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## Phylogenetic relationships and description of a new upland species of Bent-toed Gecko (*Cyrtodactylus* Gray, 1827) of the *C. sworderi* complex from northeastern Peninsular Malaysia

L. LEE GRISMER<sup>1,2</sup>, SHAHRUL ANUAR<sup>3</sup>, MOHD ABDUL MUIN<sup>4</sup>, EVAN S. H. QUAH<sup>3</sup>  
& PERRY L. WOOD, JR.<sup>5</sup>

<sup>1</sup>Department of Biology, La Sierra University, Riverside, California, USA. E-mail: lgrismer@lasierra.edu

<sup>2</sup>Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor Darul Ehsan, Malaysia

<sup>3</sup>School of Biological Sciences, Universiti Sains Malaysia, 11800 USM, Pulau Pinang, Penang, Malaysia. E-mail: evanquah@yahoo.com; shahrulanuar@gmail.com

<sup>4</sup>Centre for Drug Research, Universiti Sains Malaysia, 11800 Minden, Pulau Pinang, Penang, Malaysia. E-mail: mamuin@gmail.com

<sup>5</sup>Department of Biology, Brigham Young University, 150 East Bulldog Boulevard, Provo, Utah 84602 USA. E-mail: pwood@byu.edu

### Abstract

Molecular and morphological analyses indicate that a new upland species of the *Cyrtodactylus sworderi* complex, *C. tebuensis* sp. nov. from Gunung Tebu, Terengganu, Malaysia is most closely related to *C. sworderi* and together they form the sister lineage to *C. quadrivirgatus*. *Cyrtodactylus tebuensis* sp. nov. is differentiated from all other species of Sundaland *Cyrtodactylus* on the basis of having the unique combination of large, conical, keeled body tubercles; tubercles present on top of head, occiput, nape, and limbs, and extending posteriorly beyond base of tail; 43–51 ventral scales; no transversely enlarged, median subcaudal scales; proximal, subdigital lamellae transversely expanded; 17–21 subdigital lamellae on fourth toe; an abrupt transition between posterior and ventral femoral scales; enlarged femoral scales; no femoral or preloacal pores; no preloacal groove; body bearing four wide, bold, dark brown stripes (lateral stripe on each flank and a pair of paravertebral stripes); and a pairwise sequence divergence of 13.0% from its closest relative *C. sworderi* based on the mitochondrial gene ND2. *Cyrtodactylus tebuensis* sp. nov. is the first endemic upland species of gekkonid from northeastern Peninsular Malaysia and underscores the necessity for additional field work in all upland systems.

**Key words:** Gekkonidae, *Cyrtodactylus*, *Cyrtodactylus tebuensis* sp. nov., Malaysia, Terengganu, new species

### Introduction

The gekkonid genus *Cyrtodactylus* Gray, 1827 is a morphologically diverse lineage of geckos. Although most species are terrestrial to scansorial forest-dwelling forms characterized by large lidless eyes with vertical pupils and having slender, inflected digits expanded only at their bases, the remarkable number of adaptive types (ranging from leaf and bark mimics to obligate cave-dwellers) within *Cyrtodactylus* is commensurate with the rate at which new species are being described. The genus currently contains 159 species (see Uetz 2012; Grismer *et al.* 2012) with tens of new species being added annually (e.g., David *et al.* 2011; Grismer *et al.* 2012a; Iskandar *et al.* 2011; Ngo 2011; Oliver *et al.* 2011; Schneider *et al.* 2011; Shea *et al.* 2011), and a number of these have been from Peninsular Malaysia. Of the 23 known species from Peninsular Malaysia and its associated islands, 17 of these have been added in only the last seven years (Chan & Norhayati 2010; Grismer 2005; Grismer & Leong 2005; Grismer & Norhayati 2008; Grismer *et al.* 2008a; Grismer *et al.* 2010; Grismer *et al.* 2012; Johnson *et al.* 2012; Rösler & Glaw 2008; Youmans & Grismer 2006). The discovery of some of these new species was the result of expeditions into poorly explored regions and islands (Chan & Norhayati 2010; Grismer 2005; Grismer & Leong 2005; Grismer *et al.* 2008a, 2010a; Youmans & Grismer 2006) whereas others stem from molecular analyses of existing species indicating they were actually species complexes (Grismer *et al.* 2012a; Johnson *et al.* 2012).