

Contribution to variation and homology of crown pattern of the upper molar in *Taxidea taxus* (Mammalia: Mustelidae)

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Polymorphism of upper molar (M^1) crown patterns of *Taxidea taxus* (Schreber, 1777) involves the number, position and interconnection of the cones and cristae constituting the inner part of the crown. Some questions of homology of the cones are briefly considered.

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Introduction

The North American badger *Taxidea taxus* (Schreber, 1777) has been shown to be quite variable by skull size and proportion and body colouration (Long 1972). However, no published data on dental variation are available.

My investigation of a small sample of this species revealed a quite extensive and interesting picture of variation in the upper molar crown (M^1) pattern which involves differences in the number of cones and ridges, their position and interconnection.

Material and methods

Respective data on 14 specimens with minimally worn dentition from the Zoological Museum of Berkeley University (USA) and the Zoological Museum of Moscow University (Russia) are reported here. Dental nomenclature is adopted after Vandebroek (1961), as it is based principally on the ridges, not identification of the cones which appears to be important in the present case.

Results and discussion

Typically, the crown of M^1 in the sample studied shows the following elements (see Fig. 10): a pair of buccal main cones (eocone and distocone) and a pair of parallel ridges (epicrista and plagiocrista, see below) connecting the above main

cones with lingual cingulum. Both cristae show more or less developed cones varying in their size and number. It is those cristae and cones associated with them that display the most noteworthy variation.

The epicrista (running from eocone) bears one or two cones. Of these two, the most lingual one is larger and constantly present. It is located slightly apart from lingual cingulum, so that a fragment of epicrista joining it with the cingulum is

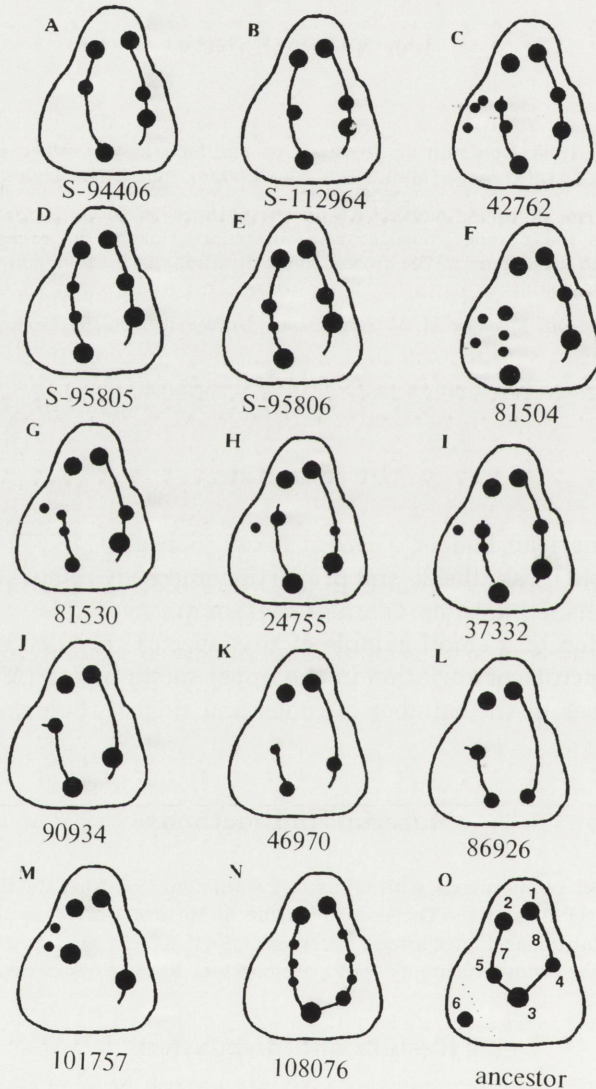


Fig. 1. Variation of crown pattern of the upper molar in *Taxidea taxus*. A-N - individual teeth, with collection numbers beneath (with "S." - from Moscow, without - from Berkeley), O - hypothetical ancestral morphotype. Crown elements: 1 - eocone, 2 - distocone, 3 - epicone, 4 - epicunule, 5 - plagiocunule, 6 - endocone, 7 - plagiocrista, 8 - epicrista.

usually visible. The second cone may be as large as the first one (Fig. 1A-G), distinctively smaller (Fig. 1H), or occasionally absent (Fig. 1J-M).

Plagiocrista (running from distocone, usually incomplete) and associated cones display more complicated variations. Most commonly this ridge bears one main cone situated where the ridge and lingual cingulum join and a smaller one situated where more labially (Fig. 1A, H, J-L). This labial conule is usually smaller than lingual, sometime "doubled" (Fig. 1C-G, I).

In some instances several small conules may occur. These are located by the labial conule and associated not with plagiocrista but with distal cingulum (Fig. 1F-I).

There are two interesting specimens in which the crown pattern differs both from the typical picture just described and from each other. One of them is distinctive as it lacks plagicrista and displays one cone situated close to the distal cingulum (Fig. 1M). In the other, there are two cristae each bearing several small conules and joining at the lingual cingulum to form one large cone (Fig. 1N).

As can be seen from the above, the variation of M^1 crown pattern in *Taxidea* is quite extensive and remarkable in two respects. First, it may clearly be ordered along a complexity gradient. Second, it reveals a problem with the homology of crown elements.

Providing that the homology of ridges is correct, identification of the cones associated with epicrista is clear. Based on their size and position, these two elements should be interpreted as epicone (larger) and epiconule (smaller). In the case of plagiocrista, however, the homology is more problematic and requests a brief consideration of the plagiocrista and talon on generalized M^1 (Fig. 1O).

This ridge originally connects epicone with distocone and bears a small cone (plagioconule) situated between them. As to the talon, when it is well developed, it displays a trend to produce one more large cone (endocone) which may be connected by a ridge with either epicone or plagioconule. This ridge becomes a continuation of epicrista in the former case or plagiocrista in the latter. If connection with plagioconule occurs, two parallel ridges appear on the crown, just as in the case under consideration. Thus, it seems reasonable to consider lingual cone associated with plagiocrista as endocone. Then the labial one becomes plagioconule, single or "splitted".

In the most simple tooth (Fig. 1M), the proximal ridge with a single cone is evidently epicrista with epicone; interpretation of distal portion of the crown is problematic. It is clear that plagiocrista is completely reduced (as in the tooth on Fig. 1F). The isolated cone might be either endocone displaced labially and having lost any connection with lingual cingulum, plagioconule being disappeared or having displaced to distal cingulum. Or it is enlarged plagioconule, endocone being reduced or completely "dissolved" in the talon cingulum. The latter interpretation appears to be more sound, as it makes this unusually looking morphotype just an extra step beyond that on Fig. 1F. This means that the tooth in question displaces not a typical quadritu-bercular, but a more ancient tribosphenic pattern.

In the most complicated tooth (Fig. 1N) the ridges are by no mean epicrista and plagiocrista. The single large cone might be either endocone, or epicone, or a result of their fusion. The first interpretation looks more appropriate, judging by somewhat distal position of the cone. If it is the case, epicone is probably the most lingual conule on epicrista proper.

Special investigation of variation of crown pattern of the upper molar in the genus *Martes* has shown that (1) most variable is also lingual part of the tooth, and (2) this variation is interpretable phylogenetically (Pavlinov 1974, Wolsan 1988, 1989, Wolsan *et al.* 1985). That means some rare morphotypes occurring in the recent population "recapitulate" quite ancient dental morphology.

As to *Taxidea*, it is worth stressing that in this genus crown pattern variation is seemingly much wider than in *Martes*, taking into account the quite small sample to hand and the great diversity of morphotypes. However, it would be premature to adopt a phylogenetic interpretation of this diversity, because for the most simple morphotype one cannot be sure at the moment if it is atavistic and factually recapitulates an ancestral condition.

It should be noted that the upper molar in *Taxidea taxus* is morphologically rather unstable. It might be caused by the fact that it has not yet reached a fixed evolutionary condition, or that rigid epigenetic control has been lost because of non-functionality of some crown elements, or by some other causes. At any rate, it is evident that variation of molar crown pattern in recent *Taxidea* is of interest from an evolutionary and taxonomic position and deserves special investigation using as large a sample size as possible.

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