



Who's your mommy? Identifying maternal ancestors of asexual species of *Leiolepis* Cuvier, 1829 and the description of a new endemic species of asexual *Leiolepis* Cuvier, 1829 from Southern Vietnam

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Abstract

A new asexual species of *Leiolepis* is described from Binh Chau – Phuoc Buu Nature Reserve, Xuyen Moc district Ba Ria-Vung Tau Province, Vietnam to where it is believed to be endemic. *Leiolepis ngovantrii* **sp. nov.** differs from all sexual species of *Leiolepis* by lacking males and from all asexual species by having nine rows of enlarged keeled scales across the forearm and 37–40 subdigital lamellae beneath the fourth toe. Phylogenetic inference based on 700 base pairs of the mitochondrial ND2 region, placed *L. ngovantrii* **sp. nov.** among the currently described asexual species and was used to assess the maternal ancestors of the remaining asexual species. Both maximum parsimony and maximum likelihood analyses recovered *L. guttata* as the maternal ancestors of *L. guentherpetersi*, *L. boehmei*, and *L. ngovantrii* **sp. nov.**, and *L. boehmei* as the maternal ancestor to *L. triploida*.

Key words: asexual, *Leiolepis*, maternal, *ngovantrii*, new species, taxonomy, Vietnam

Introduction

The discovery of asexual, vertebrate lineages (Darevsky, 1967) has opened the door to a new chapter of evolutionary biology that is still not completely understood (Schön *et al.*, 2009). Theoretically, the production of all female progeny has a two-fold reproductive advantage over sex (Maynard–Smith, 1978) yet parthenogenesis occurs in only 0.1% of described vertebrate species (Kearney *et al.*, 2006). Two major pathways that have been proposed for the origin of this reproductive lifestyle within vertebrates are (1) a genetic mutation (usually within a single egg clutch) that creates individuals with the ability to clone themselves and (2) two species (either two sexual species or an asexual and a sexual species) hybridize to create a polyploidal, all-female population whose members have the ability to clone themselves (Reeder *et al.*, 2002; Dessauer & Cole, 1989; Cole *et al.*, 1988; Cole *et al.*, 1983; Cole, 1975). However, the most common pathway to parthenogenesis is hybridization. Although asexuality is a rare reproductive life style for vertebrates, one of the most well studied cases occurs within the lizard family Teiidae, where sexual species of the genus *Aspidocelus* hybridize in ecotonal habitats (*e.g.*, the union of cismontane and transmontane habitats). In many cases, this results in polyploidal, reproductively isolated, all female populations restricted to relatively narrow, ecotonal habitats. Hybridization events such as these, have challenged the understanding of speciation in the traditional sense (Frost & Hillis, 1990) and sorting out the parental ancestry of these asexual lineages is most accurately traced within the context of a phylogeny.

The Indochinese lizard genus *Leiolepis* Cuvier, 1829 contains four sexual species (*Leiolepis belliana* (Gray, 1827); *L. guttata* Cuvier, 1829; *L. peguensis* Peters, 1971; and *L. reevesii* Gray, 1831) and three asexual species (*L. boehmei* Darevsky & Kupriyanova, 1993; *L. guentherpetersi* Darevsky & Kupriyanova, 1993, and *L. triploida* Peters, 1971) that collectively range from southern China, Vietnam, Laos, Cambodia, Myanmar, and Thailand southwestward through Peninsular Malaysia (Fig. 1). All species are moderately