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Phylogeny, diversity, and biogeography of Southeast Asian spiny rats (*Maxomys*)

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Knowledge of the diversity and relationships of species in many groups of plants and animals in Southeast Asia is severely limited, preventing an integrative understanding of evolutionary and ecological processes in island archipelagos. We generated a 3-locus DNA sequence data set to estimate phylogenetic relationships among species and populations of *Maxomys*, a genus of rodents endemic to Southeast Asia. Our inclusion of *Crunomys* as a potential outgroup supported the monophyly of *Crunomys*, but the genus was deeply nested within *Maxomys*. Because of the relatively ancient divergences (mean uncorrected p -distances up to 0.15 in cytochrome- b sequences) among species of *Maxomys* and short branch lengths among basal lineages of the phylogeny, we obtained little support for the oldest relationships in *Maxomys* + *Crunomys*. However, our analyses revealed unrecognized diversity in the form of divergent populations both between and within islands and the presence of 2 potentially undescribed species from Sulawesi. The *Maxomys* and *Crunomys* of Sulawesi belonged to 4 clades sister to extralimital species, suggesting that repeated overwater dispersal between Sundaland–Philippines and Sulawesi was an important isolating mechanism in the history of this group.

Key words: *Crunomys*, Indonesia, island colonization, Murinae, phylogeography, Sunda Shelf, Sulawesi

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Island archipelagos provide important systems for the study of biological diversification and have been the subject of many foundational works in the fields of evolution and ecology (e.g., Darwin 1859; Wallace 1869; MacArthur and Wilson 1963; Grant and Grant 1993). The Indomalayan archipelago, in particular, offers a potential model for island biogeographic study because of its exceptional endemism, its broad transition zone between the Sundaic and Sahulian biotas, and its geographic history, involving sea-level fluctuations and geological changes (Wallace 1869; Myers et al. 2000; Dirzo and Raven 2003; Corlett 2009; Lohman et al. 2011). Although the archipelago is known to contain a mix of Asian and Australian faunal and floral elements, the provenance of many Indonesian lineages remains uncertain, limiting the current value of the region as a model system for understanding ecological and evolutionary processes in a biogeographic context (Lohman et al. 2011).

One of the most diverse mammalian groups in the archipelago is the Old World rats and mice (Murinae), with at least 213 species occurring in the Indomalayan region (Corbet and Hill 1992). Despite the high diversity and abundance of murines in Southeast Asia, few studies have investigated molecular genetic diversity at the phylogeographic level in these animals (but see Steppan et al. [2003] and Gorog et al. [2004]). Among the Murinae, the spiny rats (*Maxomys*) represent a prime subject for biogeographic study because of their abundance, ubiquity, and widespread distribution across the region (Ruedas and Kirsch 1997). Eighteen species are currently recognized, with a generic distribution from mainland Southeast Asia east throughout the Sunda Shelf to some neighboring oceanic islands. Species of *Maxomys* are present

