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Abstract of Doctoral Dissertation

博士の専攻分野の名称 博士（理 学） 氏名 ノニロン マンテ アスペ
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Title of Doctoral Dissertation

Taxonomy and phylogeny of pheretimoid earthworms (Clitellata: Megascolecidae) from Mindanao and associated islands, Philippines

（フィリピン・ミンダナオ島及び周辺島嶼産フトミミズ類（環帯類：フトミミズ科）の分類と系統）

This dissertation presents a total of 39 new pheretimoid species of the family Megascolecidae, from Mindanao and associated islands, in the Philippines. Among these, 29 are in the genus *Pheretima*, characterized by having nephridia on the spermathecal ducts, having prominent dome-shaped copulatory bursae, and having a pair of caeca originating in xxvii. Of these, 27 are in the subgenus *Pheretima*, while two species are the first records of the subgenus *Parapheretima* in the Philippines. *Parapheretima* is characterized by having secretory diverticula projecting from the copulatory bursae, in contrast to members in the subgenus *Pheretima*, which do not possess such organ. Also, three species are in *Pithemera*, characterized by having a pair of caeca originating in or near xxii, three are in *Polypheretima*, characterized by having no caeca, and three are in *Amyntas*, characterized by having no copulatory bursae. The three latter genera also do not possess nephridia on the spermathecal ducts, in contrast to *Pheretima*. With the new species described, there are now 80 known *Pheretima* s. str. species in the Philippines, comprising 76% of the world's *Pheretima*, and

there are now 14 species of *Pithemera*, comprising 47% of the world's *Pithemera*. These figures suggest that the Philippine archipelago may be the center of species radiation for these groups. Also, there are now 16 species of *Amyntas* in the Philippines representing less than 1% of the world's *Amyntas* and there are now 10 species of *Polypheretima* in the Philippines representing 15% of the world's *Polypheretima*. The high diversity of the two latter genera in mainland Asia and Indonesia, respectively, strongly suggests that Indochina may be the center of species radiation for these two genera. The known ranges of the Philippine species are restricted to areas around the type localities. This pattern indicates a remarkable degree of endemism, both among local areas, among islands in the Philippines, and in the Philippines as a whole, and suggesting that many species remain to be detected in the Philippines.

A molecular phylogenetic study was done in attempt to infer phylogenetic relationships among the pheretimoid species in Mindanao and associated islands. Gene markers used include the mitochondrial cytochrome *c* oxidase subunit I (COI) and 16S rRNA, and the nuclear 28S rRNA and protein-coding histone H3 genes. Despite having limited taxa and limited genes included in the analyses, the combined data set generated a phylogeny more or less consistent with morphology-based expectation. Results show that taxonomic assignment of the genus *Amyntas* and the subgenus *Parapheretima* do not reflect phylogeny. The species grouping in *Pheretima* based on the location of spermathecae is partially reflected in the pheretimoid phylogeny. Also, results show that loss of spermatheca or fusion of two spermathecae into one can occur in pheretimoid evolution. In general, several of the nodes of the tree based on combined data set have support values that are very weak and have formed polytomies, which is most likely due to insufficient data. The results could have improved if more data were available. Further molecular work including more taxa is needed to be able to establish a more robust system of classification of the pheretimoid species and come up with a better-resolved phylogeny.