



Phylogeography, geographic variation, and taxonomy of the Bent-toed Gecko *Cyrtodactylus quadrivirgatus* Taylor, 1962 from Peninsular Malaysia with the description of a new swamp dwelling species

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Abstract

A review of the taxonomic status of the Bent-toed Gecko *Cyrtodactylus quadrivirgatus* Taylor, 1962 based on a molecular phylogeny, scalation, and color pattern analyses indicate that it is composed of a single, recently expanding, widespread population with weakly supported phylogeographic substructuring with no discrete morphological differentiation between populations. However, based on sampling, significant mean differences in selected scale counts occur between some populations. The molecular phylogeny and morphological analysis strongly indicate lineage independence between a subset of individuals from the Bukit Panchor, Penang population and their closest relative *C. pantiensis* Grismer, Chan, Grismer, Wood & Belabut, 2008 from southern Peninsular Malaysia. Furthermore, the analyses indicate that the individuals of this subset are conspecific and not part of *C. quadrivirgatus* as previously suggested. Additionally, this subset is morphologically distinct from all other Sundaland species of *Cyrtodactylus*, and as such is described herein as *Cyrtodactylus payacola* sp. nov.

Key words: Malaysia, Bukit Panchor, Penang, *Cyrtodactylus quadrivirgatus*, *pantiensis*, *payacola*, taxonomy, new species

Introduction

The genus *Cyrtodactylus* is the most speciose genus of gekkonid lizards (at least 152 species) and the rate of new species being described each year shows no sign of tapering off (see <http://www.reptile-database.org>; Shea *et al.* 2012). There are at least 27 species of *Cyrtodactylus* currently recognized from the Sunda Region of Southeast Asia, and 16 of these species occur in Peninsular Malaysia and its associated islands (Grismer 2011). One of these species, *Cyrtodactylus quadrivirgatus* Taylor, 1962 ranges from southern Thailand south of the Isthmus of Kra, throughout Peninsular Malaysia and its associated islands (Fig. 1) to Singapore and northern Sumatra (Grismer 2011). *C. quadrivirgatus* is a forest dwelling, scansorial, habitat generalist ranging from sea level to 1400 m in elevation. Although, it is diagnosed by numerous, non-overlapping morphological characters, Grismer (2011) noted that there was a significant geographic variation in color pattern that was associated with distinctive geographic regions and/or habitats in Peninsular Malaysia and Singapore. In this study, we compare the patterns of variation in