



Two new *Peripatopsis* species (Onychophora: Peripatopsidae) from the Western Cape province, South Africa

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Abstract

A recent study based on the mitochondrial *cytochrome c oxidase subunit I (COI)* and the nuclear *18S ribosomal RNA (18S rRNA)* gene sequences from the widely distributed Cape velvet worm species *Peripatopsis capensis* (Grube, 1866) revealed the presence of three distinct, geographically exclusive clades characterised by marked sequence divergence values. Two of the three clades were recognised as novel species and are described in the present manuscript. Gross morphology and scanning electron microscopy (SEM), in conjunction with the genetic data, were used to discriminate the species. Two new species, *P. lawrencei* sp. nov. and *P. overbergiensis* sp. nov., are described and compared with *P. capensis sensu stricto*. The implications of these results on the conservation management are discussed.

Key words: Onychophora, Peripatopsidae, *Peripatopsis capensis*, *P. lawrencei* sp. nov., *P. overbergiensis* sp. nov., Western Cape, South Africa

Introduction

Onychophora have a notoriously conservative morphology while some species are characterised by high intraspecific variability in morphological features (Ruhberg 1985). Collectively these factors have led to a problematic alpha taxonomy (Hamer *et al.* 1997). The application of molecular and morphological studies have revealed a wealth of novel species in Australia, New Zealand, and more recently in South Africa and Brazil (Briscoe & Tait 1995; Reid *et al.* 1995; Rowell *et al.* 1995; Reid 1996, 2000a, b; Gleeson *et al.* 1998; Trewick 1998; Tait & Norman 2001; Daniels *et al.* 2009; Daniels & Ruhberg 2010; Lacorte *et al.* 2011; Oliveira *et al.* 2011). Daniels *et al.* (2009) conducted the first DNA study in combination with morphological data on the South African velvet worm genus *Peripatopsis* Pocock, 1894 and revealed widespread speciation. Tentatively the species diversity doubled, from eight to sixteen operational taxonomic units (Daniels *et al.* 2009). These results further suggest marked levels of localised endemism. Three species complexes were recovered among the widely distributed velvet worm taxa: *Peripatopsis balfouri* (Sedgwick, 1885), *P. capensis* (Grube, 1866), and *P. moseleyi* (Wood-Mason, 1879), which necessitated further taxonomic investigation. Subsequently, a genetic study was initiated to resolve the taxonomy within each of the three species complexes. Following extensive geographic sampling of the *P. moseleyi* species complex, Daniels & Ruhberg (2010) discovered five genetically and morphologically distinct clades, of which four represent novel species (Ruhberg & Daniels 2012). Similarly, a systematic study on *P. capensis sensu lato* using the mitochondrial *COI* and the nuclear *18S rRNA* sequences, detected three statistically well-supported monophyletic clades (McDonald & Daniels 2012). The three clades were allopatric and geographically exclusive and restricted to the Cape Peninsula (Clade A), Overberg (Clade B), and the Theewaterskloof-Overstrand (Clade C). Clades were further characterised by the absence of gene flow and marked sequence divergence for the *COI* gene. The latter authors concluded that three putative species were nested within *P. capensis*, two of which represented novel and undescribed species.

The Cape Peninsula, and specifically Rhodes Memorial, represents the type locality of *P. capensis*. However, since all the Cape Peninsula samples, including samples from Rhodes Memorial formed a single distinct,