

# Subfamily Theridomyidae

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Family *Theridomyidae* ALSTON 1876Sub-Family *Theridomyinae* ALSTON 1876Genus *Isoptychus* POMEL 1854

Fig. 7-9

*Synonymy.* -

- 1848-52 *Theridomys* GERVAIS, p. 2, expl. to Fig. 6 und 7, Table 47, in part.  
 1854 *Theridomys* (*Isoptychus*) POMEL, p. 34 und 35.  
 1884 *Isoptychus* SCHLOSSER, p. 34.  
 1891-93 *Theridomys* (*Isoptychus*) ZITTEL, p. 524.  
 1898-99 *Theridomys* TROUSSART, p. 392.  
 1904 *Theridomys* (*Isoptychus*) PALMER, p. 353.  
 1941 *Trechomys* (*Isoptychus*) WINGE, p. 117, lapsus calami.  
 1951 *Isoptychus* STEHLIN & SCHAUB, p. 37, 39 and 362.  
 1952 *Theridomys* (*Isoptychus*) LAVOCAT, p. 50 and 76.  
 1953 *Isoptychus* SCHAUB, p. 394.  
 1958 *Theridomys* (*Isoptychus*) SCHAUB, p. 697.  
 1966 *Isoptychus* THALER, p. 65, 66 and 67.  
 1972 *Isoptychus* BOSMA & INSOLE, p. 137 and 138.  
 1973 *Theridomys* (*Theridomys*) VIANEY-LIAUD, p. 299, in part.  
 1974 *Isoptychus* BOSMA, p. 79.

*Type species.* - *Isoptychus aquatilis* (GERVAIS 1848-52).

*Stratigraphic range.* - Oligocene, Rupelien to Lower "Chattien", from *Isoptychus headonensis* zone to Oensingen assemblage zone (see ENGESSER & MAYO 1987).

*Geographical distribution.* - Central and West Europe.

*Previous diagnoses.* - POMEL (1854, p. 34-35); LAVOCAT (1952, p. 76); SCHAUB (1953, p. 14); SCHAUB (1958, p. 697-98); THALER (1966, p. 66); BOSMA & INSOLE (1972, 137-138) and BOSMA (1974, p. 79).

*Emended diagnosis.* - Theridomyinae of low to moderately high semi-hypsodonty, with thick borders of enamel in the antyclines and antyclinids. Maxilla very high in front of P<sup>4</sup> but with lower height dorsally to M<sup>2</sup>-M<sup>3</sup>. Infraorbital canal very deep, not vaulted; with vertical external ridge and many foramina in its floor. Small anterior alveolar foramen at the base of the infraorbital canal. Small palatine vault, relatively wide and without grooves. Posterior border of incisive foramen in front of anterior half of P<sup>4</sup>. Choanaes opened in front of the anterior half of M<sup>3</sup>. Posterior palatine foramen in front of M<sup>2</sup>. Posterior maxillary notch behind M<sup>3</sup>. Upper teeth with broad sinus and very broad I-III synclines from top to base. Small IV syncline and short sinus. I-III synclines equal or longer than sinus. Mandible: with relatively elevated mandibular ramus and strong angular process, but not more prolonged than condyloid process. Coronoid process more elevated than condyloid process and curved towards the back. Anterior border of coronoid process behind M<sub>3</sub> with a marked Temporalis crest. A strongly backwards inclined condyloid process with equal distance between the coronoid process and occlusal surface of the cheek teeth. Anterior masseteric shelflike ridge strong and inclined. Lower angular masseteric ridge very prominent. Shallow upper angular masseteric ridge. Lower teeth: P<sub>4</sub> with an entrant on the anterior border and one or two synclinids in the anterior part. M<sub>1-3</sub> with very broad sinusid and synclinids from top to base. Three synclinids equal or longer

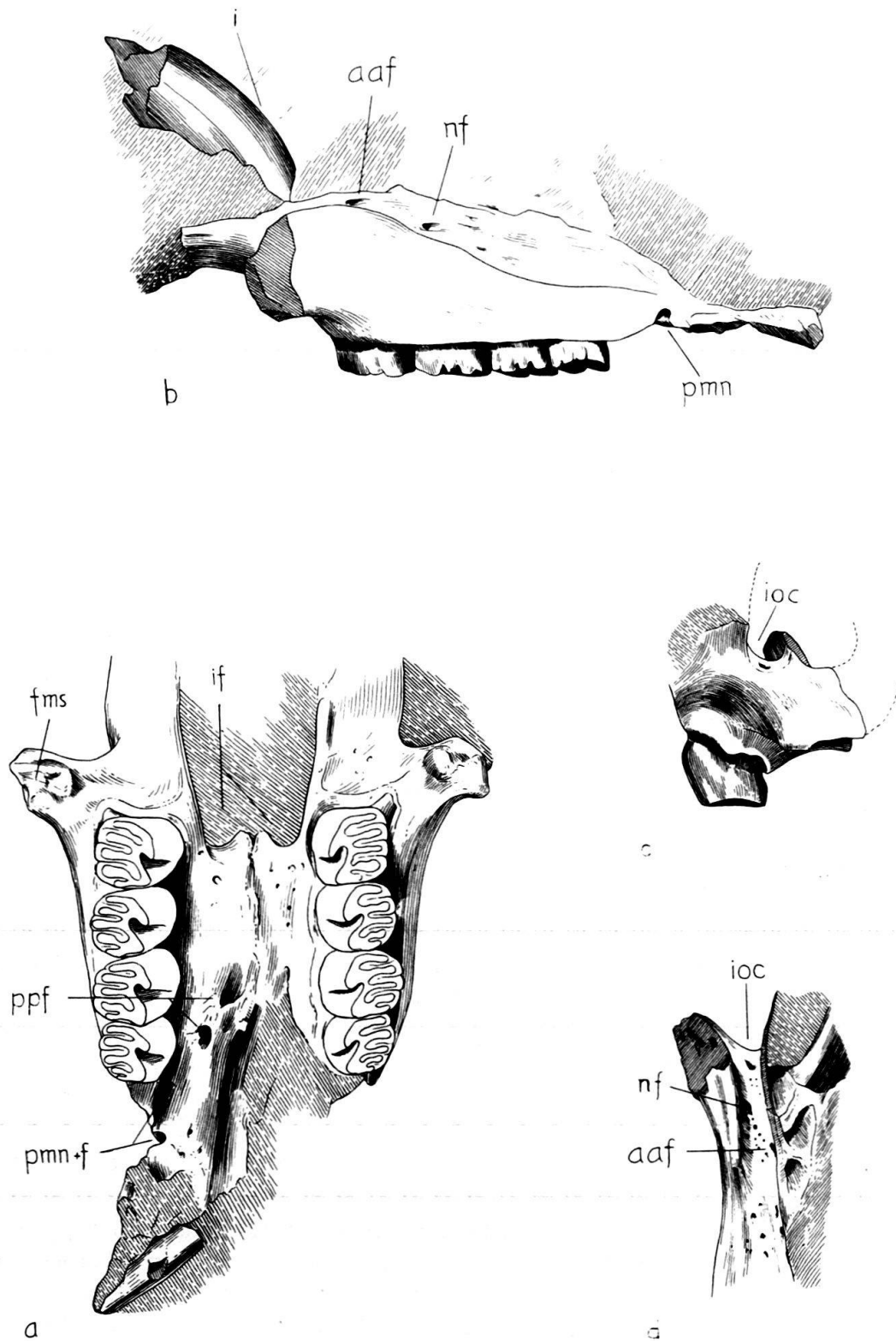


Fig. 8. *Isoptychus aquatilis* (GERVAIS 1848–52) NMB: Ro 57. Fragment of skull with teeth row (Ronzon, France). The specimen shows the typical characters of the genus *Isoptychus* POMEL 1854. a = ventral view. In the original specimen both maxillas are separated one from the other. b = lateral view of the left maxilla. c = frontal view of the left maxilla showing the deep infraorbital canal ventral to the infraorbital foramen. d = dorsal view of the infraorbital canal. – All figures  $\times 4$ .

than sinusid. Antyclines and antyclinids frequently with protuberances. Tendency to increase in size, semihypsodonty, maintenance of very broad synclines, synclinids, sinus and sinusids in all teeth and an anterior entrant in P<sub>4</sub>.

*Differential diagnosis.* – *Isoptychus* differs from *Theridomys* JOURDAN 1837 in the following characters:

- smaller size,
- lower semihypsodonty,
- different morphology of maxilla,
- different infraorbital canal,
- dorsally higher external maxillary ridge of the infraorbital canal,
- many foramina in the base of the infraorbital canal,
- different longitude of palatine vault,
- different position of the posterior border of the incisive foramen,
- different position of the choanaes,
- different position of the posterior palatine foramen,
- different morphology of the upper teeth,
- shorter and broader sinus,
- smaller 5 antycline in P<sup>4</sup>,
- partial absence of 5 antycline in M<sup>3</sup>,
- very undeveloped 5 antycline in M<sup>1</sup> and M<sup>2</sup>,
- longer I, II and III synclines than sinus,
- partial absence of IV syncline in M<sup>3</sup>,
- smaller IV syncline in P<sup>4</sup>–M<sup>2</sup>,
- different morphology of the mandible,
- different morphology of the condyloid process,
- longer anterior masseteric ridge,

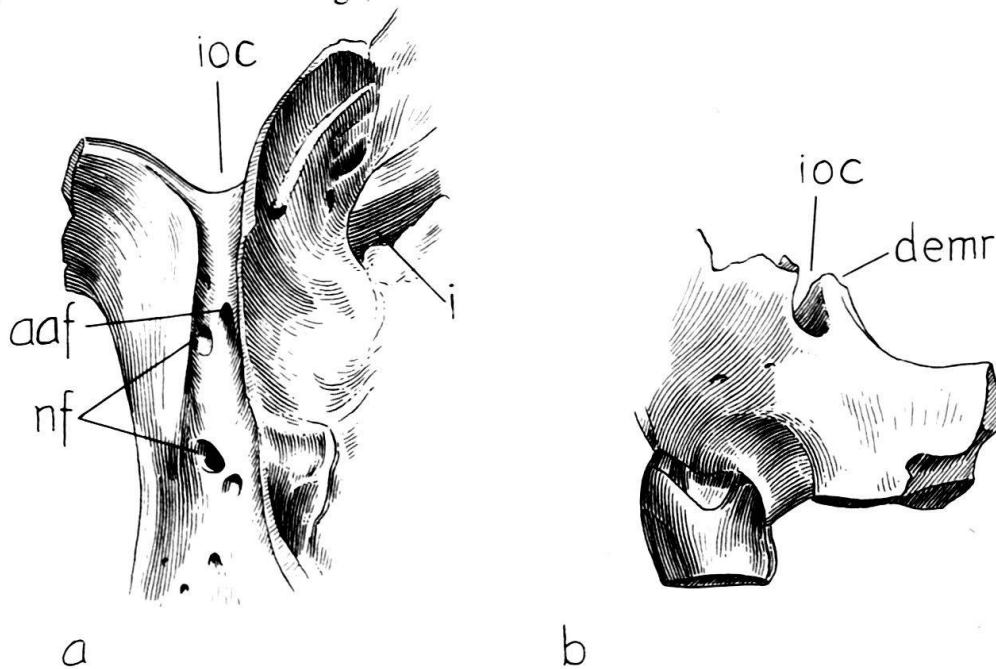
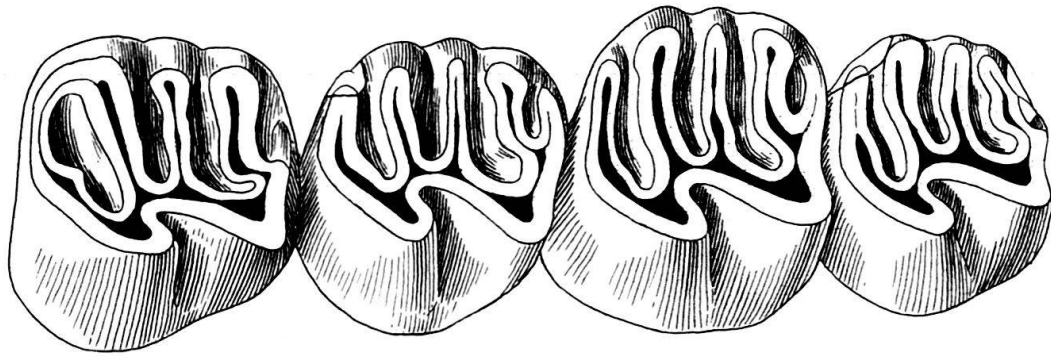
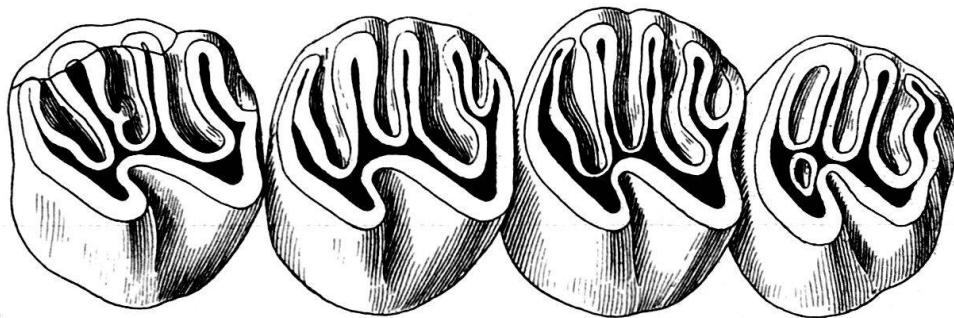


Fig. 9. *Isoptychus aquatilis* (GERVAIS 1848–52). NMB: Rz 57 Left maxilla. (Ronzon, France). a = dorsal view. Shown is the small intraspecific variations in the number of the nutritive foramina on the basis of the infraorbital canal and the position of the anterior alveolar foramen. b = frontal view. – × 6.

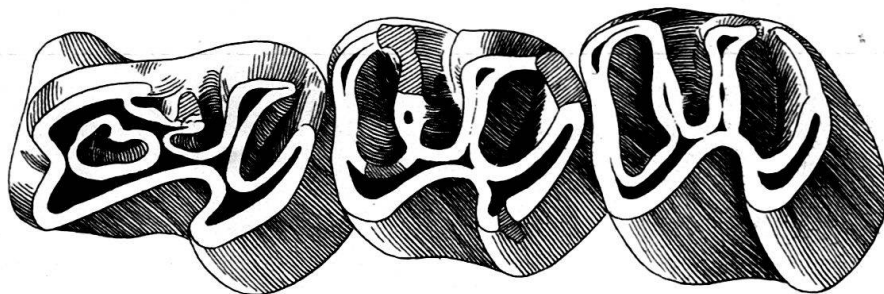
- different thickness of enamel in the incisor,
- different morphology of the lower teeth,
- absence of first antyclinid in  $P_4-M_3$ ,
- absence of first synclinid in  $P_4-M_3$ ,
- sinusid shorter than synclinids,
- broader sinusid,
- broader synclinids from top to base,
- frequent presence of protuberances or septums in upper and lower teeth.



c



b



a

Fig. 10. *Isoptychus aquatilis* (GERVAIS 1848-52). a = BM(NH): M<sup>1</sup> 11605.  $P_4-M_2$  sin. b = NMB: Rz 27.  $P^4-M^3$  dex (invers.). c = NMB: Ro 57.  $P^4-M^3$  dex (invers.). Ronzon, France. - All figures  $\times 12,5$ .

*Discussion.* – The discovery of *Isoptychus bumbachensis* n. sp. in an assemblage of very evolved genera and species shows clearly that the supposed line of evolution of “*Theridomys*” proposed by VIANEY-LIAUD (1973, p. 1007; 1973, p. 357, Fig. 27 and 1975, p. 769, Tab. 2) is very complex. VIANEY-LIAUD (1985, p. 172) described *Theridomys ludensis* and she stated that this species belongs to a second and different line of evolution to that represented by “*T. aquatilis* – *T. lembronicus*”. Nevertheless, MAYO (1982, p. 699) showed that the species of this supposed line are not successional species, because they have different generic characters. On the basis of the loss and acquisition of these characters, the relationship proposed by VIANEY-LIAUD is very improbable. MAYO (1986, p. 5, Fig. 1, in: ENGESSER et al.) illustrating different teeth, showed this taxon as a new subgenus of *Theridomys*. Now, I believe that *Theridomys* is a very evolved genus of Theridomyinae and probably has its origin in the genus *Trechomys* LARTET 1867. *Isoptychus* does not show a close relationship with *Theridomys* s. st. Therefore it is referred to as a separate genus with different successional species and two or three lines of evolution. One of these lines consists of larger species than the others. One of the lines with smaller species is *Isoptychus* (*Isoptychus*) subgenus. It is distinguishable by several subgeneric characters. The other line with smaller species is a new subgenus of *Isoptychus* to which belongs *Isoptychus ludensis*. The line with the large species, *I. bumbachensis* n. sp., I believe belongs to this new subgenus, but this matter is not completely clear at the moment (see MAYO 1987a).

*Isoptychus bumbachensis* n. sp.

Fig. II

*Synonymy.* –

1861 Nager ind. FISCHER, p. 222.

1914 *Theridomys* sp. I STEHLIN, p. 183.

1986 *Theridomys* (n. subg.) n. sp. MAYO, p. 5, Fig. 1, in: ENGESSER et al.

*Derivatio nominis.* – After Bumbach, type locality of the species.

*Holotype.* – NMB: Bum 101 (M<sup>1/2</sup> sin.) in SW-3.

*Measurements of the Holotype.* – Sinus height: 1,50 · Length: 2,33 · Width: 2,33 · Sinus length: 0,92 · Extrasinus distance: 1,33 · Crown height: 2,00.

*Paratypes.* – SW-1. – NMB: UM 7023 (D<sub>4</sub> sin.); SW-2. – Bum 107 (M<sub>1/2</sub> f dex.); SW-3. – NMB: Bum 104 (M<sup>1/2</sup> sin.); NMB: Bum 105 (P<sub>4</sub> f sin.); 106 f and 108 f (M<sub>1/2</sub> dex.); NMBer: Bu 30 (M<sub>3</sub> dex.); SW-4. – NMB: Bum 102 (M<sup>1/2</sup> sin.) and 103 (M<sub>1/2</sub> sin.).

*Definition of the stage of wear.* – Upper teeth: SW-1: unworn or almost unworn stages. SW-2: lightly worn. SW-3: some synclines opened. SW-4: all synclines closed. SW-5: very advanced worn stage. Sinus height very reduced. Lower teeth: as for upper teeth.

*Type locality.* – At the foot of Bumbach stream, Berner Oberland, Canton of Bern, Switzerland, (see KFSNMB).

*Type formation.* – Uerschli-Nagelfluh (Fluvial conglomerate of Uerschli). See HAUS 1937, p. 14 and 16; HABICHT 1987, p. 417.

*Stratum type.* – Red motley gray-blue marls with shell of mollusk, bone fragments and particles of lignite. At the foot of the riverside of Bumbach stream.

*Stratigraphic range.* – Oligocene, Lower “Chattien”, assemblage zone of Bumbach-1 (see ENGESSER & MAYO 1987).

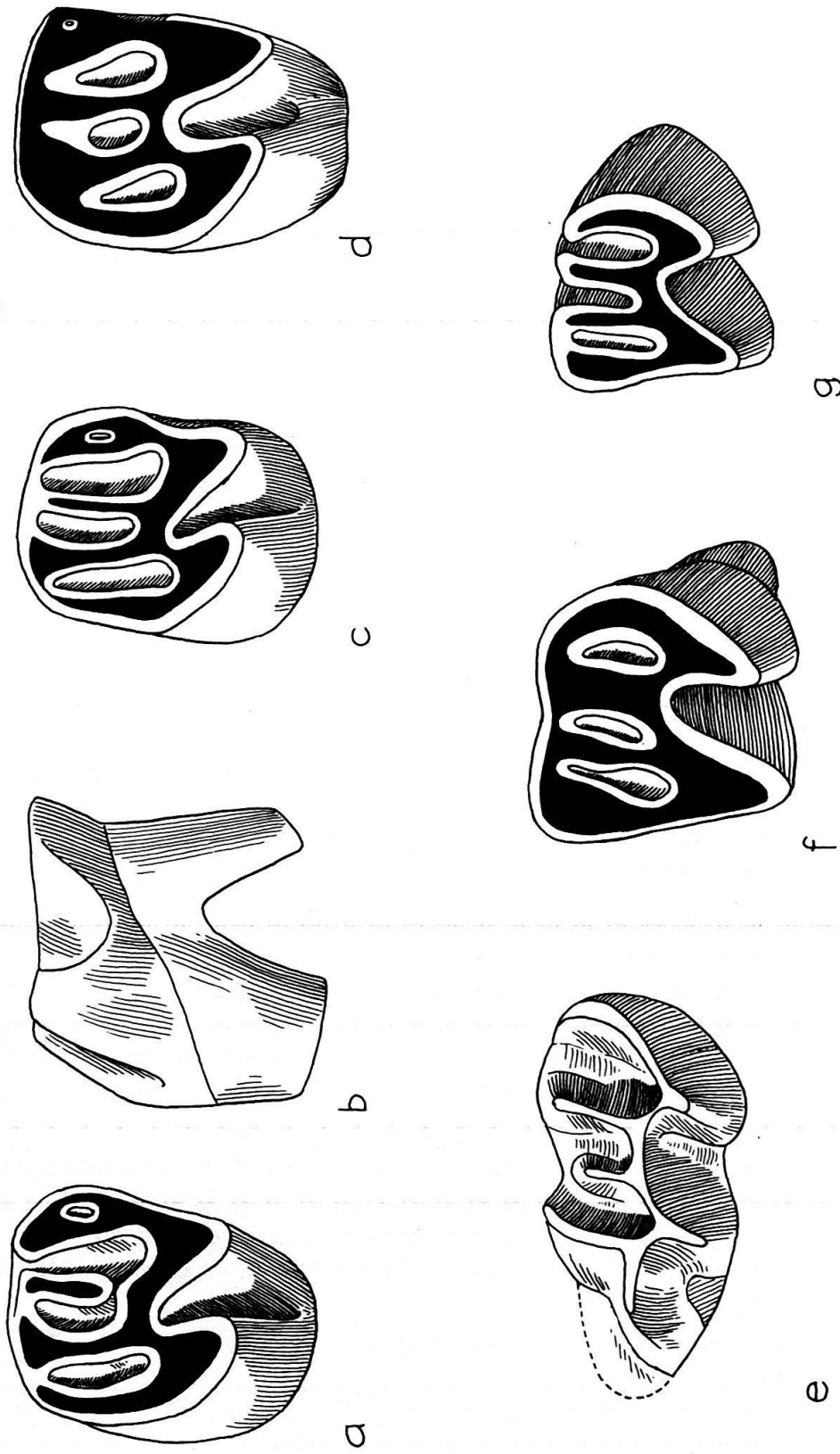


Fig. 11. *Isoptychus bumbachensis* n. sp. a = NMB: Bum 101.  $M^{1/2}$  sin. Holotype. b = NMB: Bum 101  $M^{1/2}$  sin. Holotype. Posterior view. c = NMB: Bum 104.  $M^{1/2}$  sin. Paratype. d = NMB: Bum 102.  $M^{1/2}$  sin. Paratype. e = NMB: UM 7023.  $D_4$  sin. Paratype. f = NMB: Bum 103.  $M^{1/2}$  sin. Paratype. g = NMB: Bum 30 dex (invers.). Paratype. Bumbach 1, Switzerland. — All figures  $\times 12,5$ .

*Geographical distribution.* – Central Europe.

*Diagnosis.* – Species of large size and moderately high semihypsodonty. Very broad sinusids and sinus. Synclines and synclinids much broader from top to bottom.  $M_{1/2}$  with or without joint between II and III synclines; 3 antycline completely or incompletely formed;  $P_4$  with deep and wide anterior entrant. Poorly represented protuberances in synclines or synclinids.

*Differential diagnosis.* – *Isoptychus bumbachensis* n. sp. differs from *I. ludensis* in the:

- larger size,
- higher semihypsodonty,
- larger  $D_4$ ,
- broader synclines and synclinids from top to bottom,
- poorly represented protuberances in synclines or synclinids,
- broader and deeper entrant on anterior border of  $P_4$ .

*Discussion.* – The species *Isoptychus ludensis* (VIANEY-LIAUD 1985) was described on the basis of material found in the carstic fissure filling of Rigal-Jouet (Quercy). The comparison of the material of Bumbach-1 with the sample of Rigal-Jouet showed that the species at Bumbach-1 is larger and has a higher crown. MAYO (1986, p. 5, Fig. 1, in: ENGESSER et al.) considered the species *I. bumbachensis* n. sp. as belonging to a new subgenus of *Theridomys*. In Habach-5 (West Germany), a stratigraphical locality, the species *Isoptychus ludensis* (= *Theridomys ludensis*) was also found. Thanks to the kindness of J. Gad (Mainz) I have compared the material of Bumbach-I with a large

Table 1: Measurements of the cheek teeth of *Isoptychus bumbachensis* n. sp. from Bumbach 1 (Switzerland)

Tooth	N		range	$\bar{X}$	S	V
$M^{1/2}$	3	Sinus height	1,50–1,67	1,59	0,12	7,58
	3	Length	2,25–2,50	2,36	0,13	5,41
	3	Width	2,25–2,58	2,36	0,19	8,07
	3	Sinus length	0,83–1,00	0,88	0,06	7,27
	3	Extrasinus distance	1,25–1,50	1,39	0,13	9,19
	2	Crown height	1,92–2,17	2,05	0,18	8,64
$D_4$	1	Sinusid height	–	1,17	–	–
	1	Length	–	> 3,50	–	–
	1	Width	–	1,42	–	–
	1	Sinusid length	–	0,50	–	–
	1	Extrasinusid distance	–	0,83	–	–
	1	Crown height	–	1,58	–	–
$M_{1/2}$	2	Sinusid height	1,00–1,08	1,04	0,06	5,44
	1	Length	–	2,50	–	–
	3	Width	2,08–2,67	2,59	0,12	4,65
	–	Sinusid length	–	–	–	–
	3	Extrasinusid distance	1,17–1,25	1,20	0,05	3,86
	2	Crown height	1,50–2,25	1,88	0,53	–
$M_3$	1	Sinusid height	–	1,50	–	–
	1	Length	–	2,00	–	–
	1	Width	–	1,83	–	–
	1	Sinusid length	–	0,67	–	–
	1	Extrasinusid distance	–	1,00	–	–



sample of Habach-5. Also the species *I. bumbachensis* proved to be larger with a higher crown than the sample of Habach-5.

Measurements in the Table 1.

Genus *Blainvillimys* BRAVARD, in GERVAIS 1848–52  
(sensu STEHLIN & SCHAUB 1951)

*Synonymy.* –

- 1848–52 *Blainvillimys* BRAVARD, in: GERVAIS, expl. Pl. 47, Fig. 18, p. 4, in part.  
 1848–52 *Theridomys?* GERVAIS, expl. Pl. 47, Fig. 18, p. 4, in part.  
 1855 *Blainvillimys* GIEBEL, p. 517, footnote.  
 1884 *Theridomys* SCHLOSSER, p. 33 and 34, in part.  
 1891–93 *Blainvillimys* ZITTEL, p. 524, in part.  
 1898–99 *Blainvilleomys* TROUSSART, p. 392, misprint.  
 1904 *Blainvillimys* PALMER, p. 137.  
 1951 *Blainvillimys* STEHLIN & SCHAUB, p. 35, 36, 37, 213, 214, 216 and 362.  
 1952 *Theridomys (Blainvillimys)* LAVOCAT, p. 77.  
 1958 *Blainvillimys* SCHAUB, p. 698.  
 1966 *Blainvillimys* THALER, p. 78.  
 1973 *Theridomys (Blainvillimys)* VIANEY-LIAUD, p. 325.  
 1979 *Archaeomys (Blainvillimys)* VIANEY-LIAUD, p. 205.  
 1980 *Theridomys (Blainvillimys)* MAYO, p. 1103.  
 1982 *Archaeomys (Blainvillimys)* VIANEY-LIAUD, p. 690 and 695, Fig. w/n.  
 1982 *Blainvillimys* MAYO, p. 700, 703, 713, 714 and 715, Fig. 7.

*Type species.* – *Blainvillimys blainvillei* (GERVAIS 1848–52).

*Stratigraphic range.* – Lower and Middle Oligocene.

*Geographical distribution.* – Central and West Europe.

*Previous diagnoses.* – GERVAIS (1848–52, p. 4, explanation to Fig. 17–18, Plate 47); GIEBEL (1855, p. 517, footnote 2); PALMER (1904, p. 137); STEHLIN (1951, p. 35, in: STEHLIN & SCHAUB); SCHAUB (1951, p. 362, in: STEHLIN & SCHAUB); LAVOCAT (1952, p. 77); SCHAUB (1958, p. 698); THALER (1966, p. 57); VIANEY-LIAUD (1972, p. 1009 and 1973, p. 325–326).

*Diagnosis.* – Theridomyinae of low to medium semihypsodonty. Very fine enamel on the posterior border of the antyclines in the upper teeth and on the anterior border of the antyclinids in the lower ones. Maxilla with broad infraorbital foramen. Broad and moderate to very deep infraorbital canal. Fossa of anterior alveolar foramen in infraorbital canal with many nutritive foramina. Palatine vault longer than in *Toeniodus*. Posterior border of incisive foramen in front of sinus of P<sup>4</sup>. Choanaes open in front of posterior half of M<sup>2</sup>. Posterior palatine foramen in front of anterior part of M<sup>2</sup>. Open channel in choanaes. Upper teeth: with five antyclines and four synclines. Very thick enamel on anterior border of antyclines, crown and posterior border of sinus. Tubular to pseudolaminar synclines. Thick antyclines in unworn stage and moderately broad synclines. Sinus with tendency to increase in longitude and with labial end mostly between I and II synclines. Most of I synclines of greater or equal size than II in unworn stage. I syncline smaller than II, in advanced worn stage. III with slightly deeper labial and lingual apertures; I, II and IV tubular in worn stage. Mandible: with anterior border or coronoid process behind M<sub>3</sub> and inclined backwards. Condylod process marked above the occlusal surface of the cheek teeth. Anterior shelflike masseteric ridge below P<sub>4</sub> and

anterior part of  $M_1$ . Angular lower ridge more prominent than upper. Anterior border of internal pterygoid fossa in front of anterior part of  $M_3$ . Dental foramen below crown base. Lower teeth with or without I synclinid. I synclinid with a tendency to reduction. Sinusid with the tendency to increase in longitude by reduction of III synclinid. In the very evolved stage presence of a pseudograben or a shallow graben. II and IV synclinids longer than III.  $P_4$  with a deeply opened III synclinid on the lingual border declining to a very shallow one. II without aperture to lingual border. Tubular to laminated synclinids.

*Differential diagnoses.* – *Blainvillimys* differs from *Toeniodus* in the following characters:

- different morphology of maxilla,
- longer palatine vault,
- absence of sulcus in palatine vault,
- different position of the posterior border of the incisive foramen,
- different morphology of the incisive foramen,
- different position of the aperture of the choanaes,
- different position of posterior palatine foramen,
- presence of posterior maxillary notch,
- presence of infraorbital canal,
- presence of fossa in the infraorbital canal,
- presence of many foramina in fossa of infraorbital canal,
- presence of external dorsal ridge in the maxilla,
- different morphology of  $D^4$ ,
- thicker anterior border of enamel in antyclines of the upper teeth,
- thicker anterior border of enamel in the crown of upper teeth,
- thicker posterior border of enamel of the sinus in upper teeth,
- shorter length of sinus in the upper teeth,
- thicker antyclines and antyclinids of the teeth in unworn stage,
- more represented tubular synclines or synclinids on the teeth,
- different morphology of the mandible,
- different inclination of the anterior shelflike masseteric ridge,
- different position of the union between the anterior shelflike masseteric ridge and the upper angular masseteric ridge,
- different morphology of  $D_4$ ,
- absence of deep fusion of the sinusid with IV synclinid,
- lower teeth without deep graben,
- rare occurrence of shallow pseudograben,
- pseudolaminar III synclinid in  $P_4$ ,
- possible absence of I synclinid in unworn or slightly worn teeth.

From *Archaeomys* (n. subg.) or primitive Archaeomyids in the:

- different morphology of the maxilla,
- higher maxilla dorsally to  $M^2$ – $M^3$ ,
- shorter palatine vault,
- different position of the posterior border of the incisive foramen,
- different position of the aperture of the choanaes,
- different position of posterior palatine foramen,

- absence of sulcus in palatine vault,
- presence of infraorbital canal,
- maxilla with fossa in association with the anterior alveolar foramen,
- presence of external dorsal ridge in the maxilla,
- different morphology of D<sup>4</sup>,
- lower semihypsodonty,
- thicker anterior border of enamel in the crown of upper teeth,
- shorter length of sinus in the upper teeth,
- more represented tubular synclines and synclinids,
- shorter synclines and synclinids,
- different morphology of the mandible,
- less inclined and lower position of the shelflike masseteric ridge,
- more marked upper angular masseteric sulcus,
- presence of upper angular masseteric ridge in contact with shelflike masseteric ridge,
- more strongly inclined lower border of angular process,
- different position of anterior border of internal pterygoid fossa,
- presence of a deep aperture in lingual border of III synclinid in most of P<sub>4</sub>,
- absence of deep aperture in lingual border of II synclinid in P<sub>4</sub>,
- absence of deep graben in lower teeth,
- presence of sinusid or shallow pseudograben.

*Blainvillimys blainvillei* (GERVAIS 1848–52)

Fig. 12

*Synonymy.* –

- 1848–52 *Theridomys? blainvillei* GERVAIS, expl. Pl. 47, Fig. 18, p. 4.  
 1898–99 *Theridomys blainvillei* THOUSSART, p. 392.  
 1951 *Blainvillimys blainvillei* STEHLIN & SCHAUB, p. 362.  
 1952 *Theridomys (Blainvillimys) blainvillei* LAVOCAT, p. 77, Pl. 13, Fig. 3.  
 1965 *Blainvillimys blainvillei* THALER, p. 79.  
 1966 *Blainvillimys blainvillei* THALER, p. 79, Pl. 9, Fig. b–c.  
 1973 *Theridomys (Blainvillimys) blainvillei* VIANEY-LIAUD, p. 342, non p. 345, Fig. 24.  
 1975 *Theridomys (Blainvillimys) blainvillei* BAHLO, p. 31.  
 1979 *Archaeomys (Blainvillimys) blainvillei* VIANEY-LIAUD, p. 187, 201, 204, 205, 215, non 226, 227, nec 230? and 232, Fig. 57.  
 1980 *Theridomys (Blainvillimys) blainvillei* MAYO, p. 1101, Fig. 7.  
 1982 *Archaeomys (Blainvillimys) blainvillei* VIANEY-LIAUD, p. non 691, 692, in part 694 and 695.  
 1982 *Blainvillimys blainvillei* MAYO, p. 703, Fig. 4, p. 704–705.

*Neotype.* – MNHNP: Lim 539 (M<sub>1</sub>–M<sub>3</sub> dex.). All the teeth in SW-3. It is necessary to work out the taxonomic position of *B. blainvillei* (Art. 75 a Int. Code of Zool. Nom). The specimen figured by THALER 1966, Plate 9, Fig. a and b is designated as the Neotype (see STEHLIN & SCHAUB 1951, p. 35; LAVOCAT 1952, p. 77; VIANEY-LIAUD 1973, p. 342; and 1982, p. 692, Note 2; MAYO 1980, p. 1101, Note 2 and 1982, p. 704–705). MNHNP: Lim 538 was not the piece figured by THALER but MNHNP: Lim 539.

*Measurements of the Neotype.* – Sinusid height: M<sub>1</sub> = 1,28; M<sub>2</sub> = 1,48; M<sub>3</sub> = 1,00. Length: M<sub>1</sub> = 2,24; M<sub>2</sub> = 2,12; M<sub>3</sub> = 1,88. Width: M<sub>1</sub> = ?; M<sub>2</sub> = 2,04; M<sub>3</sub> = 1,72. Sinusid length: M<sub>1</sub> = ?; M<sub>2</sub> = 1,44; M<sub>3</sub> = 1,16. Extrasinusid distance: M<sub>1</sub> = 0,64; M<sub>2</sub> = 0,60;

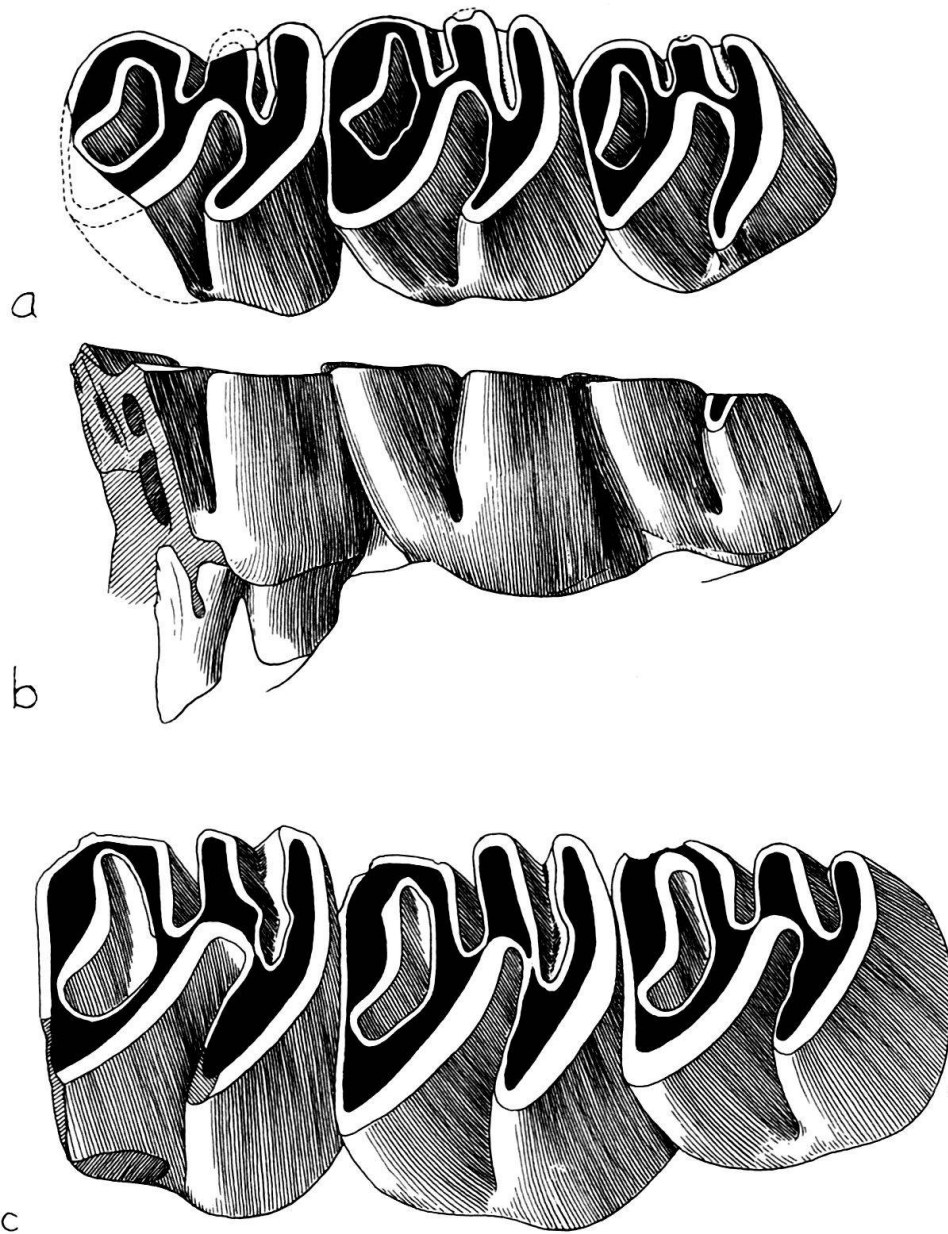


Fig. 12. *Blainvillimys blainvillei* (GERVAIS 1848–52). a = MNHNP: Lim 539.  $M_1$ – $M_3$  dex (invers.). Neotype. Occlusal view. b = MNHNP: Lim 539.  $M_1$ – $M_3$  dex (invers.). Neotype. Labial view. c = BM(NH): M 34932.  $M_1$ – $M_3$  sin. Topotype. Antoingt, France. – All figures  $\times 12,5$ .

$M_3 = 0,44$ : Crown height:  $M_1 = ?$ ;  $M_2 = 2,00$ ;  $M_3 = ?$ . Width/sinusid length ratio:  $M_1 = ?$ ;  $M_2 = 1,42$ ;  $M_3 = 1,48$ .

*Topotypes.* – SW-3. MNHNP: Lim 546 ( $M_2$ – $M_3$  sin.); BM(NH): 34932 ( $M_1$ – $M_3$  sin.):

*Definition of the stage of wear.* – Upper teeth: see new species of *Blainvillimys*. Lower teeth: SW-1: unworn or almost unworn stages. SW-2: II synclinid closed. SW-3: some synclinids opened. SW-4: all synclinids closed and with or without IV synclinid. SW-5: very advanced worn stage. Sinusid height very reduced.

*Type locality.* – Antoingt, France.

Table 2: Measurements of the lower teeth of *Blainvillimys blainvillei* from Antoingt (France)

Tooth	N		range	$\bar{X}$	S	V
M <sub>1/2</sub>	3	Sinus height	1,33–1,50	1,42	0,09	6,00
	4	Length	2,12–2,40	2,28	0,13	5,55
	4	Width	2,00–2,20	2,09	0,09	4,24
	4	Sinusid length	1,40–1,52	1,47	0,06	3,76
	5	Extrasinusid distance	0,60–0,84	0,70	0,09	13,40
	4	Crown height	1,75–2,33	2,08	0,26	12,62
M <sub>3</sub>	3	Sinusid height	1,33–1,50	1,16	0,21	18,25
	3	Length	1,88–2,25	2,02	0,20	10,07
	3	Width	1,72–2,08	1,85	0,20	10,65
	3	Sinusid length	1,16–1,20	1,17	0,02	1,97
	3	Extrasinusid distance	0,40–0,56	0,47	0,08	17,84
	2	Crown height	1,58–1,80	1,69	0,16	9,20

*Other localities.* – Romagnat, Saint-Vincent de Barbeyrargues, Sauvetat and Saint Yvoine (France).

*Continental basins.* – Auvergne and Languedoc (France).

*Stratigraphic range.* – Middle Oligocene, level of Antoingt.

*Geographical distribution.* – West Europe.

*Diagnosis.* – Species of moderately high semihypsodonty. P<sub>4</sub> with a very deep lingual aperture in III synclinid. P<sub>4</sub>–M<sub>3</sub> with long sinusid but still with a deep and long tubular III synclinid. II and IV synclinids pseudolaminated. III smaller than IV. Very thick enamel on the anterior border of the sinusid and the posterior border of the crown. Means of width/sinusid length ratio 1,45.

*Discussion.* – Concerning the problem of the systematic position of *Blainvillimys blainvillei* there are enough explanation in the literature cited below by synonymy. The width/sinusid length ratio was measured on the specimens MNHNP: Lim 539, 546 and BM(NH): 34932.

Measurements in the Table 2.

Statistical test in the Tables 54 and 56.

### *Blainvillimys stehlini* n. sp.

Fig. 13–14

*Synonymy.* –

- 1922 *Blainvillimys* sp. STEHLIN, p. 577.
- 1965 *Blainvillimys blainvillei* THALER, p. 118, in part.
- 1966 *Blainvillimys* aff. *blainvillei* THALER, 1966, p. 60 and 61, Table 4.
- 1966 *Blainvillimys blainvillei* THALER, p. 63, 79, 201, 203 and 243.
- 1973 primitive *Archaeomys* HÜRZELER, in: RUTSCH & SCHLÜCHTER, Table 1.
- 1973 *Theridomys (Blainvillimys) blainvillei* VIANEY-LIAUD, p. 342 and 345.
- 1975 *Theridomys (Blainvillimys) blainvillei* BÄHLO, p. 160, footnote 7.
- 1976 *Theridomys (Blainvillimys) blainvillei* VIANEY-LIAUD, p. 59.
- 1979 *Archaeomys (Blainvillimys) blainvillei* VIANEY-LIAUD, p. 230.
- 1980 *Archaeomys* n. sp. MAYO, p. 1100 and 1102, Fig. 2 and 4.
- 1982 *Archaeomys (Blainvillimys) blainvillei* VIANEY-LIAUD, p. 691 and 692, Fig. w/n.
- 1982 *Archaeomys (Blainvillimys) blainvillei* évolué VIANEY-LIAUD, p. 694 and 695.
- 1982 *Archaeomys* cf. *gervaisi* VIANEY-LIAUD, p. 691, in part.

1982 *Archaeomys gervaisi* plus évolué VIANEY-LIAUD, p. 692, in part.

1982 *Blainvillimys* n. sp. MAYO, 1982, p. 703, 714 and 715, Fig. 6 and 7.

*Derivatio nominis.* – After Dr. H. G. Stehlin (1870–1941), Basel.

*Holotype.* – NMB: UM 2402 ( $P_4$ – $M_2$  sin.)  $P_4$  in SW-3 and  $M_1$ – $M_2$  in SW-4.

*Measurements of the Holotype.* – sinusid height:  $P_4 = 1,75$ ;  $M_1 = 1,40$ ;  $M_2 = 1,24$ . Length:  $P_4 = 3,17$ ;  $M_1 = 2,33$ ;  $M_2 = 2,33$ . Width:  $P_4 = 1,75$ ;  $M_1 = 2,08$ ;  $M_2 = 2,17$ . Sinusid length:  $P_4 = 1,69$ ;  $M_1 = 1,83$ ;  $M_2 = 1,83$ . Extrasinusid distance:  $P_4 = 0,12$ ;  $M_1 = 0,22$ ;  $M_2 = 0,22$ . Crown height:  $P_4 = 2,42$ ;  $M_1 = 2,58$ ;  $M_2 = 2,04$ . Width/sinusid length ratio:  $P_4 = 0,59$ ;  $M_1 = 1,14$ ;  $M_2 = 1,19$ .

*Paratypes.* – All the specimens in NMB.  $D^4$ : MH-8. SW-1. –  $P^4$ : Mü 56.  $M^{1/2}$ : UM 2384f.  $P_4$ : UM 2417.  $M^{1/2}$ : UM 2424f. SW-2. –  $P^4$ : UM 2374.  $P_4$ : UM 2407 SW-3. –  $P^4$ : UM 2372.  $M^{1/2}$ : Mü 55f; UM 2377f.  $M^3$ : MH: 5.  $P_4$ : UM; 2405 and 2418(e).  $M_3$ : Mü 31. SW 4. –  $P^4$ : MH-7; UM 2370.  $M^{1/2}$ : UM 2379; 2381; 2392; MH: 9–10.  $M^3$ : UM 2362; 2378; 2385; 2389 and Mü 29.  $P_4$ : UM 2425 and 2438a.  $M^{1/2}$ : UM 2375; 2380; 2383; 2399; 2408 and 2412. SW-5. –  $M_3$ : UM 2420. Maxillary fragments: UM 2355 ( $M^1$ – $M^3$  in SW-4). Mandibular fragments: UM 2398 ( $P_4$ – $M_1$  in SW-4). UM 2400 ( $P_4$ – $M_1$  in SW-4).

Table 3: Measurements of the  $P^4$  of *Blainvillimys stehlini* n. sp. from Mümliswil–Hardberg (Switzerland)

SW	N	Sinus height	Length	Width	Sinus length	Extrasinus distance	Crown height
1	1	2,92	2,33	1,60	0,83	0,68	4,00
2	1	2,83	2,25	1,67	0,68	0,68	3,50
3	1	2,17	2,58	2,33	1,33	0,60	3,08
4	2	1,67–1,83	2,33–2,83	–	1,28–1,75	–	2,08–2,50
5	1	0,92	2,33	2,42	1,67	0,76	1,67



Fig. 13. *Blainvillimys stehlini* n. sp. a = NMB: UM 2402.  $P_4$ – $M_2$  sin. Holotype. b = NMB: UM 2402.  $P_4$  sin. Holotype. Lingual view of the  $P_4$  for to see the absence of the aperture in the III synclinid. Mümliswil–Hardberg, Switzerland. –  $\times 12,5$ .

Table 4: Measurements of the M<sup>1/2</sup> of *Blainvillimys stehlini* n. sp. from Mümliswil–Hardberg (Switzerland)

SW	N		range	$\bar{X}$	S	V
3	2	Sinus height	2,42–2,58	2,50	0,11	4,53
	2	Length	1,67–1,83	1,75	0,12	6,46
	2	Width	1,67–1,83	1,75	0,12	6,46
	2	Sinus length	1,28–1,33	1,30	0,35	2,70
	2	Extrasinus distance	0,48–0,52	0,50	0,03	5,66
	2	Crown height	3,00–3,08	3,04	0,06	1,86
4	7	Sinus height	0,75–2,25	1,56	0,46	–
	6	Length	2,17–2,33	2,22	0,04	2,94
	4	Width	2,17–2,50	2,31	0,14	6,10
	7	Sinus length	1,25–2,00	1,59	0,24	15,51
	6	Extrasinus distance	0,52–0,68	0,63	0,06	9,61
	7	Crown height	1,75–2,67	2,24	0,34	15,47

*Definition of the stage of wear.* – Upper teeth: SW-1: unworn or almost unworn stage. SW-2: lightly worn. SW-3: III syncline opened. SW-4: III syncline closed and with or without IV syncline. SW-5: very advanced worn stage. Sinus height very reduced. Lower teeth: equal to *B. blainvillei*.

*Hypodigm.* – Besides Holotype and Paratypes the following specimen: NMB Mü 32 (P<sup>4</sup>) in SW-5.

*Type locality.* – Mümliswil–Hardberg = Mümliswil–Heitersberg, Canton of Solothurn, Switzerland (see BAUMBERGER 1923, p. 71–72, Fig. 25, 26; MAYO 1980, p. 1096–97, Fig. 1 and 1982, p. 714–718, Fig. 8, 9 and KFSNMB).

*Type formation.* – Matzendörfer Kalke (Matzendorf limestone). See BAUMBERGER 1927, p. 550; WAIBEL & BURRI 1961, p. 166–67; MAYO 1980, p. 1096–97 and HABICHT 1987, p. 10.

*Stratum type.* – Gray-cream marls with concretions and shells of mollusk. Thickness 15–30 cm.

*Stratigraphic range.* – Oligocene, Lower “Chattien”, assemblage zone of Mümliswil–Hardberg (see ENGESSER & MAYO 1987).

*Geographical distribution.* – Central Europe.

Table 5: Measurements of the M<sup>3</sup> of *Blainvillimys stehlini* from Mümliswil–Hardberg (Switzerland)

SW	N		range	$\bar{X}$	S	V
3	1	Sinus height	–	1,83	–	–
	1	Length	–	–	–	–
	1	Width	–	2,00	–	–
	1	Sinus length	–	1,33	–	–
	1	Extrasinus distance	–	0,68	–	–
	1	Crown height	–	2,33	–	–
4	5	Sinus height	1,00–1,75	1,44	0,29	–
	5	Length	1,92–2,33	2,14	0,18	8,31
	5	Width	1,75–2,08	1,96	0,14	7,01
	4	Sinus length	1,42–1,58	1,53	0,08	4,95
	5	Extrasinus distance	0,44–0,60	0,51	0,07	12,84
	5	Crown height	1,33–2,50	1,98	0,47	–

*Diagnosis.* Height of maxilla anterior to P<sup>4</sup> low, and dorsally to P<sup>4</sup> higher. Slightly deep infraorbital canal, with wide and shallow fossa. Moderately high semihypsodontic teeth. P<sup>4</sup>–M<sup>3</sup> with narrow sinus, and more prolonged than the middle part of the occlusal surface. Synclines: I and II pseudolaminated and very reduced. Mandible: small, slightly inclined and moderately protuberant anterior shelflike masseteric below P<sub>4</sub>. Very well marked upper angular masseteric ridge and relative deep sulcus. Most of P<sub>4</sub>–M<sub>3</sub> with graben or semigraben; rarely with pseudograben and long sinusid. Without tubular III synclinid. II and IV synclinid laminated and shallowly opened on lingual crown border. I synclinid no represented. M<sub>1/2</sub> slightly longer than wide. Means of width/sinusid length ratio: 1,16.

Table 6: Measurements of the P<sub>4</sub> of *Blainvillimys stehlini* n. sp. from Mümliswil–Hardberg (Switzerland)

SW	N		range	$\bar{X}$	S	V
3	2	Sinusid height	1,75–2,00	1,88	0,17	9,43
	2	Length	3,00–3,17	3,09	0,12	3,90
	2	Width	1,75–1,88	1,82	0,09	5,06
	2	Sinusid length	1,50–1,69	1,60	0,13	8,42
	2	Extrasinusid distance	0,12–0,20	0,16	0,06	–
	2	Crown height	2,42–2,92	2,67	0,35	13,24
4	4	Sinusid height	0,58–2,83	1,42	0,98	–
	3	Length	2,50–3,25	2,92	0,38	13,09
	4	Width	1,33–2,00	1,77	0,30	17,03
	4	Sinusid length	1,25–1,92	1,73	0,32	18,62
	2	Extrasinusid distance	0,12–0,15	0,14	0,21	15,71
	4	Crown height	1,50–2,17	1,88	0,29	15,25

*Differential diagnosis.* – *Blainvillimys stehlini* n. sp. differs from *B. blainvillei* in the following characters:

- higher semihypsodonty,
- absence of tubular III synclinid,
- longer and laminated synclinids,
- III synclinid rare and only like a shallow notch,
- presence of graben or pseudograben in lower teeth,
- long semigraben,
- absence of real sinusid,
- absence of deep aperture in III synclinid of P<sub>4</sub>,
- shorter extrasinusid distance,
- different width/sinusid length ratio.

*Discussion.* – STEHLIN (1922, p. 577) mentioned the presence of *Blainvillimys* sp. in Mümliswil–Hardberg. The specimen NMB: UM 2355 (M<sup>1</sup>–M<sup>3</sup>) and UM 2402 (P<sub>4</sub>–M<sub>2</sub> Holotype) were referred by THALER (1966, p. 60, Tabl. 4) and VIANEY-LIAUD (1973, p. 345, Fig. 24) to *Blainvillimys blainvillei*. The last author also referred the tooth NMB: Mü 31 (M<sub>3</sub>) of Mümliswil–Hardberg (non Mümliswil–Näsihöfli as she wrote) to this species. Later, VIANEY-LIAUD (1982, p. 691–695, Fig. w/n) figured again the specimen NMB: UM 2402 as an evolved *B. blainvillei*. MAYÖ (1980, p. 1100, 1102, Fig. 2 and 4; and 1982, p. 713,



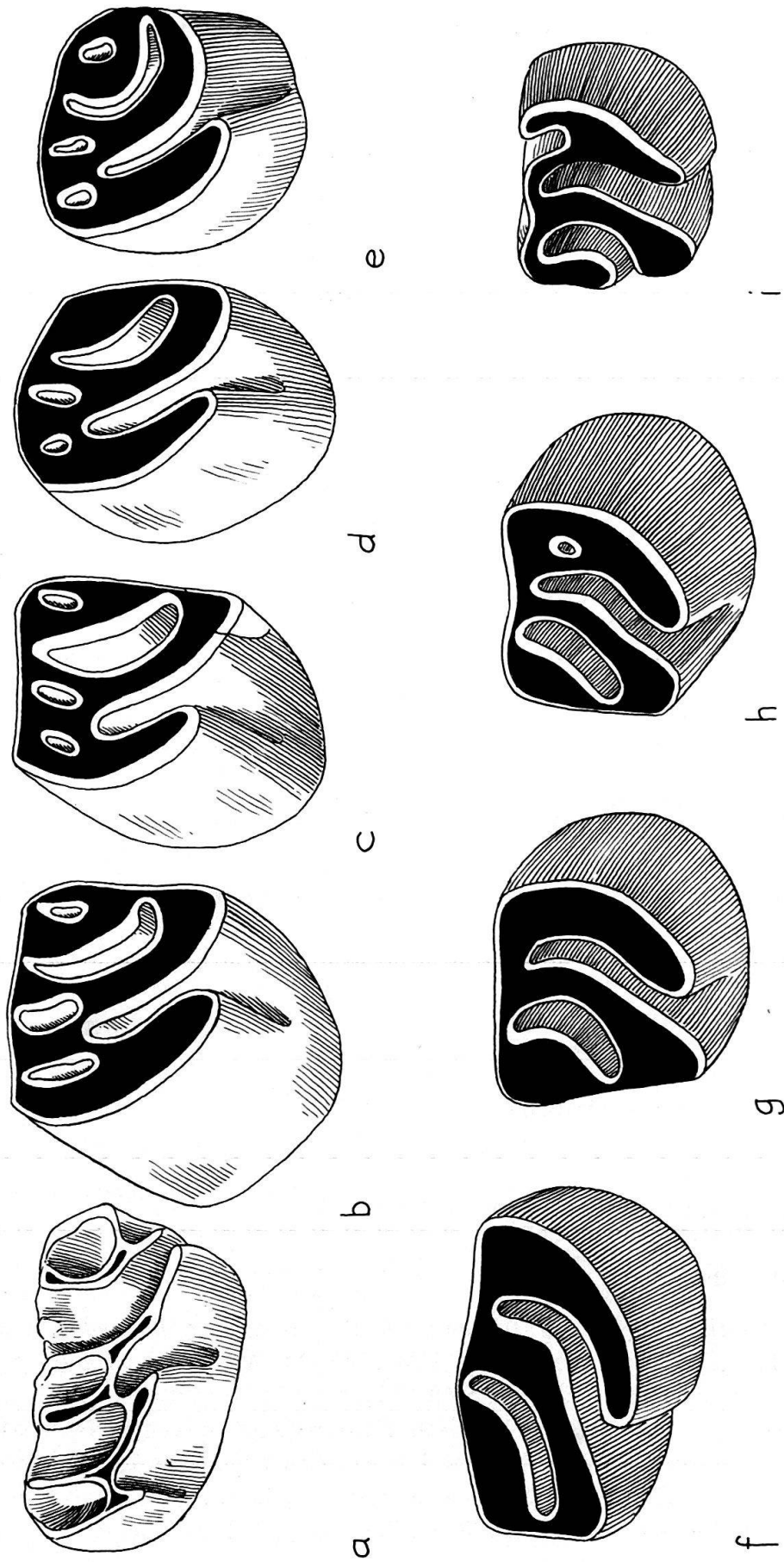


Fig. 14. *Blainvillimys stehlini* n. sp. a = NMB: MH 8. D<sup>4</sup> dex (invers.). b = NMB: UM 2372. P<sup>4</sup> dex (invers.). c = NMB: UM 2392. M<sup>1</sup> dex (invers.). d = NMB: UM 2391. M<sup>2</sup> dex (invers.). e = NMB: UM 2378. M<sup>3</sup> sin. f = NMB: UM 2425 dex (invers.). g = NMB: UM 2375. M<sub>1/2</sub> dex (invers.). h = NMB: UM 2389 M<sub>1/2</sub> dex (invers.). i = NMB: Mü 33. M<sub>3</sub> dex (invers.). Paratypes. Mümliswil-Hardberg, Switzerland. — All figures × 12.5.

Table 7: Measurements of the  $M_{1/2}$  of *Blainvillimys stehlini* n. sp. from Mümliswil–Hardberg (Switzerland)

SW	N		range	$\bar{X}$	S	V
4	10	Sinusid height	0,50–1,75	1,24	0,41	–
	9	Length	2,17–2,58	2,31	0,13	5,56
	9	Width	2,00–2,42	2,13	0,13	6,57
	8	Sinusid length	1,67–2,20	1,83	0,16	8,79
	9	Extrasinusid distance	0,16–0,28	0,21	0,03	15,06
	9	Crown height	1,33–2,75	2,01	0,56	–

715, Fig. 6 and 7) considered the material of *Blainvillimys* of Mümliswil–Hardberg as a new species: first as the genus *Archaeomys*, afterwards as *Blainvillimys*. The specimen NMB: UM 2407 ( $P_4$  sin.) and UM 2424 (unworn fragment of  $M_{1/2}$ ) show a very superficial pseudograben, where the III synclinid is only a slight notch. But, no one specimen shows a typical tubular III synclinid. Ninety six percent of the lower teeth show a graben or semigraben (none a sinusid with a tubular III synclinid). In the process of wear this rare pseudograben shows a longer “sinusid” with a wide notch on the lingual border. The Pearson variation coefficient of the length of  $M_{1/2}$  (9 specimens) show a normal value of V (5,56), in spite of the few number of specimens. The comparison by the Student t-test of the sample of *Blainvillimys blainvillei* of Antoingt (4 specimens) with the sample of *B. stehlini* n. sp. of Mümliswil–Hardberg (8 specimens) for the length of  $M_{1/2}$  did not show significant differences. But the Student t-test show highly significant differences for sinusid length (N = 11) and for the width/sinusid length ratio (N = 12).

Measurements in the Tables 3–8.

Statistical test in the Tables 54 and 56.

Table 8: Measurements of the  $M_3$  of *Blainvillimys stehlini* n. sp. from Mümliswil–Hardberg (Switzerland)

SW	N	Sinusid length	Length	Width	Sinusid length	Extrasinusid distance	Crown height
3	1	1,08	1,92	1,83	1,50	0,17	1,75
5	1	0,42	2,17	2,00	1,92	0,17	0,58

### Subfamily *Issiodoromyinae* (SCHLOSSER 1884)

#### Genus *Issiodoromys* CROIZET, in BLAINVILLE 1840

*Type species.* – *Issiodoromys pseudanema* GERVAIS 1848–52.

*Stratigraphic range.* – Oligocene, Upper “Chattien”. From Fornant-7 to Rickenbach assemblage zones in the faunal province of Switzerland and Savoy (see ENGESSER & MAYO 1987).

*Geographical distribution.* – Central and West Europe.

*Previous diagnoses.* – CROIZET 1840, in: BLAINVILLE, p. 931–32; GERVAIS 1848–52, p. 27 and 47, explanation to Fig. 6 and 8; POMEL 1854, p. 39–40; LYDEKKER 1885, p. 252; ZITTEL 1891–93, p. 525; VIRET 1929, p. 85; WINGE 1941, p. 22–23 and 131; FREUDENBERG 1941, p. 137; STEHLIN 1951, p. 69, 74 and 247–48 in: STEHLIN & SCHAUB; SCHAUB 1953, p. 190 and 1958, p. 45; VIANEY-LIAUD 1976, p. 34.

*Emended diagnosis.* – Hypsodont [protohypsodont] Issiodoromyinae. Broad infraorbital foramen. Ascending ramus of anterior zygomatic process with very concave anterior