

A discussion of the referral of *Mimomys occitanus* THALER, 1955 (Rodentia: Arvicolidae) to the genus *Mimomys*

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Abstract. *Mimomys occitanus*, which up to now has been considered to be a member of one of the *Mimomys* lineages, should be excluded from this group. The main argument for this is the development of the height of the Sb3 (=anterior buccal synclinal) wall of the M₁. Very early arvicolids such as *Promimomys* and *Mimomys davakosi* have a high Sb3-wall. Because its development seems to go into the direction of decrease, *Mimomys occitanus* with a low wall cannot be the ancestor of *Mimomys polonicus* and other modern *Mimomys* forms that all have high walls. It is much more probable that *Mimomys occitanus* belongs to a lineage which goes into the direction of *Dolomys*.

Key words: Pliocene, Arvicolidae, *Mimomys*-lineage, *Mimomys occitanus*

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I. INTRODUCTION

In the evolution of arvicolids the genus *Mimomys* occupies a central position: many evolutionary lineages within this family originate directly from this genus or are closely related to it (cf. KRETZOI 1969; RABEDER 1981; FEJFAR & HEINRICH 1982).

Although the origin of *Mimomys* is not yet wholly clear (KRETZOI 1955, 1969; VAN DE WEERD 1979; FEJFAR & HEINRICH 1982; FEJFAR et al. 1990), many authors agree that *Mimomys occitanus* THALER, 1955 is an important member of that *Mimomys* lineage which consists of the following species: *Mimomys davakosi* VAN DE WEERD, 1979, *Mimomys occitanus* THALER, 1955, *Mimomys hajrackensis* FEJFAR, 1961, *Mimomys polonicus* KOWALSKI, 1960, and *Mimomys ostramosensis* JÁNOSSY & VAN DER MEULEN, 1975 (CHALINE 1974, 1990; CHALINE & MICHAUX 1975; CHALINE & LAURIN 1986; FEJFAR & HEINRICH 1982, 1983; FEJFAR et al. 1990).

This succession illustrates general morphological trends of arvicolid evolution that are realised simultaneously in different groups, e. g., the increase in hypsodonty, the increase in the linea sinuosa, the introduction of crown cementum, enamel differentiation and the development of Schmelzmuster (KRETZOI 1969; RABEDER 1981; KOENIGSWALD 1980; FEJFAR & HEINRICH 1982).

However, the development of another morphological feature, a ridge within the Sb3 (=the anterior buccal synclinal according to the nomenclature of RABEDER 1981) of the M₁, here called Sb3-wall, supports the idea of excluding *Mimomys occitanus* from the aforementioned *Mimomys* lineage. Thus, the following arguments are intended to provoke a new discussion about the referral of all the above mentioned species to this lineage. Interest in questions concerning *Mimomys occitanus* arose during studies in Hungarian collections, where the author was first faced with the Arvicolids from Csarnóta.

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II. CHARACTERISTICS OF *MIMOMYS OCCITANUS*

Mimomys occitanus was first described in 1955 by THALER from the French locality Sète. It is characterised by many primitive features, e. g., rather limited hypsodonty, long roots and a well developed prism fold. Moreover, the linea sinuosa is rather low and crown cementum is absent in the synclinals (THALER 1955, CHALINE 1974).

The most remarkable feature of the specimens from Sète is a character which was up to that time not known in *Mimomys*: the population is notably polymorphic because of the co-occurrence of *Mimomys* morphotypes (with islet and smooth Sb3) and *Dolomys* morphotypes (without islet and with deep Sb3; Fig. 1) (THALER 1962; CHALINE 1974). Although THALER did not state whether he believed this to represent one or two species, some other authors (KOWALSKI 1960a; BACHELET 1990; FEJFAR et al. 1990) have opted for the presence of two taxa: one species of *Mimomys* and one species of *Dolomys*.

Others (CHALINE 1974; CHALINE & MICHAUX 1975) believe that the biometrically homogeneous population represents a single species of *Mimomys*. They explain the polymorphism by an initial cladogenesis into a *Mimomys* lineage (*Mimomys stehlini* (*M. occitanus*) – *Mimomys polonicus* – *Mimomys ostramosensis*) and a *Propliomya* lineage (CHALINE 1974; CHALINE & MICHAUX 1975). For *Propliomya* we should probably read *Dolomys*. *Dolomys nehringi* KRETZOI, 1959 and *Dolomys milleri* NEHRING, 1898 resemble *Mimomys occitanus* much more but can be readily distinguished from *Propliomya hungaricus* (KORMOS, 1934).

In recent decades, *Mimomys occitanus* has been recorded from other faunas. In these populations the co-occurrence of *Mimomys* and *Dolomys* morphotypes is also considered to be controversial.

Although there exist general doubts about the possibility of sympatric speciation within a population without geographical isolation (MAYR 1984), the validity of this theory of cladogenesis is not the point of discussion here. The following suggestions will illustrate another interpretation of the polymorphism and the taxonomic referral of *Mimomys occitanus*.

III. THE SB3-WALL

Whether *Mimomys* or *Dolomys* morphotypes appear depends on the Sb3-wall, a feature which was already mentioned by THALER (1955) in the first description of *Mimomys occitanus*. This wall divides the anterior buccal synclinal (Sb3) of the M₁ into two parts (in analogy with the posterior lingual synclinal, of the M₃). Through this structure the so called "*Mimomys*-islet", a funnel-shaped invagination, is separated from the true Sb3. It is of importance that the upper edge of this wall does not reach the top of the unworn crown (see Figs. 1, 2).

In the part above the upper edge of the wall the *Mimomys*-islet and Sb3 are still connected and together create a deep syncline as in *Dolomys*. When the wall is included in abrasion it divides the Sb3 into the islet and a smooth Sb3. This is typical of *Mimomys* (Figs. 1, 2). Thus, within a population with such an M₁ the appearance of *Mimomys* or *Dolomys* morphotypes depends on the height of the wall and the degree of tooth abrasion.

In discussing the arvicolidids from Weże, KOWALSKI (1960a) mentioned that some M₁'s are *Dolomys*-like in the upper part of the crown whereas in the lower part of crown they are *Mimomys*-like. The so called polymorphism with co-existence of *Mimomys* and *Dolomys* morphotypes within one population therefore seems to reflect the occurrence of teeth of different wear

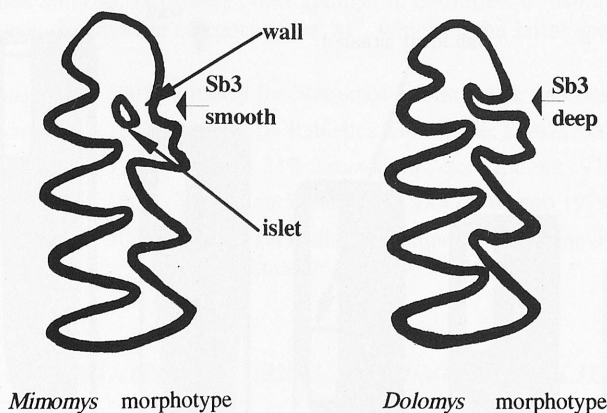


Fig. 1. Morphotypes of *Mimomys occitanus* from Sète (after CHALINE 1974)

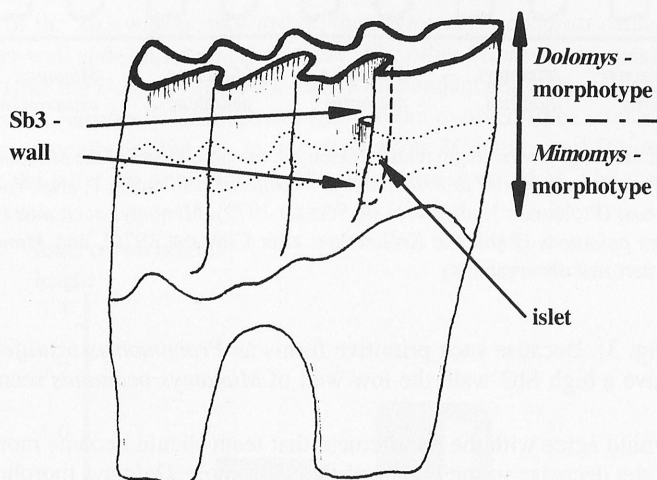


Fig. 2. Arvicolid M₁ with Sb3-wall; mesio-buccal view

stages. Of course, we must here take into account the normally distributed variation within populations of the height of the Sb3-wall.

IV. EVOLUTIONARY CHANGE OF THE SB3-WALL

The question is how the height of the Sb3-wall evolves with time: does it increase, decrease or remain unchanged? It is known that within the evolution of each lineage, hypsodonty increases successively, and therefore we should consider the distance between the top of the unworn tooth and the upper edge of the Sb3-wall. This distance will in the following discussion be called the apical distance of the wall (Fig. 3).

According to the available data (CHALINE 1974; VAN DE WERD 1979, personal observations) this distance seems to remain constant in *Promimomys insuliferus* KOWALSKI, 1958, and in the examined samples of *Mimomys* with the exception of *Mimomys occitanus*, where it is on average

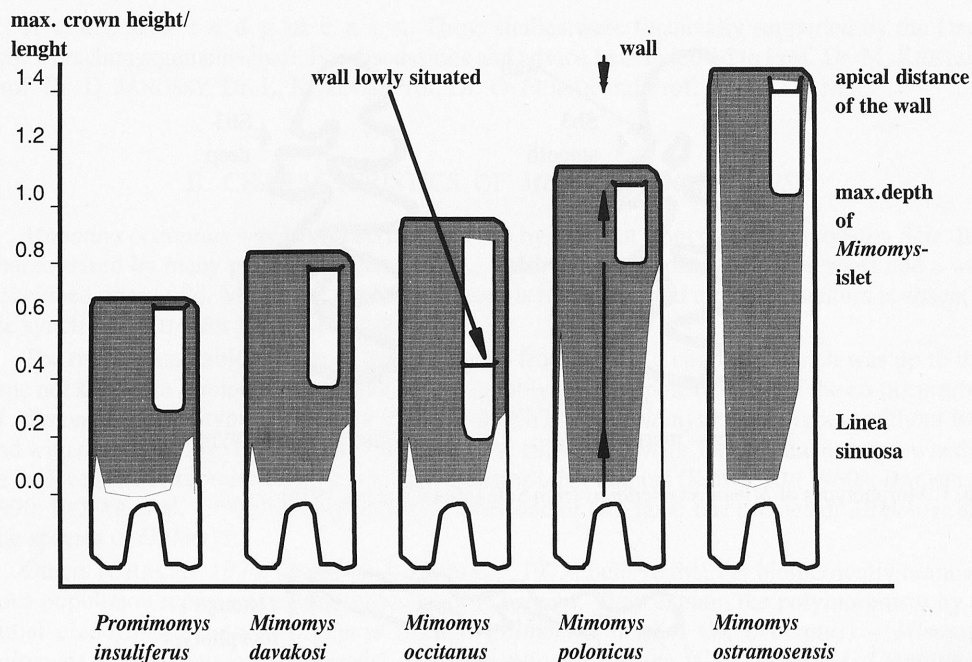


Fig. 3. Averages of maximal crown height relative to length, maximal depth of the *Mimomys* islet and situation of the upper edge of the Sb3-wall in *Promimomys insuliferus* (Ptolemais 1; after VAN DE WEERD 1979), *Mimomys davakosi* (Ptolemais 3; after VAN DE WEERD 1979), *Mimomys occitanus* (Sète; after CHALINE 1974), *Mimomys polonicus* (Rębielice Królewskie; after CHALINE 1974), and *Mimomys ostramosensis* (Neuleiningen; personal observations)

much deeper (Fig. 3). Because such primitive forms as *Promimomys insuliferus* and *Mimomys davakosi* also have a high Sb3-wall, the low wall of *Mimomys occitanus* seems to be a derived feature.

This trend would agree with the requirement that teeth should become more effective during evolution. With the decrease in the height of the wall, more *Dolomys* morphotypes appear in a population (Fig. 2). In comparison with the smooth Sb3 of *Mimomys* morphotypes, the Sb3 of *Dolomys* is deeper (Fig. 1) and therefore more effective because of the longer cutting edges (RENSBERGER 1973).

One may argue that the longer cutting edges will be replaced ontogenetically by shorter edges (the above described ontogenetic change from the *Dolomys* to the *Mimomys* morphotype), but this is affected by the question of stability, because edges must be shorter (i. e., synclinals smoother) in the lower part of the crown.

In this respect the depth of the islet is relatively constant (Fig 3). The maximal depth of the islet is reached when the top of the crown is involved in abrasion because the islet is created from the apical end of the crown (KOENIGSWALD 1982).

In *Mimomys occitanus* the islet invaginates much deeper into the crown than in the other species. The reason is seen in the greater apical distance and lesser height of the wall, so that enamel can be allocated from the side also after the beginning of wear.

The conditions in *Mimomys occitanus* are different from the other mentioned *Mimomys* and *Promimomys*, which means that they presumably do not belong to the same lineage. Moreover, it is not likely that the wall goes first down and then up in phylogeny. The direction of this evolutionary change is very probably irreversible, as is the case with the increase in hypsodonty

or height of the linea sinuosa. A further point against an evolution of *Mimomys polonicus* from *Mimomys occitanus* is the number of roots of the M^3 , which in the latter species is already more evolved:

<i>Mimomys ostramosensis</i>	100%	2 rooted (in Osztramos 3; JÁNOSSY & VAN DER MEULEN 1975)
<i>Mimomys polonicus</i>	100%	3 rooted (in Rębielice Królewskie; KOWALSKI 1960b)
<i>Mimomys occitanus</i>	77%	3 rooted, 23% 2 rooted (in Sète; CHALINE 1974)
<i>Mimomys davakosi</i>	100%	3 rooted (in Ptolemais 3; VAN DE WEERD 1979)
<i>Promimomys insuliferus</i>	100%	3 rooted (in Podlesice, Antipovka, Chugunovka; AGADZHANIAN & KOWALSKI 1978)

V. ALTERNATIVE REFERRAL OF *MIMOMYS OCCITANUS*

These discrepancies would not exist if one presumes that the apical distance remains constant within the *Mimomys* lineage and *Mimomys occitanus* belongs to another lineage where the distance becomes successively greater.

If an increase of the Sb3-wall is improbable, then *Mimomys occitanus* cannot be ancestral to forms with a higher wall and shorter apical distance (like other *Mimomys* species), but only to taxa with a lower wall (like the *Dolomys* species). Such a descendant could be, e. g., *Dolomys nehringi* KRETZOI, 1959 from Csarnóta 2. This species has a more evolved linea sinuosa than *Mimomys occitanus* and a lower wall (see Fig. 4). In this population, *Mimomys* and *Dolomys* morphotypes also co-occur, but the latter are predominant. Moreover, the shape of M^3 and the presence of two roots support this idea.

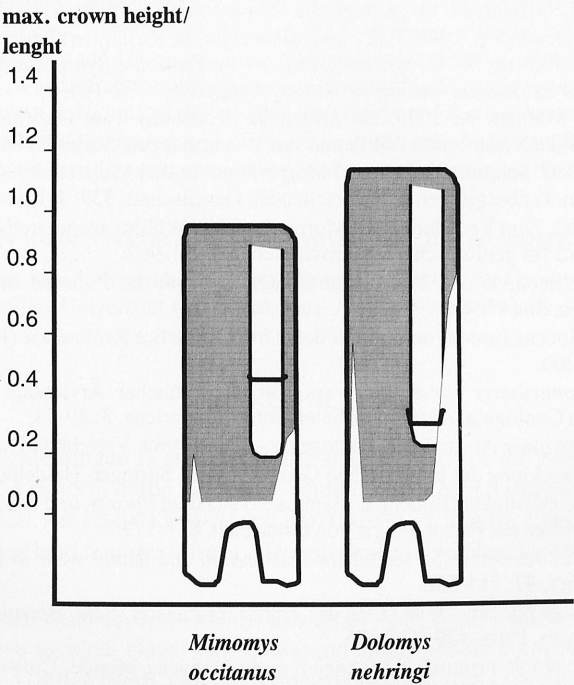


Fig. 4. Maximal crown height relative to length, maximal depth of the *Mimomys* islet and situation of the upper edge of the Sb3-wall in *Mimomys occitanus* (Sète; after CHALINE 1974), and *Dolomys nehringi* (Csarnóta; personal observations)

The Schmelzmuster of *Mimomys occitanus* is so primitive that an evolution to *Dolomys* is possible (cf. KOENIGSWALD 1980).

In summary, if these arguments are correct, *Mimomys occitanus* does not belong to the *Mimomys* lineage. Instead, there are strong arguments for interpreting it as an ancestor of *Dolomys nehringi* and it should thus be referred to *Dolomys occitanus*.

However, more data on the height of the Sb3-wall should be compiled in further investigations to test these arguments as well as to get an idea of the variability of this feature.

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