

# Biomes, geology and past climate drive speciation of laminate-toothed rats on South African mountains (Murinae: *Otomys*)

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Mitochondrial DNA sequences (1137 bp) of the cytochrome *b* gene and craniodental and craniometric data were used to investigate the evolutionary relationships of six putative rodent taxa of *Otomys* (family Muridae: subfamily Murinae: tribe Otomyini) co-occurring in the Western Cape and Eastern Cape provinces of South Africa. Phylogenetic analysis of 20 new sequences together with craniodental and craniometric characters of 94 adult skulls reveal the existence of a unique lineage of *Otomys* cf. *karoensis*, named herein *Otomys willani* sp. nov. from the Sneeuwberg Centre of Floristic Endemism in the southern Drakensberg Mountain Range. Craniometric analysis distinguished *O. karoensis* from *O. willani* and identified a further four localities in the range of the latter species. We document southern range extensions of both Sloggett's ice rat *Otomys sloggetti*, and the vlei rat *Otomys auratus* to the Sneeuwberg Mountain Range, in addition to appreciable genetic divergence between Sneeuwberg and southern and central Drakensberg populations of *O. sloggetti*. Our results demonstrate parallel patterns of cryptic speciation in two co-occurring species complexes (*Otomys irroratus* s.l. and *O. karoensis* s.l.) associated closely with the boundaries of biomes (fynbos vs. grassland biomes) and geological formations (Cape Fold Belt vs. Great Escarpment).

ADDITIONAL KEYWORDS: Africa – mitochondrial DNA – phylogeny – phylogeography – taxonomy.

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## INTRODUCTION

Laminate-toothed rats originated and diversified in South Africa 5.0–3.5 Mya, later dispersing to east-central Africa along the African Rift mountains ~2.5–1.6 Mya and then radiating throughout east, central and north-east Africa and the Cameroon Volcanic Line (Denys, 2003; Taylor *et al.*, 2004a, 2009a, 2014). There are two genera, *Otomys* F. Cuvier, 1824 and *Parotomys* Thomas, 1918. It has been suggested that *Otomys* is polyphyletic with respect to arid-adapted *Parotomys* (whistling rats), because some *Otomys* species, such as