Catalogus Fossilium Austriae

Ein systematisches Verzeichnis aller auf
österreichischem Gebiet festgestellten Fossilien

Schriftleitung
Werner E. Piller, Graz

Band 4

Rodentia neogenica

mit 77 Tafeln und 24 Abbildungen im Text

Von
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Introduction

The present volume provides an overview of Neogene Rodentia and their temporal and spatial distribution in Austria and neighbouring regions. It is based on published and unpublished fossils and introduces the taxonomy and systematics of the represented rodent groups. Dental terminology is explained using sketches of tooth morphology and the main characters of the upper and lower dentition as a basis for taxonomic identification. Descriptions of new taxa and measurements are excluded from this issue. We also excluded detailed descriptions of skulls, lower jaws and postcranials, which will be subject of other planed publications.

The studied fossils mainly are housed in the collections of the Museum of Natural History Vienna, Geological-Paleontological Department. Some fossils stem from other collections, i.e. the University of Vienna (Department of Palaeontology), the Universalmuseum Joanneum Graz (Geology & Palaeontology), the Montanuniversität Leoben, the Bayerische Staatssammlung für Paläontologie und Geologie München, and the private collections of W. Andrä (Wimpassing, Lower Austria), O. Hopfinger (Korneuburg, Lower Austria), J. Kreuzhuber Hohenzell, Upper Austria), G. Penz (Vienna), C. Schebeczek (Gaweinstal, Lower Austria), H. Schwengersbauer (Mannersdorf, Lower Austria), W. Sovis (Stockerau, Lower Austria), P. Ullrich (Vienna) and F. Weichselbaum (Mistelbach, Lower Austria).

The first mammal fossils of Austria were found in the course of coal mining activities, and others were collected in gravel-, sand- and clay pits (Hofmann 1892, 1893; Hofmann & Zdarsky 1904; Pia & Sickenberg 1934; Papp & Thenius 1954; Mottl 1970). These old collections yielded mostly isolated fossils of large mammals and rarely fossil remains of large-sized rodents such as beavers. The wide variety of small-sized mammal fossils was unknown from Austria up to mid-20th century. The first systematic excavations started when the method of screen washing of fossil-bearing sediments developed; this was adapted in Austria in the late 1960s.
In the second half of the 20th century, a range of field activities focused on smaller mammals, among them the excavations of the Kohfidisch fauna conducted by the Museum of Natural History Vienna (1955 to 1984). These excavations yielded a series of publications on small mammals (Bachmayer & Wilson 1970, 1978, 1980, 1983, 1985, 1990; Daxner-Höck 2004 b; van de Weers & Montoya 1996; Daxner-Höck & Höck 2009). During two field seasons (1968-1969) the small mammal fauna from Eichkogel was excavated by the University of Vienna. The investigated small mammal fossils from Eichkogel include rodents, insectivores and bats (Daxner 1967; Daxner-Höck 1970, 1972a, 1972b, 1975, 1977, 1980, 2004b; Daxner-Höck & Rabeder 1970; Daxner-Höck & de Bruijn 1981; Rabeder 1970, 1973; Ziegler 2006; Daxner-Höck & Höck 2009). The first mammal fossils from the locality Götzendorf were collected by private collectors. In several field seasons from 1988 to 1992, a rich vertebrate collection was excavated by the Museum of Natural History from different fossil layers in Götzendorf and from neighbouring sandpits in Stixneusiedl and Neusiedl am See. An overview of the faunas (Rögl et al. 1993) and several taxonomic studies give insight into selected small mammal groups (Bachmayer & Wilson 1984; Rabeder 1998; Daxner-Höck 2004b; Ziegler 2006; Daxner-Höck & Höck 2009).
From 1990 to 2006, numerous small mammal localities were excavated from different Neogene basins of Austria (de Bruijn 1998; Daxner-Höck 1998a, 1998b, 2003b, 2004a, 2004b, 2010; Daxner-Höck & Höck 2009; Gross et al. 2011; Harzhauser et al. 2011; Prieto et al. 2010, 2014; Ziegler 1998, 2006). Screen washing in the field has yielded very important rodent assemblages from the localities Obergänserndorf and Teiritzberg (Korneuburg Basin), Oberdorf (West Styria Basin), Mühlbach and Schernham (North Alpine Foreland Basin), Richardhof-Wald and Richardhof-Golfplatz (Vienna Basin). All these excavations were organized and conducted by the Natural History Museum Vienna, partly supported by other scientific institutions, private collectors and students. Finally, the famous vertebrate fauna of St. Stefan (Gratkorn Basin) was excavated by the Universalmuseum Joanneum Graz in cooperation with the University of München.
The investigated rodent material comprises thousands of fossil remains, i.e. parts of skulls, jaws and mostly isolated cheek teeth and incisors, rarely postcranials. The fossils stem from fifty fossil sites/layers of varying sample size and fossil richness. Only a few teeth were collected from small test samples, whereas large bulk samples of one to ten tons yielded several hundred or thousands of fossil specimens. At least one third of the Austrian Neogene rodent assemblages turned out to be very important concerning species richness, individual numbers, and their biostratigraphic and palaeoecologic input.

Some of these terrestrial assemblages deserve special attention because they were deposited in marine or brackish sediments synchronously with marine organisms. They not only provide insight into various ecosystems, but also allow correlations to be established between continental and marine biozonations (Daxner-Höck 1998a; Daxner-Höck et al. 2004; Harzhauser et al. 2002, 2008; Roetzel 2003; Rögl & Spezzaferri 2003; Steininger 1999). Moreover, the biostratigraphic results can be linked with magnetostratigraphic, lithostratigraphic and sequence stratigraphic data and serve as a foundation for an integrated stratigraphy (Daxner-Höck 2001; Harzhauser et al. 2004; magyar et al. 1999a, 1999b; Mauritsch & Scholger 1998; Scholger 1998).

These rich and well-stratified mammal assemblages from different Neogene basins of Austria provide a basis for future small mammal community analyses, phylogenetic studies and palaeoecological interpretations. The present data of Austria suggest major diversifications of small mammal communities in the course the Miocene. Signals resulting from these data will allow conclusions to be drawn on significant changes of palaeoenvironments and fauna over 11 million years.

Methods and Abbreviations

The collecting method was wet screening of test- and bulk samples in the field (we used pure water), followed by drying by sun and wind. The washing equipment involved sieves of 0.5, 2.5 and 5.0 mm mesh sizes, a water pump and a generator. The residue was dried in the field, and the smaller molluscs, bones and teeth of lower vertebrates and small mammals were picked out of the residue and studied using head-lenses and light microscopes (Leica – Wild M3B and Leica – Wild M8). The teeth were coated, and SEM-photos were taken by a Philips XL 20 scanning microscope at the Biocenter, University of Vienna. To facilitate comparisons, all right-side teeth are figured as mirror images (reversed) and their figure numbers are underlined (e.g. Pl. 2.1 = D4 from the right side). The collection numbers of the Natural Hisory Museum Vienna comprise: Institution/year/number of taxon per locality/individual number (e.g. NHMW/2011/0113/0001). So far unnumbered specimens are indicated by …./0000 (e.g. NHMW/2011/0113/0000).

For comparisons, skulls of living rodents from the Natural History Museum Vienna, Mammal Department, and fossils and casts from the following institutions were available: Institute of Earth Sciences of the University of Utrecht, Bayerische Staatssammlung für Paläontologie und Geologie in München, Municipal Museum of Pásztó, Université Claude Bernard in Villeurbanne, Comenius University of Bratislava, Catalan Institute of Paleontology Miguel Crusafont in Sabadell.

For classification above species level, we follow Mc Kenna & Bell (1997), Casanovas-Vilar & Alba (2011), Daams & de Bruijn (1995), Engesser (1990) and Hugueney (1999). Schemes of dental terminology were modified after Black (1963), de Bruijn (1966a), Daams (1985), Daams & de Bruijn (1995), van Dam (1997), Engesser (1990), Fahlbusch (1966, 1992), Fahlbusch & Mayr (1975), Freudenthal et al. (1994), Freudenthal & Martin Suarez (1999), Hugueney (1999), Kristkoiz (1992), Mein (1970), Mödden (1999), van de Weerd (1976). Not all references of taxa above genus level are included in the reference list.

Abbreviations:

NHMW	– Natural History Museum Vienna, Department of Geology and Palaeontology
PIUW	– Department of Palaeontology, University of Vienna
UMJG	– Universalmuseum Joanneum in Graz
BSPG	– Bayerische Staatssammlung für Paläontologie und Geologie in München
MUL	– Montanuniversität Leoben
FAD	– first appearance datum
FOD	– first occurrence datum
LAD	– last appearance datum
LOD	– last occurrence datum
Ma	– million years
MN	– Neogene Mammal Zone
D4, P4, M1-3	– upper cheek teeth
d4, p4, m1-3	– lower cheek teeth
l	– from the left side
r	– from the right side
GPTS	– Geomagnetic Polarity time scale
Ap	– Apfelberg
Atz	– Atzelsdorf
Bu	– Bullendorf
E	– Eichkogel (top)
Ei	– Eibiswald
F	– Feisternitz
Ga	– Gaweinstal
Gö-1	– Götzendorf (section 1)
Gö-2	– Götzendorf (section 2)
Gö-5	– Götzendorf (layer 5)
Gö-88	– Götzendorf (collection 1988)
Gör	– Göriach
GRU-B	– Grund (section B)
GRU-F	– Grund (section F)
He	– Hennersdorf
Inz	– Inzersdorf
Ko	– Kohfidisch
Ko-I	– Kohfidisch (cave)
Ko-II	– Kohfidisch (fissure II)
Ko-III o,u	– Kohfidisch (fissure III)
Ko-IV	– Kohfidisch (fissure IV)
Ko-VI	– Kohfidisch (fissure VI)
Ko-Cm	– Kohfidisch (fissure Cm)
L-S	– Leoben-Seegraben
Ma	– Mataschen
Mag	– Magersdorf
Mai	– Maigen
Mat	– Mariathal
Mü1	– Mühlbach (section 1)
Mü2	– Mühlbach (section 2)
Nl	– Niederleis
NS	– Neusiedl am See
O3	– Oberdorf (layer 3)
O4	– Oberdorf (layer 4)
OG1	– Obergänserndorf (section 1)
OG2	– Obergänserndorf (section 2)
RH-A	– Richardhof-Golfplatz
Rh	– Richardhof-Wald
Sch	– Schernham
Schö	– Schönweg
Stix	– Stixneusiedl
StM	– St. Margarethen
StS	– St. Stefan/Gratkorn
T	– Trautmannsdorf
T1	– Teiritzberg (section 1)
T2	– Teiritzberg (section 2)
V	– Voitsberg
Vö	– Vösendorf
W	– Wies
Wb	– Wienerberg
Zi	– Zillingdorf

Localization and stratigraphy of the fossil sites (Figs. 1, 2):

The fossil sites are situated in Neogene sedimentary basins of Austria: Northern Alpine Foreland Basin (western- and eastern part), Vienna Basin (northern- and southern part), Styrian Basin and its satellite basins, Pannonian Basin, and in smaller basins along the Mur-Mürz valley and the Lavant valley (Fig. 1). The fossil-bearing sediments are coastal marine sandy silts of the Alpine Foreland Basin and Korneuburg Basin, marine-brackish silts and clay of Lake Pannon, and fine silt and clay of marginal freshwater lakes. Moreover, fossils were recovered from fluvial deposits, from lignite mines and karstic fissures.

The investigated rodent assemblages span a time interval of around eleven million years from the early to the late Miocene, with Maigen being the oldest and Eichkogel the youngest localities (Fig. 2).

1. Maigen (Mai):

North Alpine Foreland Basin, Lower Austria; sandpit Stranzl; sample Mai, Kühnring Subfm. and Burgschleinitz Fm.; marine sand – silt; lower Miocene, upper Eggenburgian, Orleanian, MN3.
Marine gravels and sandy silt on top of the crystalline basement with a rich mollusc fauna and scarce vertebrate remains. The upper Eggenburgian and Orleanian (MN3) are indicated by molluscs and nannoplankton (Zone NN2/NN3) and mammals (MN3). The estimated age is around 19 Ma. (Steininger 1999; Steininger et al. 1990; Mein 1989).

Rodent assemblage:
Heteroxerus sp.
Ligerimys cf. *lophidens* (Dehm, 1950)
Ligerimys cf. *antiquus* Fahlbusch, 1970)
Peridyromys murinus (Pomel, 1853)
Melissiodon dominans Dehm, 1950

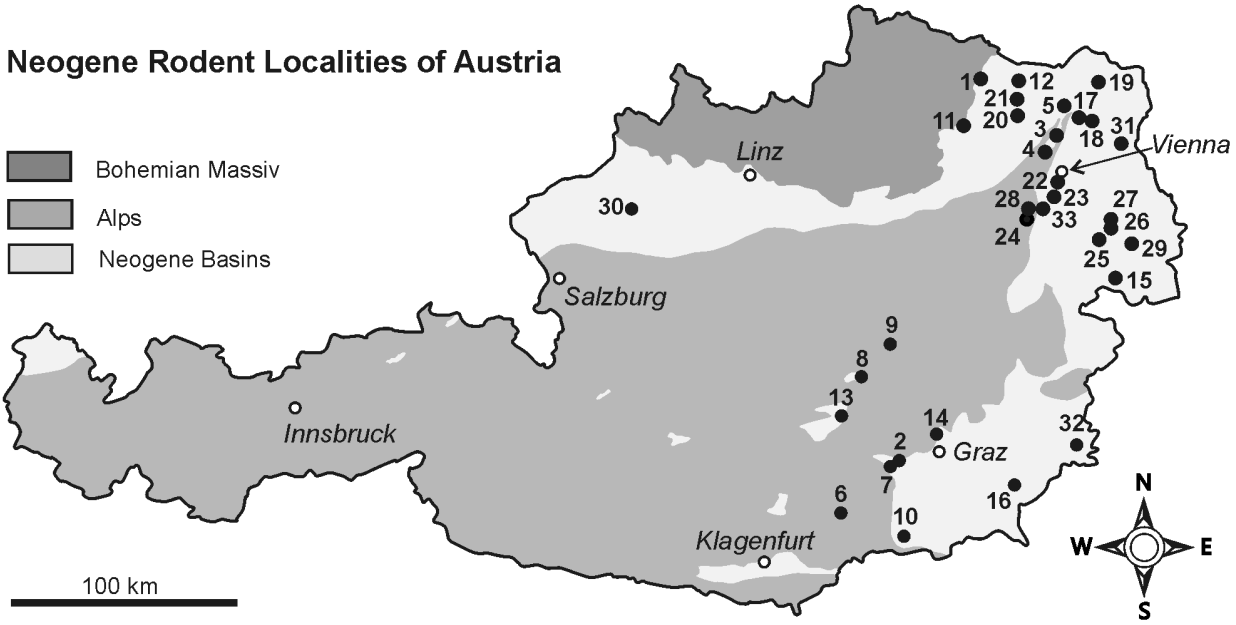

Fig. 1: Sketch map of Austria showing the topographic position of the investigated fossil sites.
1. Maigen (Mai). – **2.** Oberdorf (O3, O4). – **3.** Obergänserndorf (OG1, OG2). – **4.** Teiritzberg (T1, T2). – **5.** Niederleis (Nl). – **6.** Schönweg (Schö). – **7.** Voitsberg (V), Zangtal (Z). – **8.** Leoben-Seegraben (L-S), Münzenberg (Münz), Feisternitz (F). – **9.** Göriach (Gör). – **10.** Eibiswald (Ei), Wies (W). – **11.** Mühlbach (Mü1, Mü2). – **12.** Grund (GRU-B, GRU-F). – **13.** Apfelberg (Ap). – **14.** St. Stefan/Gratkorn (StS). – **15.** St. Margarethen (StM). – **16.** Mataschen (Ma). – **17.** Atzelsdorf (Atz). – **18.** Gaweinstal (Ga). – **19.** Bullendorf (Bu). – **20.** Mariathal (Mat). – **21.** Magersdorf (Mag). – **22.** Wienerberg (Wb). – **23.** Vösendorf (Vö), Inzersdorf (Inz), Hennersdorf (He). – **24.** Richardhof-Golfplatz (RH-A). – **25.** Götzendorf (Gö). – **26.** Stixneusiedl (Stix), Trautmannsdorf (Tr). – **27.** Zillingdorf (Zi). – **28.** Richardhof-Wald (Rh). – **29.** Neusiedl am See (NS). – **30.** Schernham (Sch). – **31.** Prottes (P). – **32.** Kohfidisch (Ko). – **33.** Eichkogel (E).

2. Oberdorf (O3, O4):

West-Styrian Basin, Styria; lignite layers O3 and O4; Köflach-Voitsberg Fm.; lower Miocene, Ottnangian, Orleanian, MN4.
Fluvial-limnic lignite deposits of the Oberdorf open pit mine with rich plant fossils, molluscs and vertebrates. The small mammal assemblages (O3, O4) were recovered from two fossil layers of the upper part of the hanging wall sequence in the eastern sub-basin of the Oberdorf pit. They indicate the early Miocene mammal Zone MN4. Magnetostratigraphic investigations show that the upper part of the hanging wall sequence is normally magnetized, while the lower part is reversed magnetized. This change is correlated with Chron C5Dn/C5Dr according to the GPTS. The age of the vertebrate assemblages O3 and O4 is around 17.5 Ma.
(Daxner – Höck 1998b, 1998c; de Bruijn 1998; Mauritsch & Scholger 1998; Steininger et al. 1998).

Rodent assemblage:
Palaeosciurus sutteri Ziegler & Fahlbusch, 1986
Spermophilinus besanus Cuenca, 1988
Ratufa sp.
Miopetaurista dehmi de Bruijn et al., 1980
Blackia miocaenica Mein, 1970
Neopetes hoeckarum (de Bruijn, 1998)
Ligerimys antiquus Fahlbusch, 1970
Keramidomys thaleri Hugueney & Mein, 1968
Glirudinus minutus Wu, 1993
Seorsumuscardinus alpinus de Bruijn, 1998
Glis minor complicatus de Bruijn, 1998
Microdyromys cf. *hildebrandti* Werner, 1994
? *Microdyromys* cf. *legidensis* Daams, 1981
Paraglirulus sp.
Glirulus lissiensis Hugueney & Mein, 1965
Peridyromys murinus (Pomel, 1853)
Bransatoglis cf. *astaracensis* (Baudelot, 1970)
Bransatoglis fugax (Hugueney, 1967)
Neocometes similis Fahlbusch, 1966
Eumyarion cf. *weinfurteri* (Schaub & Zapfe, 1953)
Democricetodon gracilis Fahlbusch, 1964
Anomalomys minor Fejfar, 1972
Anomalomys sp.

3. Obergänserndorf (OG2, OG1):

Korneuburg Basin, Lower Austria; sandpit Reitstall, section OG2 = 023/R and sandpit OG1= 023K; silt-clay; lower Miocene, upper Karpatian, Orleanian, lower MN5.
The fossil sites (OG1, OG2) are located in the middle part of the elongate Korneuburg Basin. In this region the basin was divided by the Obergänserndorf – Mollmannsdorf swell into a northern, predominantly marine part and a southern estuarine part. The analyses of small mammals, molluscs and ostracods in relation to magnetostratigraphic data date the investigated strata into the uppermost lower Miocene Karpatian stage (early MN5, Chron C5Cn3n, between 16.5 and 16.7 Ma).
(Daxner-Höck 1998a; Scholger 1998; Sovis 1998; Zorn 1998; Harzhauser et al. 2002)

Rodent assemblage:
Palaeosciurus sutteri Ziegler & Fahlbusch, 1986
Spermophilinus besanus Cuenca, 1988
Miopetaurista dehmi de Bruijn et al., 1980
Keramidomys thaleri Hugueney & Mein, 1968
Microdyromys koenigswaldi de Bruijn, 1966a
Paraglirulus werenfelsi Engesser, 1972
Glirulus diremptus (Mayr, 1979)
Peridyromys murinus (Pomel, 1853)
Miodyromys sp.
Prodryomys satus Mayr, 1979
Bransatoglis cadeoti Bulot, 1978
Eumyarion cf. *weinfurteri* (Schaub & Zapfe, 1953)
Democricetodon gracilis Fahlbusch, 1964
Democricetodon mutilus Fahlbusch, 1964
Castoridae indet.

4. Teiritzberg (T1, T2):

Korneuburg Basin, Lower Austria; artificial outcrop; sections T1= 001/D and T2= 001/z; silt-clay; lower Miocene, upper Karpatian, Orleanian, lower MN5.
The sections (T1, T2) are located in the southern, estuarine part of the Korneuburg Basin. The analyses of a wide variety of marine, brackish, fluvial and terrestrial fossils and magnetostratigraphic data point to the uppermost lower Miocene Karpatian stage (early MN5, Chron C5Cn3n, between 16.5 and 16.7 Ma).
(Daxner-Höck 1998a, 2003a; Harzhauser et al. 2002)

Rodent assemblage:
Palaeosciurus sutteri Ziegler & Fahlbusch, 1986
Spermophilinus besanus Cuenca, 1988
Miopetaurista dehmi de Bruijn et al., 1980
Keramidomys thaleri Hugueney & Mein, 1968
Microdyromys koenigswaldi de Bruijn, 1966a
Pseudodryomys aff. *ibericus* de Bruijn, 1966a
Prodryomys satus Mayr, 1979
Bransatoglis sp.
Bransatoglis cadeoti Bulot, 1978
Eumyarion cf. *weinfurteri* (Schaub & Zapfe, 1953)
Democricetodon gracilis Fahlbusch, 1964
Democricetodon mutilus Fahlbusch, 1964
Castoridae indet.

5. Niederleis (Nl):

Vienna Basin, Lower Austria; artificial outcrop; sample Nl; silt-sand; middle Miocene, Orleanian, MN5.
(Daxner-Höck 2003b)

Rodent assemblage:
Eumyarion cf. *weinfurteri* (Schaub & Zapfe, 1953)

6. Schönweg (Schö):

Near St. Andrä in the Lavant valley, Carinthia; artificial outcrop, sample Schö, clay pit Fa. Brenner, gray-green clay and gravels above thin lignite layer; lower-middle Miocene, Orleanian, MN5.
(Rabeder 1984).

Rodent assemblage:
Bransatoglis cadeoti Bulot, 1978

7. Voitsberg (V), Zangtal (Z):

West-Styrian Basin, Styria; coal mines, middle Miocene, Orleanian, MN5.
Vertebrate fossils collected over years in the course of former coal mining activities in the lignite mines Voitsberg and Zangtal. The mammal assemblages are composed of large mammals and beavers, indicating a middle Miocene age (MN5). Most likely these fossils are younger than the small mammal assemblages from the hanging wall of the Oberdorf eastern sub-basin (O3, O4).
(Hofmann 1892; Pia & Sickenberg 1934; Mottl 1970; Weber & Weiss 1983; van der Made 1998)

Rodent assemblage:
Steneofiber sp.

8. Leoben-Seegraben (L-S), Münzenberg (Münz), Feisternitz (F):

Styria, coal mines along the Mur-Mürz valley, middle Miocene, Orleanian, MN5.
Vertebrate fossils collected in the course of former coal mining activities indicate a middle Miocene age (MN5).
(Hofmann & Zdarsky 1904; Zdarsky 1909; Pia & Sickenberg 1934; Mottl 1970; Weber & Weiss 1983; van der Made 1998).

Rodent assemblage:
Steneofiber sp.

9. Göriach (Gör):

Aflenz Basin, Styria; coal mine Gör; middle Miocene, Orleanian, MN5.
Vertebrate fossils collected in the course of former coal mining activities indicate a middle Miocene age (MN5).
(Hofmann 1893; Pia & Sickenberg 1934; Mottl 1970; van der Made 1998).

Rodent assemblage:
Miopetaurista göriachensis (Hofmann, 1893)
Steneofiber sp.
Euroxenomys minutus (von Meyer, 1838)

10. Eibiswald (Ei), Wies (W):

Styrian Basin, Styria; Wies-Eibiswald coal mining district; Eibiswald Fm.; middle Miocene, Badenian, MN5.
The vertebrate faunas of the coal seam Eibiswald/Vordersdorf (base of "Middle Eibiswald beds") and coal seam Wies (base of "Upper Eibiswald beds") is dominated by large mammals and lower vertebrates, indicating a middle Miocene age, MN5. Radiometric data of the tuff layer (15.22 ± 0.17 Ma) above the Eibiswald/Vordersdorf coal seam indicate an age older than 15.22 Ma.
(Mottl 1970; van der Made 1998; Handler et al. 2006; Gross & Martin 2008).

Rodent assemblage:
Steneofiber sp.

11. Mühlbach (Mü1, Mü2):

North Alpine Foreland Basin, Lower Austria; Gaindorf Fm., artificial outcrop in Mühlbach am Manhartsberg; sandy layer in the lower part of the Badenian sections Mü1 and Mü2; middle Miocene, upper Orleanian, uppermost MN5.
Deep marine sediments with a mixture of fossils from terrestrial and marine environments. The fossils are placed into the lower Badenian, (around 15.1 Ma; Rögl & Spezzaferri 2003) and uppermost part of MN5 according to rodents. The mammal assemblages of Mühlbach and Grund are correlative to some faunas of the Alpine Foreland Basin in Germany positioned immediately below the "Brock" horizon, indicating the Ries event (14.88 ± 0.11 Ma; Abdul Aziz et al. 2007).
(Daxner-Höck 2003a, 2003b; Harzhauser et al. 2003a; Roetzel 2003).

Rodent assemblage:
Spermophilinus besanus Cuenca, 1988
Prodryomys satus Mayr, 1979
Eumyarion sp.
Cricetodon meini Freudenthal, 1963
Megacricetodon minor (Lartet, 1851)
Democricetodon gracilis Fahlbusch, 1964
Democricetodon mutilus Fahlbusch, 1964

12. Grund (GRU-B, GRU-F):

North Alpine Foreland Basin, Lower Austria; type area of the Grund Fm., artificial outcrops north of Hollabrunn; sections GRU-B, GRU-F; silt-sand; lower Badenian; middle Miocene, upper Orleanian, uppermost MN5.
From fine clastic sediments of the marine Grund Fm. a mixture of fossils was recovered; they represent terrestrial and marine environments. The fauna spans nannoplankton zone NN5. In the higher part of the section, *Praeorbulina glomerosa circularis* co-occurs with *Orbulina suturalis,* indicating planktonic foraminiferal zone M6. The normal magnetostratigraphic data are interpreted as Chron C5Bn2n. The small mammal assemblage corresponds to the Mühlbach assemblage, which indicates the uppermost part of mammal zone MN5. According to these data the age is around 15.1 Ma.
(Coric et al. 2004; Daxner-Höck 2003b; Daxner-Höck et al. 2004; Scholger & Stingl 2004).

Rodent assemblage:
Cricetodon meini Freudenthal, 1963
Democricetodon mutilus Fahlbusch, 1964

13. Apfelberg (Ap):

Fohnsdorf Basin, Styria; clay pit Apfelberg near Knittelfeld; sample Ap, clay-silt, Fohnsdorf Fm.; middle Miocene, middle/upper Badenium, Astaracian, MN6.
Sediments of a distal alluvial floodplain and a lacustrine fan delta. The rodents indicate a middle Miocene age, most likely MN6 according to the evolutionary stage of the hamsters.
(Strauss et al. 2003).

Rodent assemblage:
Dryomyinae indet.
Eumyarion bifidus (Fahlbusch, 1964)
Eumyarion medius (Lartet, 1851)
Democricetodon crassus Freudenthal, 1969

14. St. Stefan/Gratkorn (StS):

Gratkorn Basin, Styria; clay pit St. Stefan about 700 m east of the village Gratkorn; sample StS; paleosol; middle Miocene, upper Sarmatian, Astaracian, MN7+8.
The gastropod and vertebrate assemblages suggest an alluvial fan/braided river landscape. The terrestrial gastropods and mammals are indicative for the upper Sarmatian and the Astaracian (MN7+8), respectively. A correlation with the beginning of the upper Sarmatian (upper *Ervilia* Zone/Chron C5An.1n/around 12 Ma) was postulated by Harzhauser et al. (2008) based on geological data and on an integrated stratigraphy of the Gratkorn Basin.
(Daxner-Höck 2010; Gross et al. 2011; Prieto et al. 2010, 2014)

Rodent assemblage:
Spermophilinus bredai (Meyer, 1848)
Forsythia gaudryi (Gaillard, 1899)
Albanensia albanensis (Major, 1893)
Blackia sp.
Keramidomys sp.
Muscardinus aff. *sansaniensis* (Lartet, 1851)
Miodyromys sp.
Eumyarion sp.
"Cricetodon" fandli Prieto, Böhme & Gross, 2010
Megacricetodon minutus Daxner, 1967
Democricetodon sp. nov. Kälin & Engesser, 2001
Euroxenomys minutus (von Meyer, 1838)

15. St. Margarethen (StM):

Eisenstadt-Sopron Basin, Burgenland; sand pit "Altes Zollhaus" southeast of St. Margarethen; sample StM, silt-sand; middle Miocene, Sarmatian, Astaracian, MN7+8.
Coastal marine sandy silt with potamidid and batillariid gastropods and adjacent deltaplain wetlands with lymnaeid gastropods. The vertebrate remains appear scattered and disarticulated in the sediment. The mollusc and foraminifer assemblages indicate a late Sarmatian age (*Sarmatimactra* Zone/*Prosononion granosum* Zone/around 11.8 Ma).
(Harzhauser & Kowalke 2002; Latal et al. 2004).

Rodent assemblage:
Glirulus lissiensis Hugueney & Mein, 1965
Megacricetodon minutus Daxner, 1967

16. Mataschen (Ma):

Styrian Basin, Styria, clay pit Mataschen southwest of Fehring; sample Ma; clay-silt; Feldbach Fm., Eisengraben and Sieglegg members; upper Miocene, lower Pannonian, upper Astaracian, uppermost MN7+8.
Limnic deltaic sediments with mollusc and vertebrate remains. Geological data and the mollusc assemblage indicate an early Pannonian age (*Mytilopsis ornithopsis* Zone, Pannonian "zone B"). The rodent *Megacricetodon minutus* ranging from MN7+8 to MN9 is in agreement with the correlation based on molluscs. The estimated age is around 11.5 Ma.
(Daxner-Höck 2004c; Gross 2004; Harzhauser 2004).

Rodent assemblage:
Megacricetodon minutus Daxner, 1967
Chalicomys jaegeri Kaup, 1832
Euroxenomys minutus (von Meyer, 1838)

17. Atzelsdorf (Atz):

Northern Vienna Basin, Lower Austria; former gravel pit northwest of the village Atzelsdorf; sample Atz; silt, sand, gravel of the Hollabrunn-Mistelbach Fm.; lower Pannonian "zone C", upper Miocene, lower Vallesian, MN9.
The localities Atzelsdorf and Gaweinstal are situated in the Palaeo-Danube delta, where during the early Pannonian lowstand of Lake Pannon (in "zone C"/*Mytilopsis hoernesi* Zone/11.2 to 11.1 Ma) freshwater ecosystems developed in the delta plain, as evidenced in the lower part of the Atzelsdorf section (vertebrate layer). During a transgressive phase (later in "zone C"/11.1-11.0 Ma) the delta was flooded and the forested wetland environments disappeared.
The biostratigraphic correlation of the Atzelsdorf assemblage with the lower Pannonian "zone C" and the lowermost Vallesian (MN9) is indicated by the occurrences of the bivalve *Mytilopsis hoernesi* and the three-toed horse *Hippotherium* (FOD).
(Harzhauser et al. 2003b, 2004; Harzhauser 2009; Daxner-Höck & Bernor 2009; Woodburne 2009).

Rodent assemblage:
Steneofiber sp.
Euroxenomys minutus (von Meyer, 1838)

18. Gaweinstal (Ga):

Northern Vienna Basin, Lower Austria; artificial outcrop along a road construction southeast of Atzelsdorf; sample Ga; silt-sand of the Hollabrunn-Mistelbach Fm.; lower Pannonian "zone C", upper Miocene, lower Vallesian, MN9.
The fluvial deposit of Gaweinstal yielded small mammals of Zone MN9 and late Miocene molluscs of the *Mytilopsis hoernesi* Zone ("zone" C around 11.2-11.1 Ma), which are intermixed with reworked molluscs of older strata.
(Harzhauser et al. 2011)

Rodent assemblage:
Spermophilinus bredai (Meyer, 1848)
Hispanomys cf. *bijugatus* Mein & Freudenthal, 1971
Megacricetodon minutus Daxner, 1967
Democricetodon sp.
Anomalomys cf. *rudabanyensis* Kordos, 1989
Euroxenomys minutus (von Meyer, 1838)

19. Bullendorf (Bu):

Northern Vienna Basin, Lower Austria; old gravel pit 7 km northeast of Mistelbach; sample Bu; silt-sand layer with molluscs and vertebrate remains, Hollabrunn-Mistelbach Fm.; lower Pannonian "zone C", upper Miocene, lower Vallesian, MN9.
The locality is situated in the delta plain of the Mistelbach sub-basin, where freshwater ecosystems developed during the early Pannonian lowstand of Lake Pannon in "zone C" (11.2-11.1 Ma). The small mammal assemblage corresponds to the lower Vallesian MN9. The accompanying mollusc fauna is mixed with reworked molluscs of older strata.
(Daxner-Höck 1996a; Harzhauser et al. 2004; Nehyba & Roetzel 2004).

Rodent assemblage:
Neopetes hoeckarum (de Bruijn, 1998)
Hispanomys cf. *bijugatus* Mein & Freudenthal, 1971b
Megacricetodon minutus Daxner, 1967
Anomalomys cf. *rudabanyensis* Kordos, 1989

20. Mariathal (Mat):

North Alpine Foreland Basin, Lower Austria; sand pit east of Hollabrunn; section Mat, gray silt-layer above gravels of the Hollabrunn-Mistelbach Fm.; lower Pannonian "zone C", upper Miocene, lower Vallesian, MN9.
The locality Mariathal (Mat) is well known because of the occurrence of the primate *Dryopithecus* (Thenius 1982). The biostratigraphic correlation with the lowermost Vallesian (MN9) and the lower Pannonian "zone C" is indicated by the horse *Hippotherium* and the bivalve *Mytilopsis ornithopsis*, respectively. This correlates with an absolute age of around 11.2 Ma.
(Nehyba & Roetzel 2004; Daxner-Höck & Höck 2009; Woodburne 2009).

Rodent assemblage:
Muscardinus hispanicus de Bruijn, 1966b

21. Magersdorf (Mag):

North Alpine Foreland Basin, Lower Austria; private sand pit of W. Andrä near Hollabrunn; section Mat, sand-silt, Hollabrunn-Mistelbach Fm.; lower Pannonian, upper Miocene, lower Vallesian, MN9.
(Daxner-Höck 2004b).

Rodent assemblage:
Albanensia grimmi (Black, 1966)

22. Wienerberg (Wb):

Southern Vienna Basin, Lower Austria; old outcrop south of Vienna; upper Miocene (MN9).

Rodent assemblage:
Chalicomys jaegeri Kaup, 1832

23. Vösendorf (Vö), Inzersdorf (Inz), Hennersdorf (He):

Southern Vienna Basin, Lower Austria; clay pits; samples Vö, Inz, He; clay with silt layers of Lake Pannon; Bzenek Fm., upper Miocene, middle Pannonian "zone E", lower Vallesian, MN9.
The vertebrate fossils stem from the clay pits of Vösendorf, Inzersdorf and Hennersdorf about 10 km south of Vienna. The blue-green marls and clays are widespread in the Vienna Basin during the last high-stand of Lake Pannon in the middle Pannonian "zone E". The biostratigraphic correlation of the fossils with the lower Vallesian (MN9) is indicated by the horse *Hippotherium*, and with the middle Pannonian "zone E" by the molluscs *Congeria subglobosa* and *Melanopsis vindobonensis*. The magnetostratigraphic dating of the section Hennersdorf allowed its correlation with Chron C5n (Magyar et al. 1999b). The biostratigraphic, lithostratigraphic and magnetostratigraphic data correlate with an absolute age of around 10.5 Ma.
(Papp 1951; Papp & Thenius 1954; Harzhauser et al. 2004; Harzhauser & Mandic 2004).

Rodent assemblage:
Megacricetodon minutus Daxner, 1967 (Vö, Inz)
Kowalskia sp. A (Vö, He)
Anomalomys cf. *rudabanyensis* Kordos, 1989 (Vö)
Euroxenomys minutus (von Meyer, 1838) (Vö)

24. Richardhof-Golfplatz (RH-A):

Southern Vienna Basin, Lower Austria; artificial outcrop northwest of Gumpoldskirchen, section RH-A/2-11; silt-clay and layers of marly freshwater limestones; lowermost part of Cáry Fm.; upper Miocene, lower upper Pannonian "zone F", lower Vallesian, MN9.
A rich smaller vertebrate- and gastropod fauna was excavated from three fossil layers (RH-A/2, RH-A/7, RH-A/11) of a 7-m-thick sediment sequence. The fauna reveals a swampy freshwater lake environment that developed when the margin of Lake Pannon had retreated from the western part of the Vienna Basin. The gastropod *Prososthenia specularis* marks "zone F". The biostratigraphic correlation with the lower Vallesian (MN9) is indicated by the rodent association of *Microtocricetus molassicus*, *Albanensia grimmi*, *Pliopetaurista kollmanni*, *Myoglis ucrainicus*, *Muscardinus vallesiensis* and *Muscardinus hispanicus*. The advanced MN9 fauna of Richardhof-Golfplatz is intermediate between Vösendorf and Götzendorf. The biostratigraphic data correlate with an absolute age of around 10.3 Ma.
(Harzhauser et al. 2004; Daxner-Höck & Höck 2009; Harzhauser & Tempfer 2004; Harzhauser & Binder 2004; Ziegler 2006).

Rodent assemblage:
Spermophilinus bredai (Meyer, 1848)
Blackia miocaenica Mein, 1970
Albanensia grimmi (Black, 1966)
Neopetes hoeckarum (de Bruijn, 1998)
Pliopetaurista kollmanni Daxner-Höck, 2004b
Keramidomys ermannorum Daxner-Höck & Höck, 2009
Keramidomys cf. *pertesunatoi* Hartenberger, 1966
Eomyops catalaunicus (Hartenberger, 1966)
Muscardinus vallesiensis Hartenberger, 1966
Muscardinus hispanicus de Bruijn, 1966b
Glirinae gen. et spec. indet.
Myoglis ucrainicus Nesin & Kowalski, 1997
Glis minor minor Kowalski, 1963
Paraglirulus werenfelsi Engesser, 1972
Glirulus lissiensis Hugueney & Mein, 1965
Graphiurops austriacus Bachmayer & Wilson, 1980
Eumyarion leemanni (Hartenberger, 1965)
Megacricetodon minutus Daxner, 1967
Democricetodon sp.
Kowalskia sp. A
Microtocricetus molassicus Fahlbusch & Mayr, 1975
Anomalomys rudabanyensis Kordos, 1989
Eozapus intermedius (Bachmayer & Wilson, 1970)
Euroxenomys minutus (von Meyer, 1838)

25. Götzendorf (Gö-1, Gö-2):

Southern Vienna Basin; Lower Austria; sand pit Götzendorf-Sandberg near Mannersdorf an der Leitha; sections Gö-1, Gö-2; silt-sand of the lignite-bearing Cáry Fm.; upper Miocene, upper Pannonian "zone F", lower Vallesian, MN9.
The sections (Gö-1 and Gö-2) display floodplain deposits. The mollusc fauna indicates a correlation with the *Mytilopsis neumayri/Mytilopsis zahalkai* Zone ("zone F) and the lower upper Pannonian. The rodent assemblage is almost identical with Richardhof-Golfplatz and indicates the uppermost part of MN9. Normal magnetisation of the fossiliferous silt with a low signal of reversed magnetisation towards the underlying clay correlates with the upper part of Chron C5n and with an absolute age of around 10 Ma.
(Bernor et al. 1988, 1993; Daxner-Höck 2001; Daxner-Höck & Höck 2009; Harzhauser et al. 2004; Rögl et al. 1993; Rögl & Daxner-Höck 1996; Zapfe 1989).

Rodent assemblage:
Spermophilinus bredai (Meyer, 1848)
Miopetaurista sp.
Blackia miocaenica Mein, 1970
Albanensia grimmi (Black, 1966)
Neopetes hoeckarum (de Bruijn, 1998)
Pliopetaurista kollmanni Daxner-Höck, 2004b
Eomyops catalaunicus (Hartenberger, 1966)
Muscardinus vallesiensis Hartenberger, 1966
Muscardinus hispanicus de Bruijn, 1966b
Glirinae gen. et spec. indet.
Myoglis ucrainicus Nesin & Kowalski, 1997
Paraglirulus werenfelsi Engesser, 1972
Eumyarion leemanni (Hartenberger, 1965)
Democricetodon sp.
Kowalskia sp. A
Microtocricetus molassicus Fahlbusch & Mayr, 1975
Anomalomys rudabanyensis Kordos, 1989
Eozapus intermedius (Bachmayer & Wilson, 1970)
Chalicomys jaegeri Kaup, 1832
Euroxenomys minutus (von Meyer, 1838)

26. Stixneusiedl (Stix), Trautmannsdorf (T):

Southern Vienna Basin, Lower Austria; sand pit Stixneusiedl, and sample Trautmannsdorf (CFT8:18.10-18.20 m), Gem. Trautmannsdorf near Bruck a.d. Leitha; silt-sand of the Cáry Fm.; upper Miocene, upper Pannonian "zone F", lower Vallesian, MN9.
The section Stixneusiedl consists of 20 m of clay, silt and sand and rare gravel with some intercalated lenses containing molluscs and isolated teeth of small mammals. The sedimentary succession points to repeated shifts from fluvial settings to lake environments. Biostratigraphically the small rodent fauna evidences an early Vallesian (MN9) age, similar to Götzendorf.
(Daxner-Höck 1996a; Harzhauser et al. 2004; Rögl et al. 1993).

Rodent assemblage:
Keramidomys ermannorum Daxner-Höck & Höck, 2009
Eomyops catalaunicus (Hartenberger, 1966)
Kowalskia sp. A

27. Zillingdorf (Zi):

Southern Vienna Basin, Lower Austria; sample Zillingdorf (ZL3: 21.30-21.45 m); silt-sand of the lignite-bearing Cáry Fm.; upper Miocene, Vallesian, MN9.
(Harzhauser et al. 2004; Rögl et al. 1993)

Rodent assemblage:
Kowalskia sp. A

28. Richardhof-Wald (Rh):

Southern Vienna Basin, Lower Austria; artificial outcrop northwest of Gumpoldskirchen, section Rh-1-5; silt-clay of the Gbely Fm.; upper Miocene, lowermost upper Vallesian, MN10.
The section (Rh) comprises marly sandy silt and silty clay with three main fossil layers (Rh-1, Rh-3, Rh-5) yielding a rich small mammal fauna. The sediments represent a swampy freshwater lake that developed along the easternmost slopes of the Alps in the late Pannonian. The biostratigraphic correlation with the upper Vallesian (lower part of MN10) is indicated by the FOD of the murid *Progonomys hispanicus* and by LOD of the rodents *Albanensia*, *Muscardinus vallesiensis, Eumyarion* and *Microtocricetus*. *Pliopetaurista kollmanni*, *Paraglirulus werenfelsi* and *Muscardinus hispanicus* had their LAD. The estimated age is around 9.7 Ma.
(Daxner-Höck 1996a, 2001; Daxner-Höck & Höck 2009; Ziegler 2006).

Rodent assemblage:
Spermophilinus bredai (Meyer, 1848)
Blackia miocaenica Mein, 1970
Albanensia grimmi (Black, 1966)
Neopetes hoeckarum (de Bruijn, 1998)
Pliopetaurista kollmanni Daxner-Höck, 2004b
Keramidomys ermannorum Daxner-Höck & Höck, 2009
Eomyops catalaunicus (Hartenberger, 1966)
Muscardinus hispanicus de Bruijn, 1966b
Muscardinus vallesiensis Hartenberger, 1966
Glirinae gen. et spec. indet.
Myoglis ucrainicus Nesin & Kowalski, 1997
Glis minor minor Kowalski, 1963
Paraglirulus werenfelsi Engesser, 1972
Glirulus lissiensis Hugueney & Mein, 1965
Graphiurops austriacus Bachmayer & Wilson, 1980
Eumyarion leemanni (Hartenberger, 1965)
Democricetodon sp.
Kowalskia sp. B
Collimys primus Daxner-Höck, 1972b
Microtocricetus molassicus Fahlbusch & Mayr, 1975
Anomalomys rudabanyensis Kordos, 1989
Progonomys hispanicus Michaux, 1971

29. Neusiedl am See (NS):

Vienna Basin, Burgenland; sand pit "Lehmgstetten" east of Neusiedl am See; section NS; silt-sand, gravels of the Gbely Fm.; upper Miocene, upper Pannonian, upper Vallesian, MN10.
The sandpit displays a cross bedded sand and gravel sequence. The vertebrate remains and reworked molluscs appear scattered in a 10-15 cm sand layer. The biostratigraphic correlation with the upper Vallesian (lower part of MN10) is indicated by the first occurrence of the murid *Progonomys hispanicus* and the last occurrence of *Microtocricetus*. Biostratigraphically the small assemblages corresponds to Richardhof-Wald (upper Miocene, upper Pannonian, upper Vallesian, MN10). The estimated age is around 9.7 Ma.
(Rögl et al. 1993; Daxner-Höck 1996a).

Rodent assemblage:
Kowalskia sp. B
Microtocricetus molassicus Fahlbusch & Mayr, 1975
Progonomys hispanicus Michaux, 1971

30. Schernham (Sch):

North Alpine Foreland Basin, Upper Austria; sand and gravel pit Fekter, 3 km southwest of Haag am Hausruck; Hausruck Schotter; fossil horizon Sch; upper Miocene, upper Pannonian, upper Vallesian, MN10.
Above lignite-bearing deposits, the section comprises gravels and conglomerates with intercalated sand layers and gray, yellow and reddish lenses. One 20 cm sand layer yielded a very rich vertebrate fauna comprising smaller and large mammals and many different lower vertebrates. The sediment represents a fluvial environment. The biostratigraphic correlation with the upper Vallesian (upper part of MN10) is indicated by the FAD of the flying squirrel *Pliopetaurista bressana* and the dormice *Muscardinus pliocaenicus austriacus* and *Paraglirulus schultzi.* Furthermore, there are FODs of *Apodemus lugdunensis*, *Pliopetes*, *Prospalax*, *Pseudocollimys*, and the LOD of *Myoglis.* Some advanced small mammals from Schernham indicate close relations or identity with lower Turolian species. The estimated age is around 9 Ma.
(Daxner-Höck 2004a, 2004b; Daxner-Höck & Höck 2009; Ziegler & Daxner-Höck 2005)

Rodent assemblage:
Spermophilinus aff. *bredai* (Meyer, 1848)
Miopetaurista sp.
Blackia miocaenica Mein, 1970
Neopetes hoeckarum (de Bruijn, 1998)
Pliopetes cf. *hungaricus* Kretzoi, 1959
Sciuridae indet.
Pliopetaurista bressana Mein, 1970
Keramidomys ermannorum Daxner-Höck & Höck, 2009
Eomyops catalaunicus (Hartenberger, 1966)
Muscardinus pliocaenicus austriacus Bachmayer & Wilson, 1970
Myoglis ucrainicus Nesin & Kowalski, 1997
Paraglirulus schultzi Daxner-Höck & Höck, 2009
Glirulus lissiensis Hugueney & Mein, 1965
Graphiurops austriacus Bachmayer & Wilson, 1980
Kowalskia sp. C
Pseudocollimys steiningeri Daxner-Höck, 2004a
Prospalax aff. *petteri* Bachmayer & Wilson, 1970
Apodemus lugdunensis (Schaub, 1938)
Eozapus intermedius (Bachmayer & Wilson, 1970)
Chalicomys jaegeri Kaup, 1832
Euroxenomys minutus (von Meyer, 1838)

31. Prottes (P):

Northern Vienna Basin, Lower Austria; sand-gravel pit 4 km southeast of Matzen, upper part of the Gbely Fm. (Gelbe Serie); fossil horizon P, upper Miocene, lower Turolian, MN11 ?
Fluvial sands and gravels display scattered remains of testudines, large mammals and a beaver.
(Bachmayer & Mlynarski 1985; Harzhauser et al. 2004)

Rodent assemblage:
Chalicomys jaegeri Kaup, 1832

32. Kohfidisch (Ko):

Pannonian Basin, Burgenland; karstic cave and fissure system of Palaeozoic limestones near Kirchfidisch; clay; fissures (Ko-II-VI, Cm) and the cave (Ko-I); upper Miocene, upper Pannonian, lower Turolian, MN11.

The locality displays one of the richest vertebrate faunas of Europe. The biostratigraphic correlation with the Lower Turolian (MN11) is indicated by the FOD of *Epimeriones austriacus*, *Kowalskia fahlbuschi*, *Vasseuromys pannonicus* and *Hystrix parvae.* Concerning composition and first occurrences of taxa as well as the relative specimen-abundances, Kohfidisch and Eichkogel are very similar, almost identical. Though Kohfidisch is most likely somewhat older than Eichkogel, the stratigraphic correlation is lower Turolian (MN11), not upper Vallesian (MN10) as previously assumed (de Bruijn et al. 1992). The estimated age is around 8.5 Ma. (Bachmayer & Zapfe 1969; Bachmayer & Wilson 1985; Daxner-Höck & Höck 2009; Wöger 2011)

Rodent assemblage:
Spermophilinus aff. *bredai* (Meyer, 1848)
Miopetaurista sp.
Pliopetes cf. *hungaricus* Kretzoi, 1959
Pliopetaurista bressana Mein, 1970
Keramidomys ermannorum Daxner-Höck & Höck, 2009
Eomyops catalaunicus (Hartenberger, 1966)
Muscardinus pliocaenicus austriacus Bachmayer & Wilson, 1970
Glis minor minor Kowalski, 1963
Glirulus lissiensis Hugueney & Mein, 1965
Graphiurops austriacus Bachmayer & Wilson, 1980
Myomimus dehmi (de Bruijn, 1966b)
Vasseuromys pannonicus (Kretzoi, 1980)
Kowalskia fahlbuschi Bachmayer & Wilson, 1970
Kowalskia skofleki (Kordos, 1987)
Collimys primus Daxner-Höck,1972b
Epimeriones austriacus Daxner-Höck, 1972a
Ischymomys sp.
Prospalax petteri Bachmayer & Wilson, 1970
Progonomys woelferi Bachmayer & Wilson, 1970
Apodemus lugdunensis (Schaub, 1938)
Eozapus intermedius (Bachmayer & Wilson, 1970)
Hystrix parvae (Kretzoi, 1951)
Chalicomys jaegeri Kaup, 1832

33. Eichkogel (E):

Vienna Basin, Lower Austria; artificial outcrop south of Mödling; section E; upper Gbely Fm., "Gelbe Serie", marly silt below freshwater limestone on the top of Eichkogel; upper Miocene, upper Pannonian "zone H", lower Turolian, MN11.
Immediately below the freshwater limestone (10-12m) forming the top of Eichkogel, the section comprises a few meters of marly silt with an extremely high concentration of terrestrial and aquatic gastropods and smaller vertebrates. Lithology and fossils indicate a swampy environment around a freshwater lake. The small mammal and gastropod assemblages from Eichkogel indicate the upper Pannonian "zone H" and the lower Turolian Mammal Zone MN11. The estimated age is around 8.5-8.0 Ma.

The underlying unit (sand, marl, silt and limestone) is also termed "Eichkogel" in the literature, but the mollusc and large mammal assemblages of this Eichkogel sandpit unit indicate the middle Pannonian "zone E" and the Vallesian MN9. From this place no rodents are available.
(Daxner-Höck 1980; Daxner-Höck & Höck 2009; Harzhauser et al. 2004; Harzhauser & Binder 2004; Ziegler 2006).

Rodent assemblage **Eichkogel-top** (E):
Spermophilinus aff. *bredai* (Meyer, 1848)
Blackia miocaenica Mein, 1970
Neopetes hoeckarum (de Bruijn, 1998)
Pliopetes cf. *hungaricus* Kretzoi, 1959
Pliopetaurista bressana Mein, 1970
Keramidomys ermannorum Daxner-Höck & Höck, 2009
Muscardinus pliocaenicus austriacus Bachmayer & Wilson, 1970
Glirulus lissiensis Hugueney & Mein, 1965
Graphiurops austriacus Bachmayer & Wilson, 1980
Myomimus dehmi (de Bruijn, 1966b)
Vasseuromys pannonicus (Kretzoi, 1980)
Kowalskia skofleki (Kordos, 1987)
Collimys primus Daxner-Höck,1972b
Epimeriones austriacus Daxner-Höck, 1972a
Anomalomys gernoti Daxner-Höck, 1980
Prospalax petteri Bachmayer & Wilson, 1970
Progonomys woelferi Bachmayer & Wilson, 1970
Apodemus lugdunensis (Schaub, 1938)
Eozapus intermedius (Bachmayer & Wilson, 1970)
Chalicomys jaegeri Kaup, 1832
Euroxenomys minutus (von Meyer, 1838)

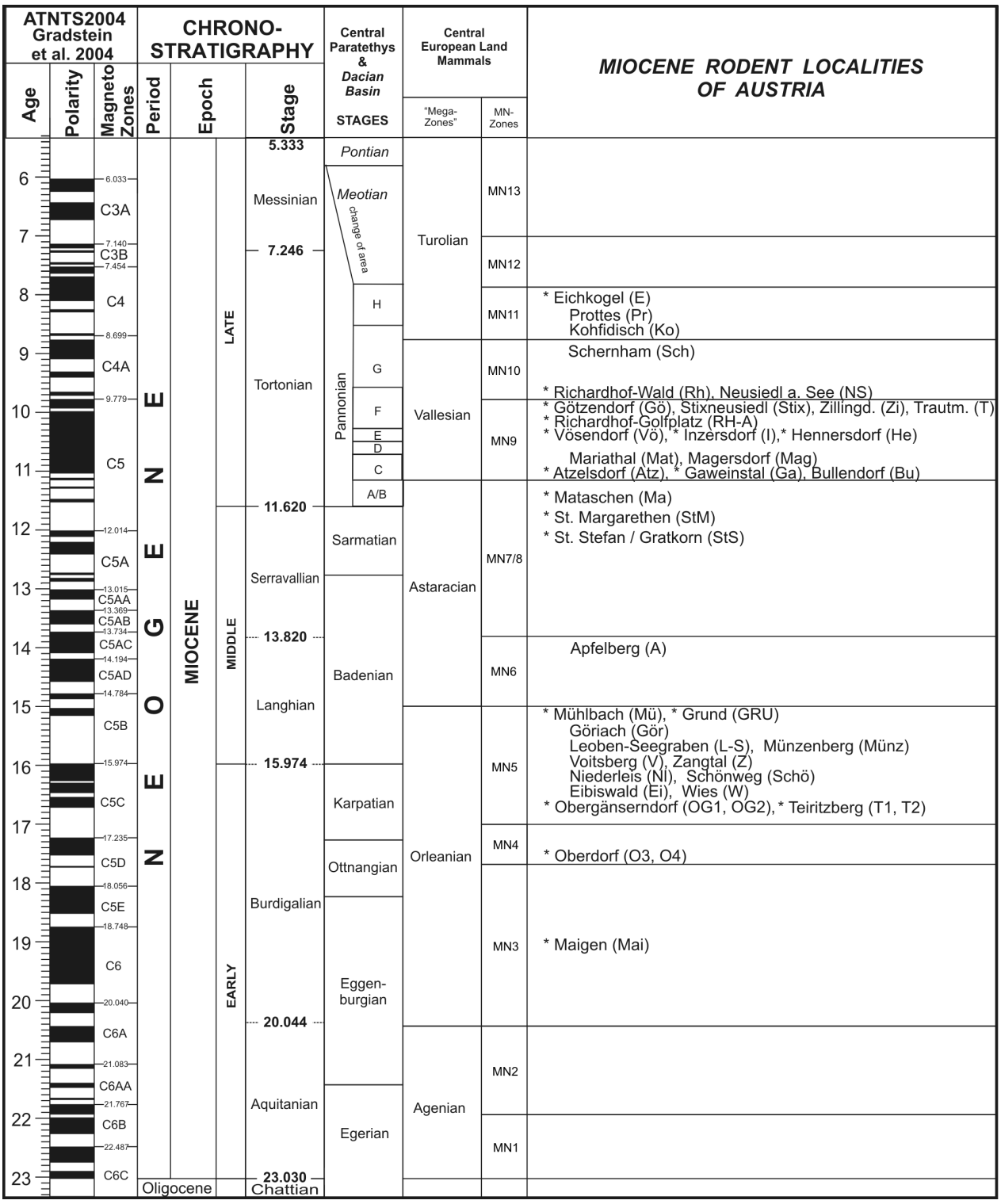

Fig. 2: Stratigraphy of the Miocene with stratigraphic position of the fossil sites. Modified from Gradstein et al. (2004, 2012), Hilgen et al. (2012), Piller et al. (2007) and Steininger (1999). *marks correlation tie points.

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