



<http://dx.doi.org/10.11646/zootaxa.3986.3.2>

<http://zoobank.org/urn:lsid:zoobank.org:pub:B07485D0-EE3A-4FE7-92E5-B6122240597B>

## Morphological and molecular review of the *Gekko* diversity of Laos with descriptions of three new species

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### Abstract

A review of the taxonomy, phylogeny, zoogeography, and ecology of the genus *Gekko* in Laos is provided based on morphological and molecular datasets. Three new species, which are both morphologically distinctive and molecularly divergent from described congeners, are described from Khammouane Province, central Laos: two members of the *G. japonicus* group, *Gekko bonkowskii* sp. nov. and *Gekko sengchanthavongi* sp. nov., and another member of the *G. petricolus* group, *Gekko boehmei* sp. nov. *Gekko bonkowskii* sp. nov. is closely related to the recently described *G. thakekensis*, which also occurs in Khammouane Province. *Gekko sengchanthavongi* sp. nov. is supported as a sister taxon to *G. scientiadvertura* and *Gekko boehmei* sp. nov. is recovered as a sister species to *G. petricolus*. In addition, a key to the currently recognized members of the genus *Gekko* from Laos is provided.

**Key words:** *Gekko*, morphology, taxonomy, molecular phylogeny, Khammouane Province, Laos, karst forest

### Introduction

Rösler *et al.* (2011) provided a review of the taxonomy, phylogeny, and zoogeography of all currently recognized *Gekko* species based on morphological and molecular datasets. These authors assigned the members of the genus *Gekko* to six species groups, namely the *G. gekko*, *G. japonicus*, *G. monarchus*, *G. petricolus*, *G. porosus*, and *G. vittatus* groups. However, the genus *Gekko* Laurent, 1768 still remains a comparatively poorly researched lizard group, as new species are continuously described. One hot spot of *Gekko* diversity within Southeast Asia is Vietnam, with 13 currently recognized species: *G. adleri* Nguyen, Wang, Yang, Lehmann, Le, Ziegler & Bonkowski, *G. badenii* Szczerbak & Nekrasova, *G. canaensis* Ngo & Gamble, *G. canhi* Rösler, Nguyen, Doan, Ho & Ziegler, *G. gekko* (Linnaeus), *G. grossmanni* Günther, *G. palmatus* Boulenger, *G. reevesii* (Gray, 1831), *G. russelltraini* Ngo, Bauer, Wood & Grismer, *G. scientiadvertura* Rösler, Ziegler, Vu, Herrmann & Böhme, *G. takouensis* Ngo & Gamble, *G. truongi* Phung & Ziegler, and *G. vietnamensis* Nguyen (see Rösler *et al.* 2011; Phung & Ziegler 2011; Nguyen *et al.* 2013). In comparison, the diversity of *Gekko* in Laos is still underestimated, with only five recognized species so far, namely *Gekko gekko* (Linnaeus), *G. scientiadvertura* Rösler, Ziegler, Vu, Hermann & Böhme (Teynié *et al.* 2004), *G. petricolus* Taylor (Bain & Hurley 2011), *G. thakhekensis* Luu, Calame, Nguyen, Le, Bonkowski & Ziegler, and *G. aaronbaueri* Ngo, Pham, Phimvohan, David & Teynié (see Table 1).