

Title of dissertation			
Systematic Study of Flying Squirrels (Mammalia, Sciuridae) in Lao PDR			
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Background

The family Sciuridae is the second largest group of the order Rodentia consisting of 292 species and 60 genera. The tribe Pteromyini (flying squirrels) currently involves 15 genera of 52 species. The molecular data have supported the flying squirrels are monophyly with a sister group to the tribe Sciurini (tree squirrels). Flying squirrels occur in North America and Eurasia, but absent from the Australian region, South America, Africa, and the polar regions. The species richness hotspot of distribution of flying squirrel occurs in the Oriental region; however, the research effort is disproportionate to this pattern. The geographic variation in pelage colour of flying squirrel is considerable but there is no comprehensive description or revision.

Lao PDR is located in the area of high diversity of flying squirrel, but the taxonomy and diversity studies are very rare. The most recent report in the country was summarized six species: *Petaurista philippensis*, *P. elegans*, *Belomys pearsonii*, *Hylopetes alboniger*, *H. phayrei*, and *H. spadiceus*. However, the authors mentioned that *P. philippensis* is highly variable in pelage colour across its wide range. As well small flying squirrels have been seen regularly in deciduous and degraded evergreen forests; but scattered records from many other areas, including evergreen forests, presumably involve several taxa. Thus, in this present study the taxonomy and diversity of flying squirrel is conducted.

Materials and Methods

A total of 86 specimens from 29 survey sites throughout the country and 260 museum specimens are examined. The measurements included five external and 24 cranio-dental morphometric characters of adult specimens were examined using univariate analysis. As well seven external and six cranio-dental taxonomic characters were examined in order to evaluate the validity of diagnostic character with comparison of five type specimens.

Results

I found a new species *Biswamoyopterus laoensis* from Bolikhamxai Province in Central Lao PDR. The discovery extends the known range of this genus by some 1,250 km from the only known holotype of *B. biswasi*, collected from Arunachal Pradesh, northeast India.

The occurrence of the red giant flying squirrel, *Petaurista petaurista*, in Lao PDR is confirmed on the basis of a single adult male specimen collected from Xekong Province in the south of the country. The record extends the known distribution of this species in southeast Thailand by approximately 700 km eastwards.

The first known occurrence of *Petinomys setosus* in Lao PDR was recorded from a single specimen collected from Vientiane Province, which is approximately 240 km from its nearest known distribution in northern Thailand.

Discussion

The new species *Biswamoyopterus laoensis* showed close affinities to *Biswamoyopterus biswasi*, but *B. laoensis* differs from *B. biswasi* substantially in pelage colour, and diagnosed by having ventral pelage is orange intermixed with grey; the ear tufts are black at the base of the anterior and posterior margins; the tail is entirely black from its tip to the outer border of the interfemoral membrane; the tympanic bullae are very large and closely aligned to one another.

The *Petaurista petaurista* from Lao PDR is compared with the holotypes and type descriptions of 6 subspecies: *P. p. candidula*, *P. p. cicur*, *P. p. melanotus*, *P. p. penangensis*, *P. p. taylori*, and *P. p. terutaus*, described from mainland Southeast Asia. It differs in pelage colour from those subspecies. However, when compared with *Petaurista annamensis barroni*, described from southeast Thailand, which is considered as synonym of *P. petaurista*. The Lao specimen shared similar morphological characters, as well two specimens which had been collected from northeast Thailand. Thus, *P. a. barroni* is considered to be distinct subspecies of *P. petaurista*, which separated from Thai-Malay Peninsula, and western Thailand and Myanmar subspecies by the Isthmus of Kra and Chao Phraya River, respectively.

Morphological characters of *Petinomys setosus* from Lao PDR is similar to *P. setosus* specimens from northern Thailand and most of their morphometric measurements are overlapped; however, they differ from specimens from Peninsular Malaysia which have prominent reddish-brown in dorsal pelage and eye rings, and reddish-brown tail without white tip. The *P. setosus* capture location in Lao PDR was on the east side of the Mekong River, which is hypothesized to serve as geographical barrier that affects the dispersal and diversification of some rodent species.

Conclusion

Based on my research and previous record, I summarized nine species of five genera of flying squirrel in Lao PDR which are *Petaurista philippensis*, *P. petaurista*, *P. elegans*, *Biswamoyopterus laoensis*, *Belomys pearsonii*, *Hylopetes alboniger*, *H. phayrei*, *H. spadiceus*, and *Petinomys setosus*. This study is fundamentally clarified taxonomic of *P. petaurista* in mainland Southeast Asia by combination of morphological characters and measurements. Discovering of *B. laoensis* and *P. setosus* from the region of limestone karsts and east side of Mekong River. This may support the hypothesis that limestone karst and Mekong River serves as area for speciation and diversification, and geographical barrier for small mammals' dispersal, respectively.

Photos



My first field survey at Ashiu, Kyoto, Japan in July, 2018 with all laboratory members under Professor. Dr. Masaharu Motokawa supervisor.



My great smile after Ph.D. dissertation presentation in January, 2020 at Kyoto University.