MORPHOLOGICAL OBSERVATIONS ON A *MICROGALE* SPECIMEN (INSECTIVORA, TENRECIDAE) FROM WESTERN MADAGASCAR

M. ADE

Résumé: Une nouvelle espèce de *Microgale* de la forêt de Kirindy

Nous rapportons certains caractères morphologiques d'un jeune individu de *Microgale* à longue queue. L'espèce est probablement arboricole. C'est le premier échantillon d'un *Microgale* cluster *longicaudata* de l'ouest de Madagascar.

Abstract

This is the first record of a long tailed *Microgale* in western Madagascar. Although the tail is too short, other diagnostical structures clearly indicate that it belongs to the *longicaudata* cluster of the genus *Microgale*. The exact taxonomic status could not be determined. Several morphological features indicate that the species is regularly climbing.

1. Introduction

The taxonomic diversity of shrew-tenrecs of the genus *Microgale* is still not properly known. According to the revision of MACPHEE (1987), the genus *Microgale* (shrew-tenrecs) comprises 10 species, while more recent reviews (HUTTERER, 1993; JENKINS, 1993) recognise 13 species, and further taxa are currently being described (HUTTERER, pers. comm.). In this genus several long tailed forms with a naked area on the terminal dorsum of the tail have been described. This is a specialization known only to occur in long tailed microgales (*longicaudata* cluster in MACPHEE, 1987). However, only two of them have been accepted as being valid species: *M. longicaudata* and *M. principula* (see MACPHEE, 1987).

In March 1990 a subadult microgale was found in the Kirindy Forest (leg. M. BUTTERWECK and I. PETZOLD). The specimen has characters indicating that it is a long tailed microgale, but the tail is too short for any form already described. Whether or not this specimen is conspecific to one of the long tailed species cannot be decided at present. The reasons for this are discussed below. Until now, there has been no record of a long tailed microgale from western Madagascar. No direct observations on the behaviour of long tailed microgales are available at present, nor are detailed documentations of their external characters available in literature. The present paper provides a documentation of some external characters and discusses them in relation to possible behavioural traits taking into consideration other, better known forms. Important taxonomical characters are also reported. The specimen is still under examination for external characters and related musculture, except for the teeth, all the skeletal characters are derived from x-ray photographs.

2. Dental age and taxonomically important morphological characters

The specimen has still the fourth upper milk premolar (Pd^4), indicating that stage II of tooth eruption had not yet finished (see MACPHEE, 1987) (Fig. 1A). Remarkably, Pd^4 has a centrally

situated buccal stylar cusp (Fig. 1A,B). The individual is definitely subadult judging from the large epiphyseal plates present in several bones of the postcranial skeleton.

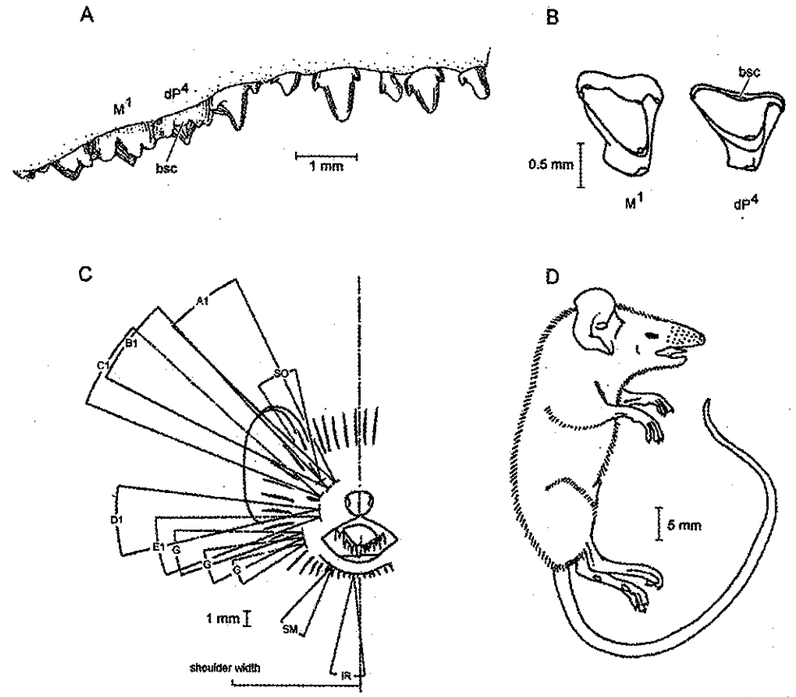

Fig. 1: A: Buccal aspect of the upper teeth, bsc: buccal stylar cusp. B: Occlusal view of first molar (M1) and fourth milk premolar (dP4), bsc: buccal stylar cusp. C: Vibrissa extention. A1-E1: longest proximal mystacial vibrissae, SO: longest supraorbital vibrissa, G: longest genal vibrissae, SM: longest submental vibrissa, IR: longest interramal vibrissa. Each triangular field represents the area which a given vibrissa covers when projecting into the frontal plane. The triangular field takes into account a certain variation due to errors in the applied drawing technique (see ADE, 1993). D: Body outline.

For general habitus see Fig. 1D and Fig. 2A. The following characters indicate that the specimen should considered a longtailed microgale: the tail has a 5 mm long naked area situated dorsally at its terminal end (Fig. 2E); the ratio hindfoot length (HFL=15 mm) to head and body length (HBL=51 mm) is 0.29 (range in long tailed forms is 0.23-0.28; MACPHEE, 1987); and hindfoot structure is the same as described for *M. longicaudata* by DOBSON (1882), e.g., the fourth toe is reaching most distally, the hallux is much shorter than the fifth toe and the latter is nearly equal in length to the second toe (Fig. 2B). Obviously, this is different from the "usual" pattern in the Insectivora (see DOBSON, 1882). However, it is not known if *M. principula* has

a similar pes structure (compare MACPHEE, 1987). Greatest skull length (18.3 mm) is most similar to that which is found in the smallest *M. longicaudata* (18.8 mm; smallest *M. principula*: 23.5 mm) (see MACPHEE, 1987). The similarity in greatest skull length is not seen in the tail length (TL). The specimens TL is only 81 mm, which is much smaller than the shortest TL either of *M. longicaudata* or *M. principula* (109 mm, 134 mm, respectively). Correspondingly, the ratio TL/HBL is also different: 1.58 for the specimen discussed compared to a minimum of 1.77 at minimum in *M. longicaudata* and 2.03 in *M. principula* (see MACPHEE, 1987).

M. longicaudata has been recorded in northern Madagascar (MACPHEE, 1987; NICOLL and RATHBUN, 1990; HUTTERER, 1993). This region belongs floristically to the Western Domain (NICOLL and RUTHBUN, 1990). All other records of this species are from the Eastern Domain (NICOLL and RUTHBUN, 1990; HUTTERER, 1993). It seems therefore possible that *M. longicaudata* occurs in more southern regions of the Western Domain. However, the short tail make one hesitate to delegate this individual to *M. longicaudata*. More and especially adult specimen are needed to decide whether the short tail is an aberrant or constant character.

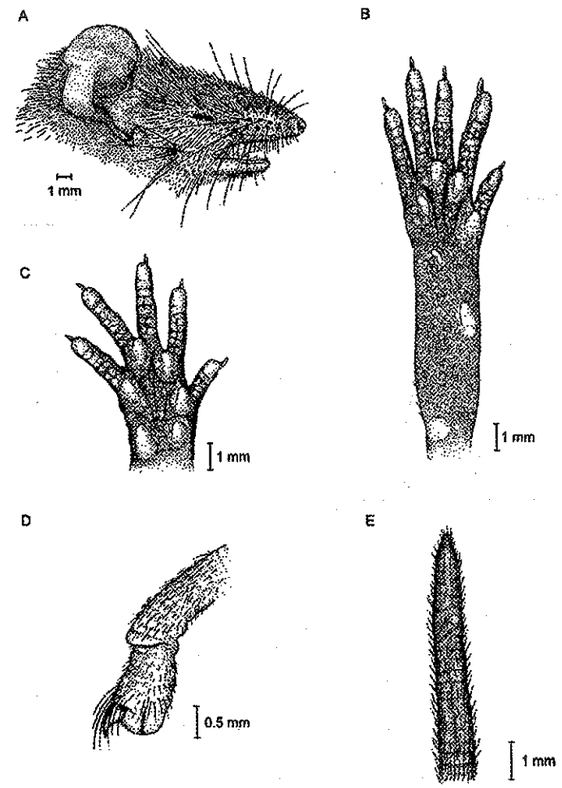

Fig. 2: A: Head in lateral view. B: Right pes, plantar view. C: Right manus, palmar view. D: Pedal digit IV, lateral view. Fig. E: Terminal dorsum of tail.

3. External and presumed behavioural characters

The "more lengthened fifth hind toe" has been already taken as an indication for arboreality in *M. longicaudata* (THOMAS, 1918). Moreover, the hindfeet of arboreal dormice (Gliridae, Rodentia) show similar relative length proportions in their hind toes (fourth toe is the longest one, fifth toe conspicuously longer than hallux and similar in length to the second toe, fifth toe extends conspicuously distally; MOHR, 1954, Fig. 67; pers. obs. in *Muscardinus avellanarius* and *Glis glis*). A more detailed documentation of this phenomenon is in preparation (ADE, in prep.) It is very interesting in this context that dormice grasp around small twigs when climbing ("Greifzehen"; ZIPPELIUS and GOETHE, 1951). The claws of the chiridia are short, markedly curved and pointed. Their claws are relatively shorter than in the short tailed *M. cowani* (DOBSON, 1882 and pers. observ.), which is a surface forager "with moderate climbing ability" as judged from external characters (EISENBERG and GOULD, 1970). The scansorial shrew *Sylvisorex megalura* has also short claws (see below).

The naked area on the tail's dorsum is irregularly wrinkled distally. This is visible when the skin surface is contrasted with aqueous methylene blue solution. It is not "transversely wrinkled" as mentioned by THOMAS (1918) for *M. longicaudata*. Because the specimen has been preserved in formalin, shrinking of the skin is unlikely. The ring like scales of the tail are partly fused in this region, which together with the wrinkled area forms a conspicuous surface differentiation of the integument (Fig. 2E). The naked area is already present in an early juvenile, undetermined long tailed microgale with a very weak developed pelage (HBL 37 mm; Museum für Naturkunde, Humboldt-Universität Berlin; No. 73257). This indicates that it is not produced by abrasion in later life. In analogy to some "prehensile-tailed muridae" it is concluded that the naked area on the tail of *M. longicaudata* is an indication for prehensile function (THOMAS, 1918). The exposure of naked skin in certain areas indicates that these may have special tactile functions. They are therefore regarded as "tactile areas" in prehensile tails ("Tastflecke", "Taststellen"; HILZHEIMER, 1913; AUGUSTINY, 1943). Tactile exploration with the tail should be important when it is used for prehensile movements, e.g., in locating supporting structures.

Like long tailed microgales, most of the partly arboreal prehensile tailed rats (*Pogonomys*) also have a naked area terminally on the dorsum of their tail, which is curled backwards when used during prehensile movements and not downwards (NOWAK, 1991). However, prehensile tails with (ventrally) naked areas are also found in the climbing marsupials *Didelphis* and *Marmosa* (Didelphidae; compare AUGUSTINY, 1943 with HUNSAKER and SHUPE, 1977).

The maximum relative vibrissa length (longest vibrissa to head width: 2.0; longest vibrissa to HBL: 0.39) may also indicate climbing abilities, because it is similar to these ratios found in arboreal rodents (see KRATOCHVIL, 1968; AHL, 1987). The vibrissa extension is documented in Fig. 1C.

The shrew *Sylvisorex megalura* (Soricidae) is an example for a small scansorial insectivore. Its method of climbing has been described pictorially by VOGEL (1974). This species uses its long tail during climbing by coiling it around twigs. It is a matter of debate if this can be called a prehensile action in the strict sense of the word (see MACPHEE, 1987), but supporting action by the tail during climbing is obvious (VOGEL, 1974). The tail is also used for balancing (VOGEL, 1974). Unfortunately, the tail morphology of *S. megalura* has not been described. The claws are also short compared to a confamiliar, terrestrial species (HUTTERER, 1985; Fig.1).

It is tempting to interpret the pes structure in the microgale as an adaptation for climbing by grasping as in some Gliridae (see above). However, if climbing actually occurs, the "simplest

and most familiar" mode of clinging on the substrate by interlocking the claws cannot be excluded (see CARTMILL, 1985). Because of their high ratio HFL to HBL and the long tail, it is suspected that the microgales of the *longicaudata* cluster are "climbers and richochettors among branches" EISENBERG and GOULD (1970). The fact that the present specimen has been caught in a ground trap indicates that it at least sometimes behaves terrestrially

The specimens stomach and intestines were almost empty. Remains of caterpillars, an insect mandible of the phytophagous type (Blattariae?), various other arthropod remains, and a radula could be identified.

4. Acknowledgements

Thanks are due to Prof. Dr. B. Rakotosamimanana, Laboratoire de Primatologie, University of Antananarivo, for donation of the specimen, Prof. Dr. W. Maier, Tubingen for providing a working place; Dr. J. Habersetzer, Frankfurt for carrying out the X-ray photographs and for help in their interpretation; Dr. R. Angermann, Berlin, for providing material, Dr. R. Hutterer, Bonn; Dr. H. Schmalfuss and Dr. F. Dieterlen, Stuttgart; Dr. P. Bartsch, Tübingen; S. Frahnert, Halle und A. MESS, Tübingen for their helpful comments on the manuscript; PD Dr. J. Ganzhorn, Göttingen; Dr. M. Nicoll, WWF Madagascar, and the staff of the CFPF for their assistance in the field. The study was carried out under the "Accord de Collaboration entre le Laboratoire de Primatologie de l'Université d'Antananarivo and Abteilung für Verhaltensphysiologie of Tübingen University. It was funded by the Fritz Thyssen Stiftung, the Universitätsbund Tübingen, and the World Wide Fund for Nature.