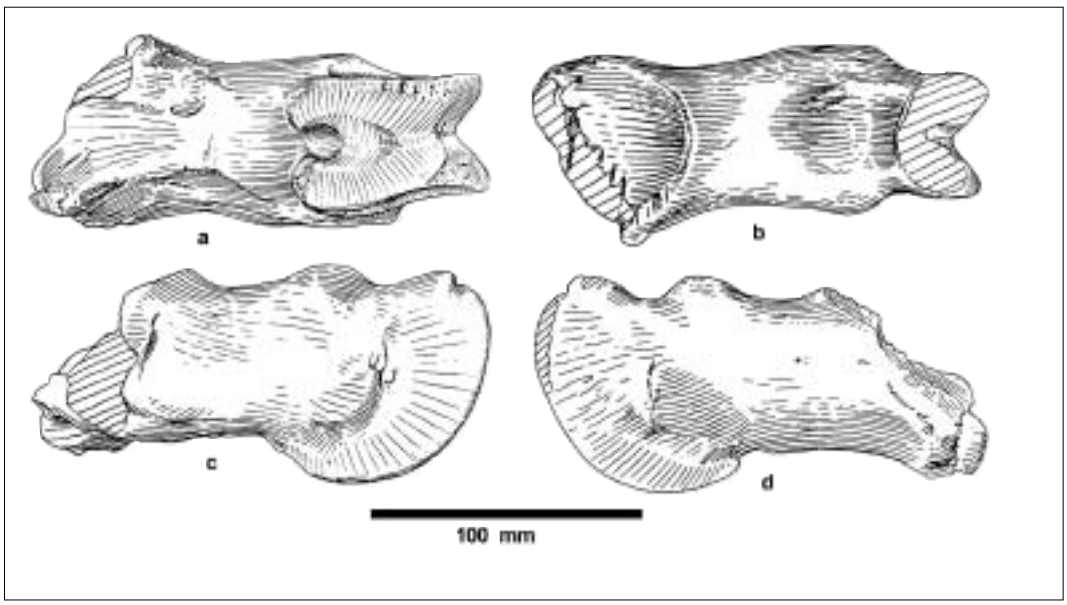

Figure 10 Chalicotheriidae indet. gen. et sp. II. A single record of an unusual big co-ossified phalanges PH I/II of the manus (?); the proximal part is gnawed by a large amphicyonid carnivore; length = 133, 7 mm). The morphology of the distal trochlea proves a sub-kinetic joint of P II/III. **a**: plantar view, **b**: dorsal view, **c**: lateral view, **d**: medial view.

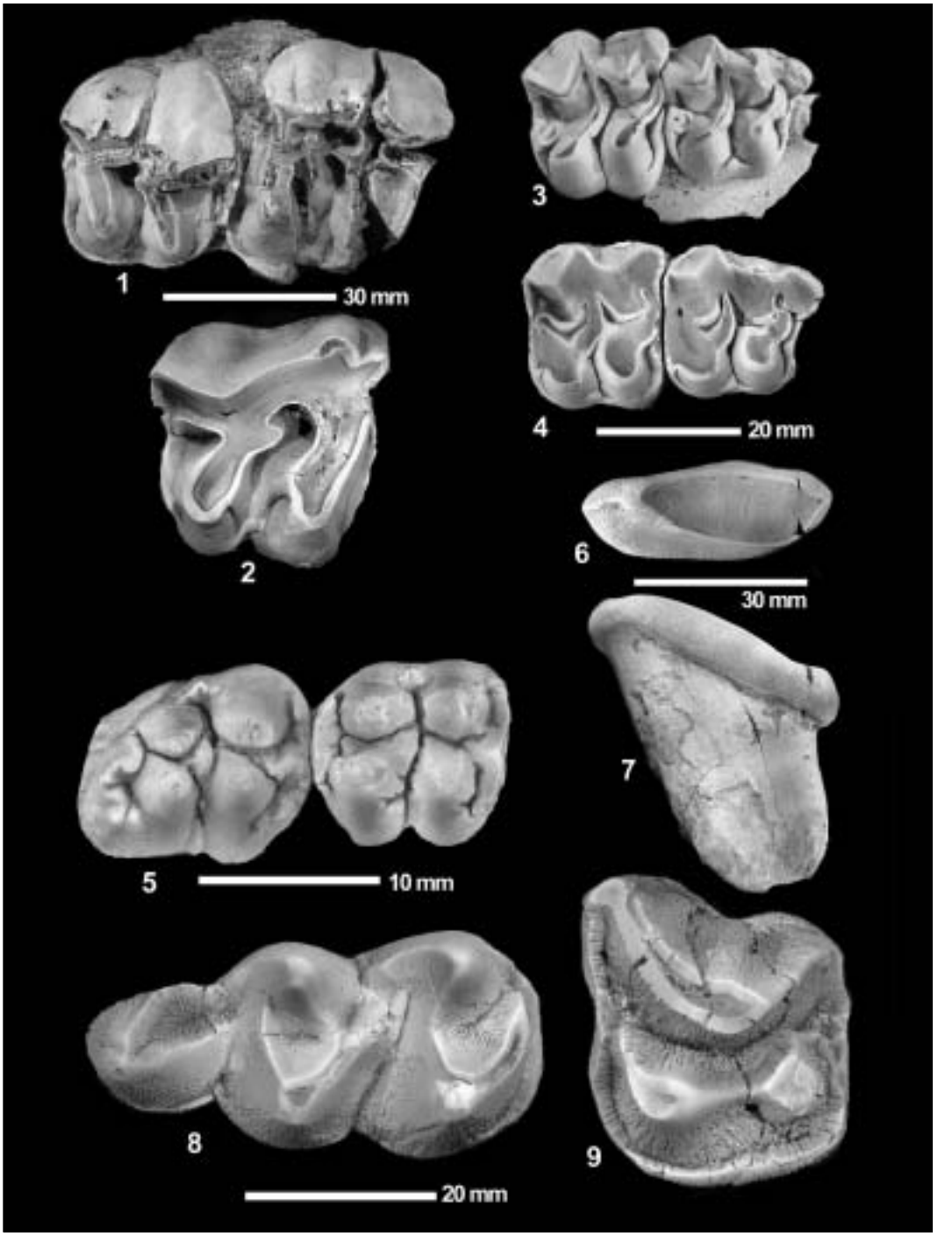

Plate 1 **1**: *Protaceratherium minutum* (CUVIER), left upper P3, P4, occlusal; **2**: *Prosantorhinus* n. sp., right upper M1 re., occlusal; **3**, **4**: *Anchitherium aurelianense* (CUVIER) upper right P3, P4, juvenile (**3**) and adult (**4**) individual; **5**: *Propalaeochoerus aurelianensis* right upper M2, M3; **6**, **7**: '*Diaceratherium*' *douvillei* (OSBORN), left upper incisor I 1, occlusal (**6**) and medial (**7**); **8**, **9**: *Brachyodus onoideus* (DEPERET) right lower m3 (**8**) and right upper P2. **1**, **2**, **5** - **9**: from Tuchorice travertine section "Reuss-Suess", **3**, **4**: from the base of the main coal seam, open pit Merkur-North. Occlusal (**1** - **6**, **8**, **9**) and medial (**7**) views.

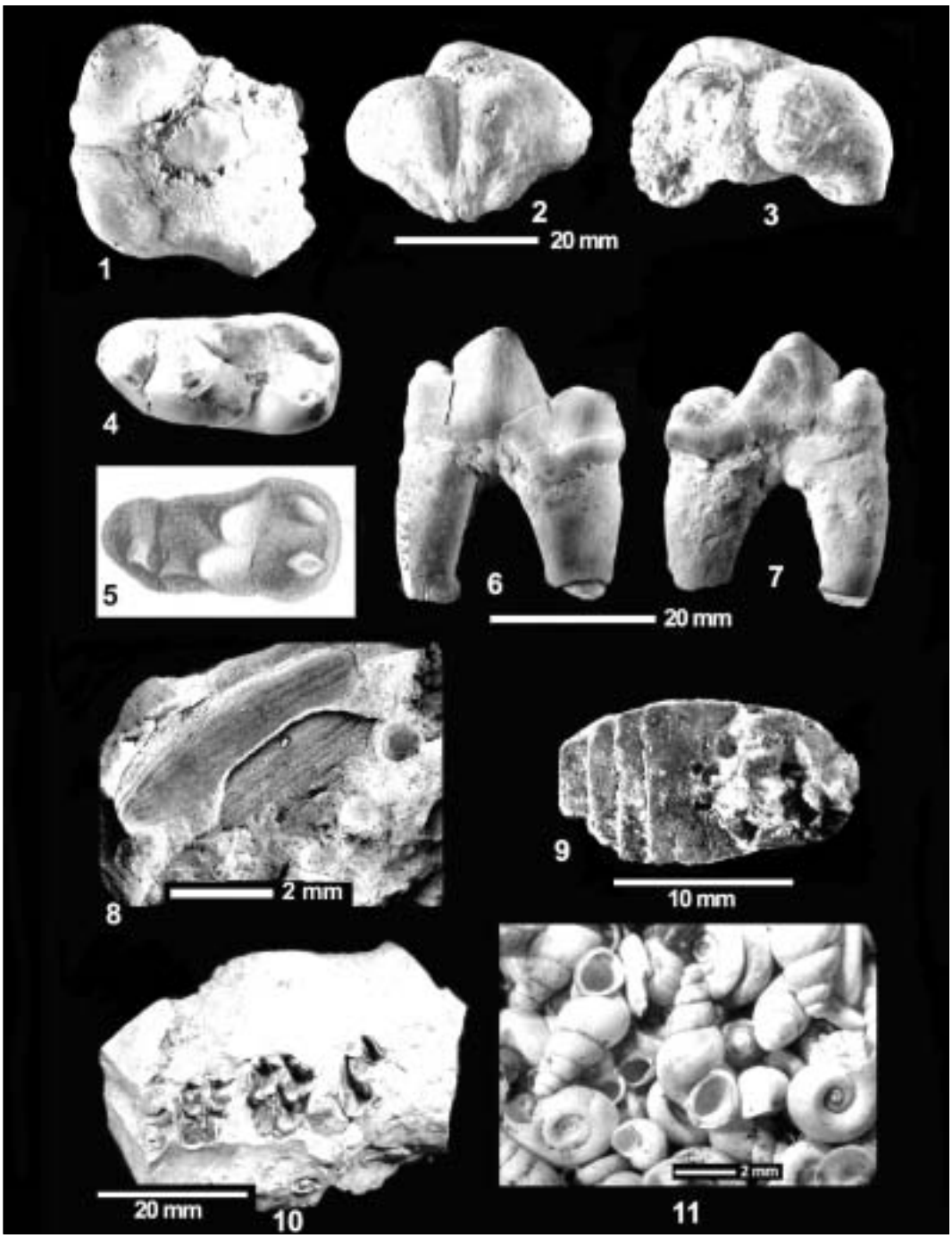

Plate 2 **1** - **3**: Endocranial cast of a bird (Accipitridae indet.), views: dorsal (1), frontal (2), lateral (3); **4** - **7**: *Amphicyon bohemicus* SCHLOSSER, the Type: lower left m 1 (coll. CU, No. 7330), views: occlusal (**4**), copy of the original figure 1861 (**5**), buccal (**6**), lingual (**7**); **8** - **9**: examples of the insects: impression of a wing-case in a calcified coprolite, Merkur-North (**8**), ventral view of an encrusted small beetle, travertine section of Tuchorice (**9**); **10**: rare record of a small cervid ("enamel shells" of the dislocated upper molars of cf. *Procervulus*) in the bedded freshwater limestone facies from Tuchorice; **11**: rich small freshwater gastropods (the prevailing genus *Nystia*) in the base of the brown coal seam in the open pit Merkur-North.

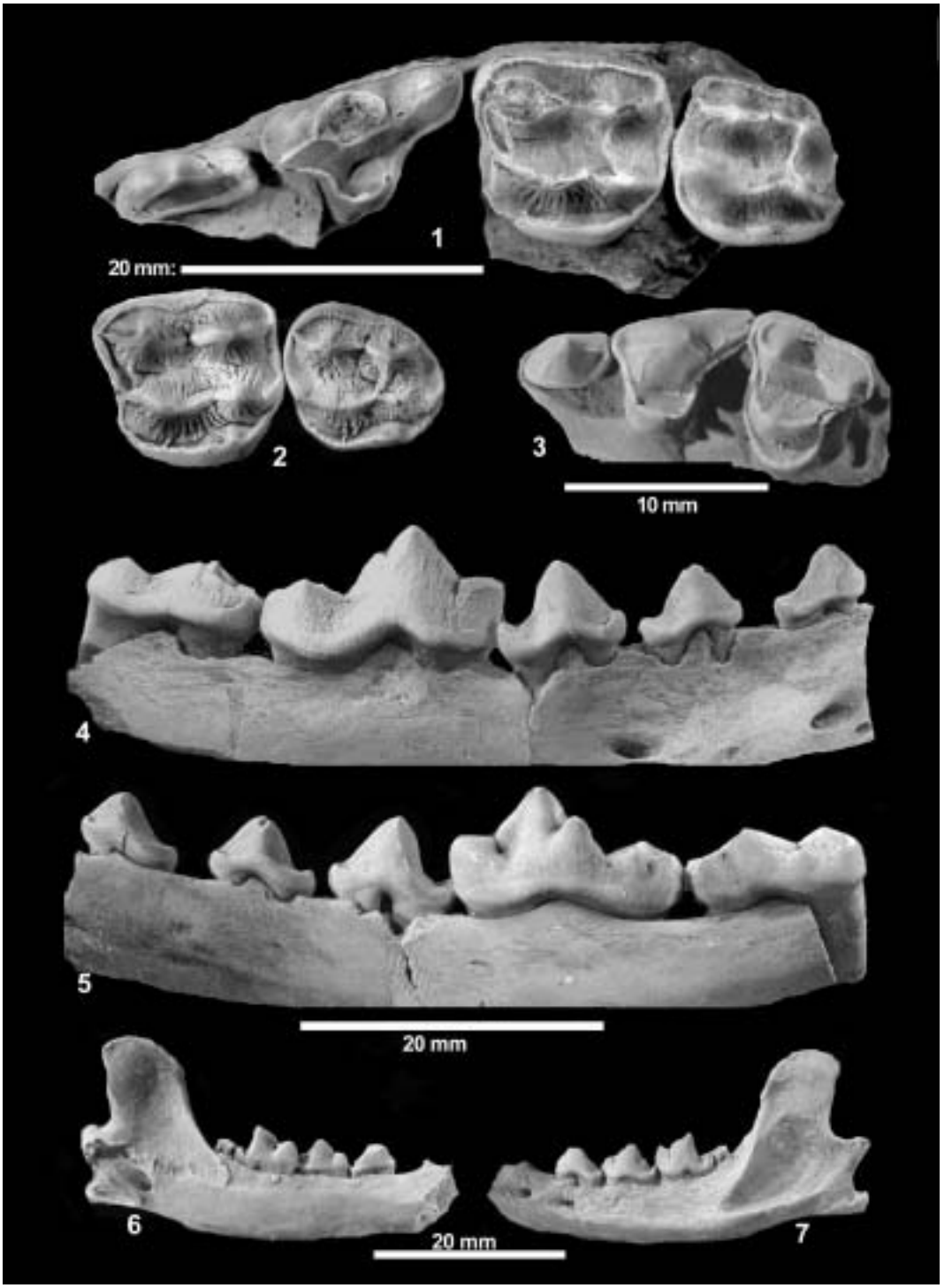

Plate 3 Examples of the carnivores from the base of the main brown coal seam from the open pit Merkur-North. **1**, **2**, **4**, **5**: *Ballusia elmensis* DEHM, upper left maxilla, P3 - M2 (1); **2**: juvenile upper left M1-2; **4**, **5**: right mandible p1 - m1, views buccal (**4**) and lingual (**5**); **3**: *Stromeriella franconica* DEHM, left maxilla P3 - M1; **6**, **7**: *Palaeogale hyaenoides* DEHM, left mandible p3 - m2.

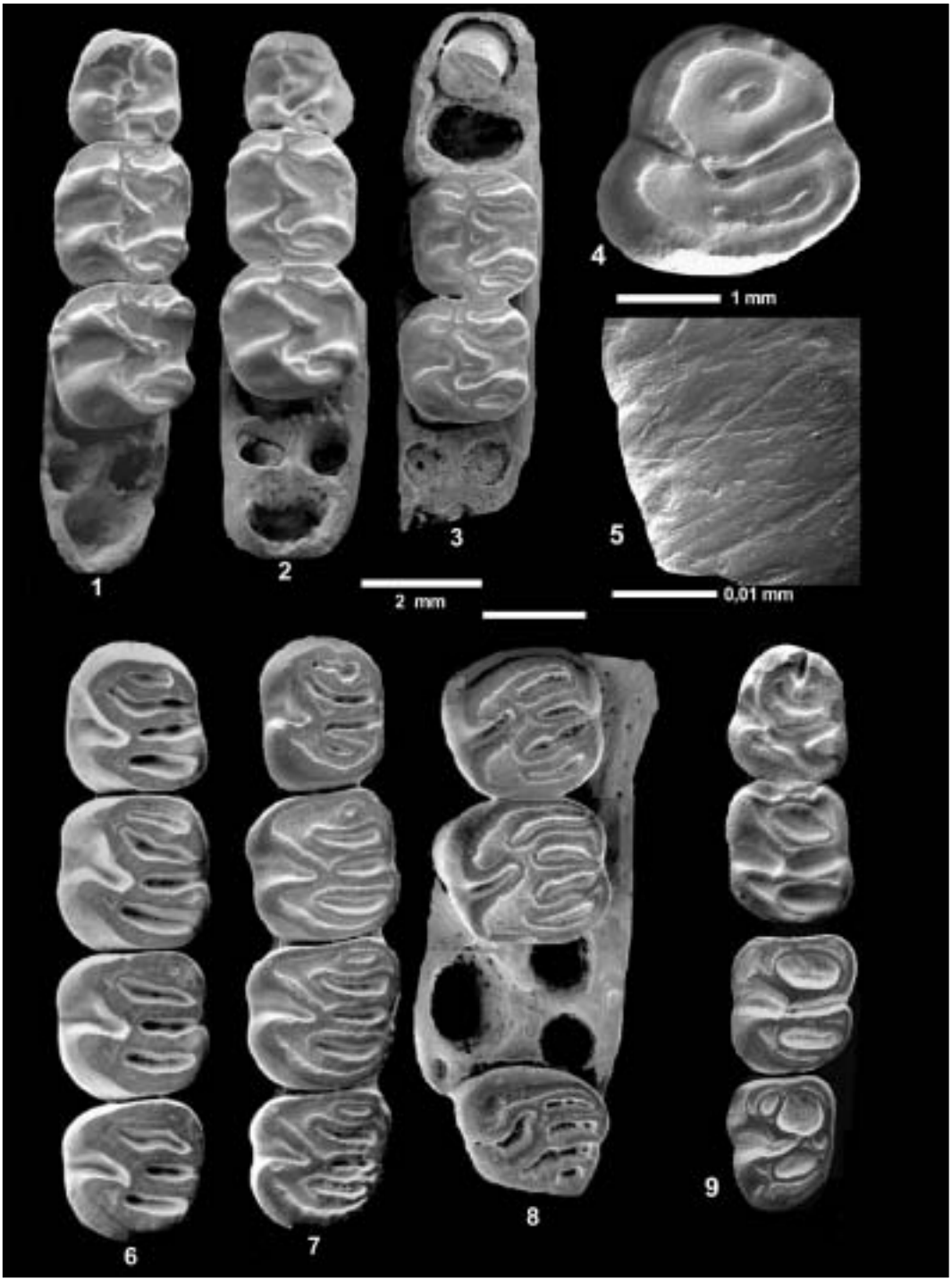

Plate 4 Examples of eomyids from the base of the main brown coal seam from the open pit Merkur-North. **1** - **3**: Bunodont genus *Pentabuneomys* represented by two (?) forms sp. I and II, **4**, **5**: the giant *Megapeomys lavocati* FEJFAR *et al.*, lower left p4 occlusal (**4**), detail of the scratched occlusal surface of enamel (prove of the fossorial habit of this species ?); **6** - **9**: Lophodont genera *Pseudotheridomys* sp. (**6** - **8**) and *Ligerimys lophidens* DEHM (**9**).

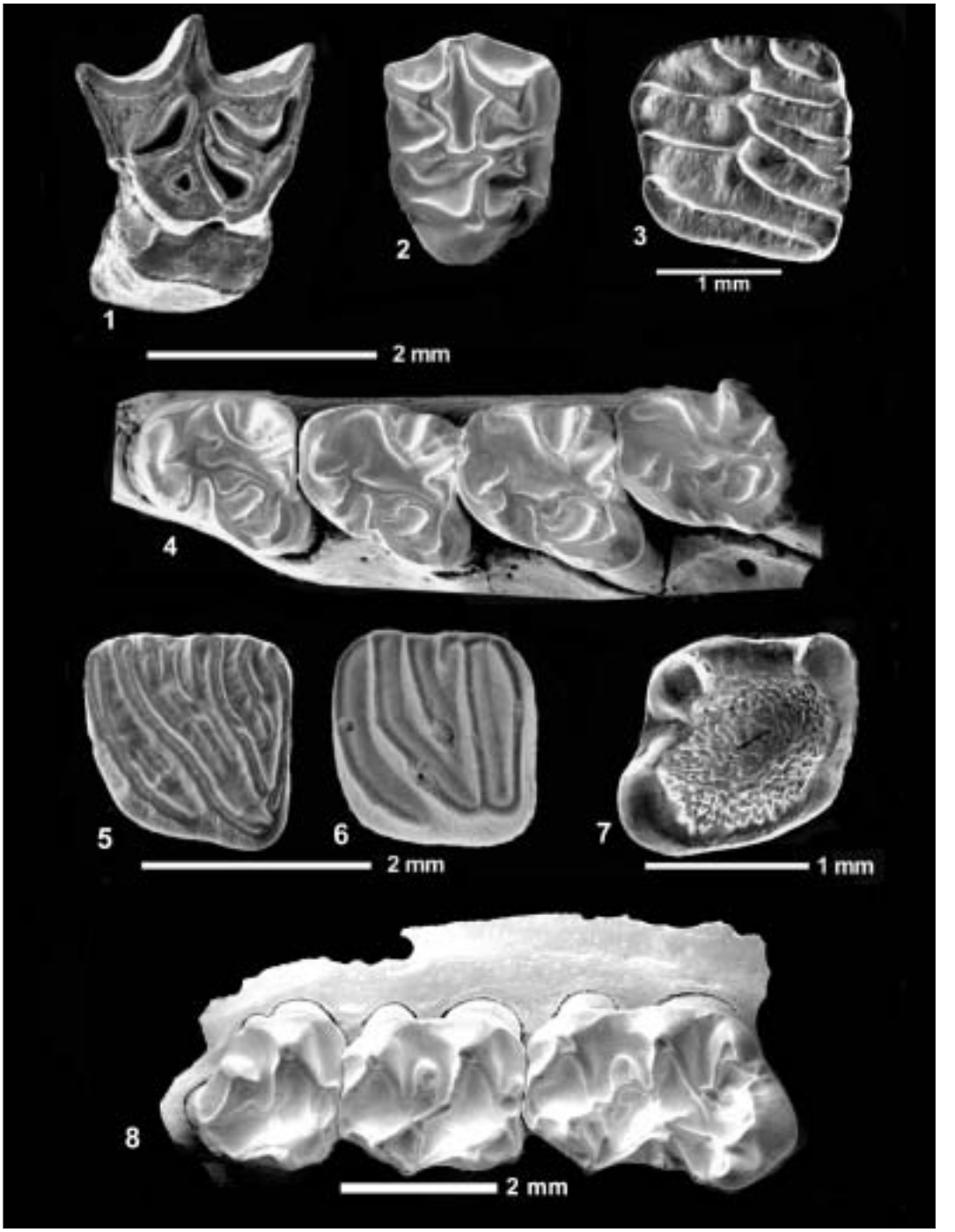

Plate 5 Examples of rodents from the base of the main brown coal seam from the open pit Merkur-North. **1**, **2**, **4**: the aplodontids: **1**: *Ameniscomys selenoides* DEHM, upper left M 1, (an unique record from a deep drilling in 1964 in the area of the future open pit Merkur-North), **2**, **4**: *Plesispermophilus descendens* DEHM, upper right M 1 (2) and lower left p4 - m3 in a mandible; **5**, **6**: the glirid *Myoglis antecedens* MAYR, upper left P 4 (**5**) and M 1-2 (**6**); **7**: the small petauristid *Blackia miocaenica* MEIN, lower left m1-2; **8**: upper right maxilla (inverse) of the aberrant cricetid *Melissiodon dominans* DEHM, with M 1-3.