Evolutionary History of the Subgenus *Mus* in Eurasia with Special Emphasis on the House Mouse *Mus musculus*

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Abstract. Elucidation of the evolutionary history of the subgenus *Mus*, including the House Mouse *Mus musculus*, is essential to understanding species diversification mechanisms in the Indomalayan region, which is a global biodiversity hotspot. In terms of interspecific relationships, the topography of India, Myanmar, and other Southeast Asian regions has been proposed to explain the speciation process and ecological niche diversification followed by range overlap after speciation. Recent research into mitochondrial DNA clocks has created the opportunity to reconstruct the detailed dynamics of *M. musculus* as affected by human activity. The resultant evolutionary scenarios are in good accordance with archaeological evidence observed in Asia, especially in China, Korea, and Japan.

Introduction

The evolution of murine rodents (subfamily Murinae) is the most successful example of species diversification in mammals (Musser & Carleton, 2005). Over 560 species emerged within a short evolutionary time of several million years (Myr), with an unusual level of morphological diversity. The genus *Mus*, which includes the well-known model species, the House Mouse *Mus musculus*, is a species-rich group of murine rodents with unclear taxonomic diversity, probably due to substantial morphological similarity among species. Ken Aplin, a researcher who undertook extensive field studies in Southeast Asia to control pest rats and mice (Aplin, 2003), has expanded the network of researchers committed to resolving the taxonomic relationships of rats and mice and describing their evolutionary histories using genetic methods (e.g., Aplin *et al*., 2011). In this article, I focus on his findings in studies of *Mus* species over the last two decades, and review the recent progress of phylogenetic research into members of the subgenus *Mus* and phylogeographic studies of the widespread species *M. musculus*.

Framework of species diversity in the subgenus *Mus*

The genus *Mus* dominates the small granivore/omnivore niche in the Old World region from southern Africa to eastern Asia, and is now recognized as comprising more than 40 species (Musser & Carleton, 2005; Shimada *et al*., 2010). In Eurasia, 20 species of *Mus* are known, which are grouped in the subgenus *Mus*. The taxonomy of this group was relatively stable until field surveys (2003–2007) of mice from Myanmar by Ken Aplin. He noticed taxonomic problems among the mice from Myanmar and conducted genetic studies to determine their phylogenetic backgrounds. In his research, populations previously known as *Mus cervicolor* and *Mus booduga* were found to have distinct evolutionary histories from mice referred to as *Mus cervicolor* from Thailand and Laos, and those called *Mus booduga* from India and Nepal, respectively. He demonstrated that the appropriate taxonomic names for these mice were instead *Mus nitidulus* Blyth, 1859 (Shimada *et al*., 2007a) and *M. lepidoides* Fry, 1931 (Shimada *et al*., 2010), respectively, characterizing them as