Biogeography and evolutionary patterns of landsnails on the island of Borneo

recognition as a distinct subspecies, *M. m. kami.* However, my genetic analysis have yielded contradicting results, placing the Taiwanese populations much closer to the Ryukyu populations than to the continental populations. *Geoemyda japonica* is endemic to the central Ryukyus, with its closest relative, *G. spengleri*, being confined to the distant southeastern continental China and northern Indochina. These two species had long been considered as conspecific subspecies, but a recent comparative study demonstrated remarkable differences between these species in a number of qualitative characters. With respect to *C. flavomarginata*, morphometric analyses suggested the Ryukyu populations to be most divergent among conspecific populations, deserving taxonomic recognition at the subspecific level (*C. f. evelynae*). Recent studies proved that *P. sinensis* shows considerable genetic variation among the Japanese, Taiwanese and continental Chinese populations. Geographic variation has not yet been studied at all for *M. japonica* or *O. sinensis*. Characteristics of the turtle fauna of the East Asian Islands may be summerized as follows: 1) endemic species are recognized in Japan mainland and the central Ryukyus; 2) all taxa occurring in Taiwan also occurs in the continental China; 3) certain extent of variations exist between conspecific populations of Taiwan and the southern Ryukyus; and 4) in widespread species, Taiwanese populations may be closer to the continental population than the Japanese population (but see the case of *M. mutoca* mentioned above). The geographic faunal pattern of the East Asian turtles is in good agreement with the currently prevailing scenario for the history of dispersals and vicariances of several other terrestrial organisms in this region.

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The northern part of Borneo (Sabah) has experienced the island's most active and recent tectonic processes, which include the expansion of land area (from the Middle Eocene to the Middle Pliocene) and climate fluctuations (during the Pleistocene). The interplay between geology and climate generates extraordinary diversity and genetic distinctiveness among species. However, the effects of historical processes on contemporary distributions of landsnails in Borneo are not known. The mitochondrial DNA sequences from 16S rRNA and COI genes, and nuclear ribosomal DNA sequences from ITS-1 were used to investigate phylogeographic patterns among two landsnail genera: *Everettia* (Gastropoda: Ariophatidae) and *Meghimatium* (Gastropoda: Philomycidae) in Northern Borneo. Maximum parsimony and maximum likelihood analyses on these genetic datasets produced trees in general agreement with phylogeographical patterns in both genera. Their taxonomy (based on the morphology) was also well-supported by genetic data. The resulting diversity and phylogeography for both groups of landsnails can be linked to major vicariance events in the Miocene and Pliocene. The phylogenetic trees also showed that a number of endemic species on Mount Kinabalu are possible remnants from the Pleistocene climate fluctuations.