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Two new species of diminutive leaf-litter skinks (Squamata: Scincidae: *Tytthoscincus*) from Gunung Penrissen, Sarawak, Malaysia (northern Borneo)

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Abstract

We describe two new species of skinks from Gunung Penrissen, Sarawak, Malaysia, in northern Borneo, *Tytthoscincus batupangah* **sp. nov.** and *T. leproauricularis* **sp. nov.** Morphological and molecular analyses both corroborate the two new species as unique compared to all other *Tytthoscincus* and additional *Sphenomorphus* that are candidates for taxonomic placement in the genus *Tytthoscincus*. Despite their phenotypic similarity and sympatric distribution, a molecular analysis shows that the new species are not sister taxa and exhibit a deep genetic divergence between each of their respective sister taxa. We discuss how historical climatic and geographic processes may have led to the co-distribution of two relatively distantly related phenotypically similar species. In light of these discoveries, we also emphasize the importance of conserving primary montane tropical rainforest for maintaining species diversity.

Key words: Endemism, co-distribution, *Sphenomorphus*, Sundaland, Sunda Shelf, sympatric

Introduction

Tytthoscincus Linkem, Diesmos & Brown, 2011 is a genus of diminutive, leaf-litter dwelling skinks in Southeast Asia and the Philippines. Only recently described as part of the revision of the large catch-all genus *Sphenomorphus* Fitzinger, 1843 (Linkem *et al.* 2011). *Tytthoscincus* currently contains just five species previously recognized under the genus *Sphenomorphus*: *T. aesculeticolus* (Inger, Tan, Lakim & Yambun); *T. atrigularis* (Stejneger); *T. biparietalis* (Taylor); *T. hallieri* (Lidth de Juede); *T. parvus* (Boulenger).

In the generic revision, Linkem *et al.* (2011) split the polyphyletic genus *Sphenomorphus sensu lato* into multiple new and resurrected genera, including the new genus *Tytthoscincus*, based largely on genetic evidence, but listed three morphological features to diagnose the genus: (1) small size usually less than 45 mm snout–vent length (SVL), (2) temporal scales that were not differentiated from the lateral body scales in size or shape, and (3) small digits. Based on these criteria, it remains clear that many of the species currently recognized in the genus *Sphenomorphus* are members of the genus *Tytthoscincus* but have not yet undergone morphological or genetic analyses to facilitate a taxonomic revision. Despite some evidence for additional species that should be transferred to the genus (phenotypic and genetic similarity; Linkem *et al.* 2011), the lack of detailed morphological descriptions that include diagnostic characters, their wide geographical distribution, and the difficulty of collecting additional specimens has led to a lag in a comprehensive revision of *Tytthoscincus*. We therefore face a difficulty in describing new species of *Tytthoscincus* in choosing with which species to compare them.

Given that many members of *Sphenomorphus* are yet to be formally transferred to *Tytthoscincus*, we choose a conservative approach in these descriptions and diagnose the two new species against all currently recognized *Tytthoscincus*, as well as the candidate species of *Sphenomorphus* listed below (see Table 1). Unpublished genetic evidence in Linkem (2013) show the following species of *Sphenomorphus* to be more closely related to *Tytthoscincus*: *S. bukitensis* Grismer, *S. butleri* (Boulenger), *S. ishaki* Grismer, *S. langkawiensis* Grismer, *S. perhentianensis* Grismer, Wood & Grismer, *S. perhentianensis* Grismer, Wood, Grismer, *S. sanana* (Kopstein), *S.*