

Phylogenetics and systematics of *Angiostrongylus* lungworms and related taxa (Nematoda: Metastrongyloidea) inferred from the nuclear small subunit (SSU) ribosomal DNA sequences

P. Eamsobhana^{1*}, P.E. Lim^{2,3} and H.S. Yong²

¹Department of Parasitology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand: ²Institute of Biological Sciences, University of Malaya, 50603 Kuala Lumpur, Malaysia:

³Institute of Ocean and Earth Sciences, University of Malaya, 50603 Kuala Lumpur, Malaysia

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Abstract

The *Angiostrongylus* lungworms are of public health and veterinary concern in many countries. At the family level, the *Angiostrongylus* lungworms have been included in the family Angiostrongylidae or the family Metastrongylidae. The present study was undertaken to determine the usefulness and suitability of the nuclear 18S (small subunit, SSU) rDNA sequences for differentiating various taxa of the genus *Angiostrongylus*, as well as to determine the systematics and phylogenetic relationship of *Angiostrongylus* species and other metastrongyloid taxa. This study revealed six 18S (SSU) haplotypes in *A. cantonensis*, indicating considerable genetic diversity. The uncorrected pairwise 'p' distances among *A. cantonensis* ranged from 0 to 0.86%. The 18S (SSU) rDNA sequences unequivocally distinguished the five *Angiostrongylus* species, confirmed the close relationship of *A. cantonensis* and *A. malaysiensis* and that of *A. costaricensis* and *A. dujardini*, and were consistent with the family status of Angiostrongylidae and Metastrongylidae. In all cases, the congeneric metastrongyloid species clustered together. There was no supporting evidence to include the genus *Skrjabinigylus* as a member of Metastrongylidae. The genera *Aelurostrongylus* and *Didelphostrongylus* were not recovered with *Angiostrongylus*, indicating polyphyly of the Angiostrongylidae. Of the currently recognized families of Metastrongyloidea, only Crenosomatidae appeared to be monophyletic. In view of the unsettled questions regarding the phylogenetic relationships of various taxa of the metastrongyloid worms, further analyses using more markers and more taxa are warranted.

Introduction

Lungworms of the genus *Angiostrongylus* are bursate nematodes of the superfamily Metastrongyloidea. The Metastrongyloidea contains up to seven families,

depending on taxonomic authorities – Angiostrongylidae, Crenosomatidae, Filaroididae, Metastrongylidae, Protostrongylidae, Pseudaliidae and Skrjabinigylidae – with over 180 species in 46 genera (Anderson, 2000). In the National Center for Biotechnology Information (NCBI) taxonomy, only six families are recognized, without Skrjabinigylidae but with the genus *Skrjabinigylus* treated as a member of the Metastrongylidae.

*E-mail: praphathip.eam@mahidol.ac.th