

Switzerland

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Introduction

The first fossil insectivore remain from Switzerland mentioned in the scientific literature, was probably a talpid humerus from the locality of Vermes 2. The specimen was found around 1850 by the Swiss geologist J.B. Greppin, who sent it to H. von Meyer in Frankfurt. This great palaeontologist made a drawing of the humerus and mentioned it in a communication to Professor Bronn (1853). H. von Meyer's drawing was published in 1887 (plate 4, fig. 14) by M. Schlosser, who provided it with the name "*Talpa telluris* Pomel". H. von Meyer also received two mandible fragments of an erinaceid from J.B. Greppin, also found in Vermes 2. He mistakenly identified them as "*Didelphys (Peratherium) Blainvillei* Chr.". Under this name these specimens were mentioned in two publications of J.B. Greppin (1867, 1870). M. Schlosser identified this erinaceid as *Parasorex socialis* and figured the two mandible fragments in 1887 (plate 2, figs 47 and 70).

In his survey of the mammals of the Swiss Molasse H.G. Stehlin (1914) gave faunal lists of all localities known at that time. In this compilation numerous findings of insectivores were mentioned for the first time. Joh. Hürzeler (1939) gave more detailed information and descriptions of insectivore remains in a paper about some mammal faunas of the Upper Freshwater Molasse of north-western Switzerland. In this publication insectivores from Anwil, Zeglingen, and Vermes 2 were described.

A milestone in insectivore research is certainly Joh. Hürzeler's revision of the family of the Dimylidae (1944), probably the first monograph of a fossil insectivore family in whole Europe. In this very clear and extraordinarily well-illustrated paper Hürzeler described three new genera and species. Besides fossils from France and Germany numerous findings from Switzerland were published.

The great Swiss Palaeontologist Hans Georg Stehlin, who during his life had worked on many mammal orders, mainly ungulates and primates, shortly before his death published a paper on the phylogeny of the soricids (1940).

In 1968, the Basel Natural History Museum for the first time carried out a large excavation for recovering fossil mammals. It was decided to excavate in Anwil (Canton of

Baselland), because since 1906 mammal remains had frequently come to light there during construction work. During six months an area of 100 m² was excavated by hand, and ten tons of sediment were screen-washed for recovering small mammals. The excavation yielded about 6500 mammal remains, mainly small mammals, which subsequently were described monographically (Engesser, 1972). With 74 mammal species the Anwil fauna is by far the most diverse Neogene mammal fauna of Switzerland, containing 15 insectivores, of which three genera and species were new.

Subsequently, Engesser published a number of papers on Neogene insectivores, in which also finds from Swiss localities were described; a revision of the European Heterosoricinae (1975), a study of the milk dentition of the Dimylidae (1976), and a comparison of Miocene insectivores and rodents from North America and Europe (1979). In a study of the Late Oligocene / Early Miocene faunas of Boudry (Canton of Neuchâtel) some important insectivore remains were described (Mojon *et al.*, 1985). Bolliger (1992a) described in his thesis about Miocene small mammals from eastern Switzerland numerous insectivores from many localities, most of them new.

For a long time no Pliocene mammals were known from Switzerland, because the sediments of that period were mostly eroded. In 1990, in the tunnel of Vue des Alpes (Canton of Neuchâtel), a fissure filling was discovered containing small mammals of Middle Pliocene age. This fauna contains eight soricids and one talpid, showing affinities with coeval faunas from eastern Europe (Bolliger *et al.*, 1993).

Between 1978 and 1999 various projects of the Swiss National Science Foundation were carried out with the aim to establish a biozonation of the Swiss Molasse based on mammals. Within this project many new mammal localities were found and many tons of sediments were washed. In this way, extensive material of Oligocene and Miocene small mammals was collected, including many insectivores, most of them thus far undescribed.

From 1990-1994 the Basel Natural History Museum carried out excavations at the Nebelbergweg near Nunningen (Canton of Solothurn). Four tons of sediments were screen-washed, yielding over nine hundred small mammal teeth of 33 species, eight of which insectivores (Kälin & Engesser, 2001). The fauna from Nebelbergweg is of special importance, since it is the youngest of the Swiss Molasse.

The local mammal zones used in the following for characterizing the biostratigraphic position of the faunas refer to the biozonation for Switzerland and Savoy based on mammals of Engesser & Mödden (1997) and Bolliger (1997). The coordinates given for each locality refer to the Swiss federal map (Landeskarte der Schweiz) 1 : 25'000.

The acronyms used in this article are:

CDKS	Collection D. Kälin (CH-3314 Schalunen)
CEHS	Collection E. Heizmann (Stuttgart, Germany)
IGS	Institut de Géologie Strasbourg, France
MGL	Musée géologique Lausanne
MW	Museum Winterthur
NMB	Naturhistorisches Museum Basel
PIMUZ	Paläontologisches Institut und Museum Zürich.

Insectivore faunas in the Neogene of Switzerland

MN 1

Boudry 1

Location – South east of the village Boudry (Canton of Neuchâtel) on the southern bank of Areuse River, in the Boudry-Viaduc section [coordinates 554.560/199.980 (map sheet CH/1164 Neuchâtel)].

Stratigraphy – Zone of Fornant 11 of the mammal zonation of Switzerland and Savoy.

Literature – Hürzeler (1944), Mojon *et al.* (1985).

Insectivores – Plesiosoricidae: *Plesiosorex* sp. Talpidae: Talpidae gen. et sp. indet. Dimylidae: *Dimylodes stehlini* Hürzeler, 1944 (type locality). Soricidae: Heterosoricinae gen. et sp. indet.

Taxonomic descriptions – Hürzeler (1944), Mojon *et al.* (1985).

Storage of material – NMB.

Remarks – Boudry 1 was discovered by Joh. Hürzeler in 1934.

Messen

Location – Freshwater deposits with alternating grey limestones and marls south of the village of Messen (Canton of Solothurn) [coordinates 600.950 / 214.220 (map sheet CH/1146 Lyss)].

Stratigraphy – Zone of Boudry 2, Lower Aquitanian.

Literature – Rigassi (1957), Engesser (1976).

Insectivores – Plesiosoricidae: *Plesiosorex* sp. Talpidae: *Myxomygale* sp. Dimylidae: *Pseudocordylodon rigassii* Engesser, 1976 (type locality). Soricidae: *Oligosorex* sp., ?*Heterosorex*.

Taxonomic descriptions – Engesser (1976) described *Pseudocordylodon rigassii* and gave a faunal list of the remainder of the fauna. The small soricid was listed there as *Crocidosorex* sp. Van den Hoek Ostende (2001) reserved the genus name *Crocidosorex* for its type species, *C. piveteaui*, and reinstated the name *Oligosorex* for the other species previously assigned to *Crocidosorex*.

Storage of material – NMB, CDKS.

Remarks – Messen was discovered by Danilo Rigassi sometime before 1952.

MN 2**La Chaux 7**

Location – On the side of the road between the hamlets of La Chaux and Noirvaux-Dessus near Ste Croix, Canton of Vaud [coordinates 527.300/187.225 (map sheet CH/1182 Ste Croix)].

Stratigraphy – Type locality of the Swiss Mammal zone of La Chaux 7.

Literature – Engesser & Mödden (1997), Weidmann *et al.* (2003).

Insectivores – Plesiosoricidae: *Plesiosorex* sp. Talpidae: *Paratalpa* cf. *richi* Lavocat, 1951. Dimylidae: *Dimylus paradoxus* von Meyer, 1846. Soricidae: *Oligosorex antiquus* (Pomel, 1853), Soricidae gen. et sp. indet., *Heterosorex neumayrianus* (Schlosser, 1887).

Taxonomic descriptions – A faunal list was given by Engesser & Mödden (1997).

Storage of material – NMB, MGL, PIMUZ.

Remarks – In contrast to the classical fauna of La Chaux, that of La Chaux 7 comes only from one layer of about 8 cm thickness. During the excavations of 1918, when the classical fauna of La Chaux was collected, the fossils of the different layers in this locality (there are six rich layers) were not distinguished as separate units.

MN 4**Jona-Tägernastrasse**

Location – Excavation in the village of Jona (Canton of St. Gallen) [coordinates 706.125/232.360 (map sheet CH/1113 Ricken)].

Stratigraphy – 340 m below the “Hüllistein-Leithorizont”. Type locality of the Swiss mammal zone of Jona-Tägernastrasse.

Literature – Bolliger (1992 a, b; 1997).

Insectivores – Erinaceidae: *Galerix symeonidisi* Doukas, 1986. Plesiosoricidae: *Plesiosorex* cf. *styriacus* (Hofmann, 1892). Talpidae: *Desmanella* sp. Dimylidae: *Plesiodimylus helveticus* Bolliger, 1992 (type locality). Soricidae: Soricidae gen. et sp. indet., *Heterosorex neumayrianus* (Schlosser, 1887).

Taxonomic descriptions – The small mammal fauna from Jona Tägernastrasse was described by Bolliger (1992a).

Storage of material – NMB, PIMUZ.

MN 5

Martinsbrünneli

Location – Municipality of Jona (canton of St. Gallen) [coordinates 705.750/233.770 (map sheet CH/1112 Stäfa)].

Stratigraphy – 5 m below the Hüllstein reference horizon, mammal zone of Vermes 1.

Literature – Bürgisser *et al.* (1983), Hünemann (1984), Bolliger (1992 a, b).

Insectivores – Erinaceidae: *Galerix* sp. Dimylidae: *Plesiodimylus helveticus* Bolliger, 1992. Soricidae: *Dinosorex* cf. *sansaniensis* (Lartet, 1851).

Taxonomic descriptions – Bolliger (1992a).

Storage of material – PIMUZ.

Tobel-Hombrechtikon

Location – Canton of Zürich [coordinates 700.050/233.300 (map sheet CH/1112 Stäfa)].

Stratigraphy – 130 m above the “Hüllstein-Leithorizont”, type locality of the Swiss mammal zone of Tobel-Hombrechtikon.

Literature – Bolliger (1992, 1997), Engesser (1990).

Insectivores – Erinaceidae: *Lantanotherium* aff. *sansaniense* (Lartet, 1851), Plesiosoricidae: ? *Plesiosorex*. Dimylidae: *Plesiodimylus* cf. *bavaricus* Schötz, 1985. Soricidae: *Miosorex* cf. *desnoyersianus* (Lartet, 1851), Soricidae gen. et sp. indet.

Taxonomic descriptions – The small mammals from Tobel-Hombrechtikon were described by Bolliger (1992a).

Storage of material – PIMUZ, NMB.

Vermes 1

Location – Lignitic marls with gastropods in a section south of the northern side river of the river Gabiare, east of the village of Vermes (Canton of Jura) [coordinates 603.100/242.00 and 602.980/241.960 (map sheet CH/1107 Balsthal)].

Stratigraphy – Type locality of the Swiss mammal zone of Vermes 1.

Literature – Engesser (1972), Engesser *et al.* (1981).

Insectivores – Erinaceidae: *Galerix* aff. *exilis* (Blainville, 1839), *Lantanothereum* sp., *Atelerix* sp. Plesiosoricidae: *Plesiosorex* cf. *germanicus* (Seemann, 1938). Talpidae: cf. *Desmanella*, Talpidae gen. et sp. indet. Dimylidae: *Plesiodymylus chantrei* Gaillard, 1897. Soricidae: Soricidae gen. et sp. indet., *Dinosorex zapfei* Engesser, 1975.

Taxonomic descriptions – The insectivores were described by Engesser *et al.* (1981). The taxon listed there as *Mioechinus* sp. is here classified as *Atelerix* sp. for reasons given by Mein & Ginsburg (2002).

Storage of material – NMB, CEHS, CDKS.

Remarks – The fauna of Vermes 1 comes from three different localities (Vm.1., Vm.5, Vm.10) all in the same layer.

Vermes 2

Location – Canton of Jura, about 2,5 m higher in the section and 180 m downstream from the locality of Vermes 1 [coordinates 602.940/241.935 (map sheet CH/1107 Balsthal)].

Stratigraphy – Zone of Tobel-Hombrechtikon.

Literature – Stehlin (1914), Hürzeler (1939), Engesser *et al.* (1981).

Insectivores – Erinaceidae: *Galerix* aff. *exilis* (Blainville, 1839), *Atelerix* aff. *depereti* Mein & Ginsburg 2002. Talpidae: cf. *Proscapanus*. Soricidae: *Dinosorex* sp.

Taxonomic descriptions – Descriptions were given by Engesser *et al.* (1981). Their *Mioechinus* aff. *sansaniensis* is here listed as *Atelerix* aff. *depereti* (see Mein & Ginsburg, 2002).

Storage of material – NMB, IGS (Coll. Greppin).

Remarks – The locality was discovered around 1850 by J.B. Greppin and A. Gressly.

MN 6

Rümikon

Location – Former sandstone quarry at the foot of the Hegiberg east of the city of Winterthur (Canton of Zürich) [coordinates 701.400/261.800 (map sheet CH/1072 Winterthur)].

Stratigraphy – Type locality of the Swiss Mammal zone of Rümikon.

Literature – Stehlin (1914), Fischli & Weber (1916), Schaub (1925), Helbing (1928), Fahlbusch (1964), Engesser (1972).

Insectivores – Erinaceidae: *Galerix* cf. *exilis* (Blainville, 1839), *Lantanothereum* aff. *sansaniense* (Lartet, 1851), *Atelerix* cf. *depereti* Mein & Ginsburg, 2002. Plesiosoricidae: *Plesiosorex styriacus* (Hofmann, 1892). Talpidae: *Mygalea* aff. *antiqua* (Pomel, 1848). Dimylidae: *Plesiodymylus chantrei* Gaillard, 1897. Soricidae: Soricidae 1 gen. et sp. indet., Soricidae 2 gen. et sp. indet., *Dinosorex* cf. *sansaniensis* (Lartet, 1851).

Taxonomic descriptions – A faunal list was given by Fischli & Weber (1916). *Mioechinus* cf. *sansaniensis* is here listed as *Atelerix* cf. *depereti* (see Mein & Ginsburg, 2002).

Storage of material – NMB, MW, CDKS.

Zeglingen

Location – Marly limestone near the farmhouse “Ebnet” on the road from Zeglingen (Canton of Baselland) to Wisen [coordinates 635.090/251.450 (map sheet CH/1088 Hauenstein)].

Stratigraphy – Swiss mammal zone of Oeschgraben.

Literature – Stehlin (1914), Hürzeler (1939), Engesser (1972).

Insectivores – Erinaceidae: *Galerix* cf. *exilis* (Blainville, 1839). Talpidae: *Mygalea antiqua* (Pomel, 1848), *Proscapanus* sp. Dimylidae: *Plesiodymylus chantrei* Gaillard, 1897. *Metacordylodon* sp. Soricidae: Soricidae gen. et sp. indet.

Taxonomic descriptions – Hürzeler (1939) gave an annotated faunal list.

Storage of material – NMB.

MN 7/8

Anwil

Location – Horizontally bedded lignitic marls with gastropods, about 1,5 m below the surface, at the eastern end of the village of Anwil (Canton of Baselland), north of the road to Kienberg [coordinates 638.050/255.780 (map sheet CH/1069 Frick)].

Stratigraphy – Type locality of the Swiss mammal zone of Anwil, reference locality of MN 8.

Literature – Stehlin (1914), Hürzeler (1939), Engesser (1972).

Insectivores – Erinaceidae: *Atelerix* cf. *oeningensis* (Lydekker, 1886), *Parasorex socialis* von Meyer, 1865, *Lantanothereum sansaniense* (Lartet, 1851). Plesiosoricidae: *Plesiosorex schaffneri* Engesser, 1972 (type locality). Talpidae: *Proscapanus sansaniensis* (Lartet, 1851), *Scaptonyx edwardsi* Gaillard, 1899, *Talpa minuta* Blainville, 1838, cf. *Mygalea*, *Desmanella*

stehlini Engesser, 1972 (type locality), Talpidae gen. et sp. indet. Dimylidae: *Plesiodimylus chantrei* Gaillard, 1897, *Metacordylodon schlosseri* (Andreae, 1904). Soricidae: cf. *Crusafontina* sp., Soricidae 1 gen. et sp. indet., *Dinosorex pachygnathus* Engesser, 1972 (type locality).

Taxonomic descriptions – With the exception of *Atelerix* and cf. *Mygalea* all taxa were described in Engesser (1972). The species therein described as soricid II was classified as cf. *Crusafontina* sp. by Van Dam (2004).

Storage of material – NMB.

Grat 930 m

Location – Municipality of Mühlrüti (Canton of St. Gallen) [coordinates 715.440/249.310 (map sheet CH/1093 Hörnli)].

Stratigraphy – Lower part of the Swiss mammal zone of Anwil.

Literature – Bolliger (1992a, b).

Insectivores – Erinaceidae: *Galerix* sp. Dimylidae: *Plesiodimylus* sp. Soricidae: *Miosorex* cf. *desnoyersianus* (Lartet, 1851), Soricidae gen. et sp. indet., *Dinosorex* cf. *pachygnathus* Engesser, 1972, Heterosoricidae gen. et sp. indet.

Taxonomic descriptions – Bolliger (1992a) gave descriptions of the fauna.

Storage of material – PIMUZ, NMB.

MN 9

Nebelbergweg

Location – East of the hamlet Engi, south of Nunningen (Canton of Solothurn) [coordinates: 613.070/250.240 (map sheet CH/1087 Passwang)].

Stratigraphy – Type locality of the Swiss mammal zone of Nebelbergweg.

Literature – Kälin & Engesser (2001).

Insectivores – Erinaceidae: *Schizogalerix voesendorfensis* (Rabeder, 1973), *Schizogalerix* sp. Talpidae: *Desmanella* sp., *Proscapanus sansaniensis* (Lartet, 1851), *Talpa minuta* Blainville, 1838, Desmaninae gen. et sp. indet. Dimylidae: *Plesiodimylus johanni* Kälin & Engesser, 2001 (type locality). Soricidae: *Dinosorex* aff. *pachygnathus* Engesser, 1972.

Taxonomic descriptions – All insectivores were described in Kälin & Engesser (2001).

Storage of material – NMB.

Storage of material – NMB.

MN 15

Vue-des-Alpes

Location – Karstic fissure filling in Kimmeridgian limestones, in the road tunnel underneath the Vue-des-Alpes [coordinates 558.065/212.395 (map sheet CH/1144 Val de Ruz)].

Stratigraphy – Upper Ruscinian.

Literature – Bolliger *et al.* (1993).

Insectivores – Talpidae: Talpidae gen. et sp. indet. Soricidae: *Blarinoides mariae* Sulimski, 1959, *Beremendia fissidens* (Petényi, 1864), *Deinsdorfia* cf. *hibbardi* (Sulimski, 1962), cf. *Sorex* (*Drepanosorex*), cf. *Blarinella*, cf. *Petenya hungarica* Kormos, 1934, cf. *Crocidura*, Soricidae 3 gen. et sp. indet.

Taxonomic descriptions – The fauna was described by Bolliger *et al.* (1993).

Storage of material – NMB.

Remarks – The fauna of Vue-des-Alpes is the only mammal fauna between MN 9 and MN 17 in Switzerland.

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