



HOKKAIDO UNIVERSITY

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Author(s)	Hla, Myet Chel
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The title of the doctoral dissertation

Morphological and molecular study on gastrointestinal parasites of Asian elephants in Myanmar

（ミャンマーのアジアゾウにおける消化管内寄生虫に関する形態学および分子学的研究）

In Myanmar, there are approximately 3000 captive Asian elephants, *Elephas maximus*, in which cyathostomine gastrointestinal nematodes and stomach bot fly cause enteritis and death especially in younger animals. Despite the importance as the causative agents, there is no study on the prevalence of those parasites in Myanmar and there are few studies with the photomicrographs or molecular aspects so far. In this study, 47 nematodes and a bot fly larva were obtained from the faeces of Asian elephants in Myanmar after anthelmintic treatment and subjected to morphological identification and molecular analysis. In the results, five cyathostomine nematode species, *Murshidia falcifera* (n=3), *Murshidia indica* (1), *Murshidia neveulemairei* (10), *Quilonia renniei* (29) and *Quilonia travancra* (4), and one bot fly species, *Cobboldia elephantis* (1), were identified by morphology with providing the photomicrographs of key structures for morphological diagnosis. For molecular study, the partial sequences of the COI gene were determined for each species. Phylogenetic analysis revealed that *Murshidia indica*, *Quilonia renniei* and *Cobboldia elephantis* have close relationship to *Murshidia africana*, *Quilonia africana* and *Cobboldia loxodontis* reported from African elephants, respectively. It was also suggested that *Murshidia falcifera* and *Murshidia neveulemairei* constructs a clade with *Murshidia linstowi* and *Murshidia longicaudata* reported from African elephants. This clade is divided into three sub-clades, one by *Murshidia falcifera*, one by *Murshidia neveulemairei* and the

last by *Murshidia linstowi* and *Murshidia longicaudata*. *Quilonia travancra* makes one separate clade. This study was the first report of the prevalence of five cyathostomine nematode species and one species of stomach bot fly in Asian elephants in Myanmar. This study could provide the photomicrographs of key structures for morphological identification of three *Murshidia*, two *Quilonia* and one *Cobboldia* species 100 years after the original drawings. The *COI* gene sequences of *M. falcifera*, *M. indica*, *M. neveulemairei*, *Q. renniei*, *Q. travancra*, and *C. elephantis* were deposited as the first time for genetic information in Asian elephants and the phylogenetic analysis was conducted with the parasite species found in African elephants. The findings are useful for future molecular survey of parasites in Asian elephants and African elephants. Further studies such as the interaction between host, parasites, and drugs are required to provide the new insight into control strategies and more species identifications are necessary in other elephant camps in Myanmar as well as in other countries for better understanding of the evolution of gastrointestinal parasites in elephants.