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Dissecting the major African snake radiation: a molecular phylogeny of the Lamprophiidae Fitzinger (Serpentes, Caenophidia)

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Abstract

The Elapoidea includes the Elapidae and a large (~60 genera, 280 sp.) and mostly African (including Madagascar) radiation termed Lamprophiidae by Vidal *et al.* (2007), that includes at least four major groups: the psammophiines, atractaspidines, lamprophiines and pseudoxyrhophiines. In this work, we reviewed the recent taxonomic history of the lamprophiids, and built a data set including two nuclear protein-coding genes (c-mos and RAG2), two mitochondrial rRNA genes (12S and 16S rRNA) and two mitochondrial protein-coding genes (cytochrome *b* and ND4) for 85 species belonging to 45 genera (thus representing about 75% of the generic diversity and 30% of the specific diversity of the radiation), in order to clarify the phylogenetic relationships of this large and neglected group at the subfamilial and generic levels. To this aim, 480 new sequences were produced. The vast majority of the investigated genera fall into four main monophyletic clusters, that correspond to the four subfamilies mentioned above, although the content of atractaspidines, lamprophiines and pseudoxyrhophiines is revised. We confirm the polyphyly of the genus *Stenophis*, and the relegation of the genus name *Dromophis* to the synonymy of the genus name *Psammophis*. *Gonionotophis brussauxi* is nested within *Mehelya*. The genus *Lamprophis* Fitzinger, 1843 is paraphyletic with respect to *Lycodonomorphus* Fitzinger, 1843. *Lamprophis swazicus* is the sister-group to *Hormonotus modestus*, and may warrant generic recognition. Molecular data do not support the traditional placement of *Micrelaps* within the Atractaspidinae, but its phylogenetic position, along with that of *Oxyrhabdium* (previously considered to belong to the Xenodermatidae), requires additional molecular data and they are both treated as Elapoidea *incertae sedis*. The interrelationships of Psammophiinae, Atractaspidinae, Lamprophiinae, Pseudoxyrhophiinae, *Prosymna* (13 sp.), *Pseudaspis* (1 sp.) and *Pythonodipsas* (1 sp.), *Buhoma* (2 species), and *Psammodynastes* (1 sp.) remain unresolved. Finally, the genus *Lycognathophis*, endemic to the Seychelles, does not belong to the African radiation, but to the Natricidae.

Key words: Alethinophidia, Atractaspidinae, c-mos, cytochrome *b*, *Dromophis*, Elapoidea, *Gonionotophis*, *Hormonotus*, Lamprophiinae, *Lamprophis*, *Lycodonomorphus*, *Lycognathophis*, *Mehelya*, *Micrelaps*, ND4, *Oxyrhabdium*, Psammophiinae, *Psammophis*, Pseudoxyrhophiinae, RAG2, *Simocephalus*, *Stenophis*, 16S rRNA, 12S rRNA

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