NATURAL INFECTION OF THE RAT LUNGWORM *ANGIOSTRONGYLUS CANTONENSIS* IN A THAI EDIBLE LAND SNAIL, *HEMIPLECTA DISTINCTA*

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ABSTRACT

Natural infection with Angiostrongylus cantonensis *was confirmed in an edible land snail,* Hemiplecta distincta, *collected from Northeast (14 provinces) and Central (2 provinces) Thailand. Thus,* H. distincta *is an intermediate host for* A. cantonensis *and, if eaten raw, it can be a potential source of human infection with eosinophilic meningoencephalitis. However, a more definitive proof must await results from infecting rats experimentally with this larvae and adult worm identification.*

INTRODUCTION

Angiostrongylus cantonensis is primarily a parasite of wild rodents, but it is now generally recognized as the causative agent of human eosinophilic meningoencephalitis, widely observed in the Pacific Islands, Southeast Asia and even some parts of Northeast Asia. *A. cantonensis* requires a molluscan intermediate host for the completion of its life cycle. Various species of terrestrial and aquatic snails and terrestrial slugs are known as the intermetiate host.[1]

Meningoencephalitic angiostrongylosis, or parasitic meningoencephalitis, caused by the rat lung-worm *A. cantonensis,* is known to be transmitted by a number of gastropods. Among these, the giant African snail is the most important carrier.[2, 3] In Thailand, young larvae of *A. cantonensis* were found infecting many species of fresh water snails, and adult worms were found infecting rats in Bangkok and many provinces in the northeastern area.[4]

Human meningoencephalitic angiostrongylosis has been reported in Vietnam, Thailand, Sumatra, the Phillipines, Taiwan,[3] Hawaii and South Pacific Islands,[5] and recently natural infection has been found in a fresh water snail in the southern Islands of Japan.[6, 7]

Hemiplecta distincta is a large edible land snail consumed by the people, especially in Northeast Thailand.[8,9] The snail occurs in the wild and is gathered by villagers for consumption and for sale (Fig. 1). If *H. distincta,* distributed all around Thailand and Laos,[10, 11] is proved to be an intermediate host for *A. cantonensis,* it would be a valuable species from the parasitological point of view. The present study was undertaken to ascertain whether *H. distincta* would be an intermediate host for *A. cantonensis.*

In order to examine whether natural infection with *A. cantonensis* is present in *H. distincta*, the snails were purchased from markets, as well as captured alive from natural habitats of 14 northeastern provinces and 2 central provinces of Thailand (Fig. 2), and were brought to the laboratory at the Department of Zoology, Faculty of Science, Kyoto University. The shell was then crushed and the body was removed. Two methods were used for detecting infection by *A. cantonensis* larvae : (1) by dissecting the snails and examining for the larvae under a microscope, and (2) by mincing the body and digesting it artificially in acid pepsin solution containing 1% HCl and 0.5 g of pepsin followed by filtering and sedimenting the digest. The sediments were then examined for larvae under a microscope. Larvae of *A. cantonensis* were identified by their characteristic morphological features according to the study of Mackerras and Sandars.[12] However, a more definitive proof must await results from infecting rats experimentally with this larvae and adult worm identification.

The results of examination for larvae of *A. cantonensis* in *H. distincta* are summarized in Table 1. Natural infection was confirmed in the snails collected from every province. The larvae of *A. cantonensis* were found encapsulated by the lungs and connective tissues of the snails (Fig. 3).

This study has shown that *H. distincta* transmitting *A. cantonensis* is widely distributed in Northeast Thailand. Infection with the parasite in the two central provinces, however, is very low. This may be due to the fact that people in Central Thailand do not usually consume raw or unproperly cooked land snails.

It is generally assumed that the larval nematodes that utilize gastropods as intermediate hosts enter these hosts via the oral route, e.g. the modes of infection of *Achatina fulica* with *A. cantonensis*.[13]

There are many cases of meningoencephalitic angiostrongylosis in Thailand, but most cases are due to infection by *A. cantonensis* from aquatic snails of the family Ampullariidae.[4, 14] The people, particularly those in Northeast Thailand, like to eat half-cooked meats and this is the main cause of parasitic infection.

This study reports a new natural intermediate host for *A. cantonensis* in Thailand. This finding suggests that *H. distincta* may not only be an important edible snail but may also be an important potential source of human eosinophilic meningoencephalitis.

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บทคัดย่อ

ได้ตรวจสอบพบตัวอ่อนของพยาธิตัวกลม *Angiostrongylus cantonensis* ในหอยทากชนิด *Hemiplecta distincta* ซึ่งเป็นหอยที่คนในภาคตะวันออกเฉียงเหนือรับประทานเป็นอาหาร พบตัวอ่อนของพยาธิในหอย 14 จังหวัดในภาคตะวันออกเฉียงเหนือ และ 2 จังหวัดในภาคกลาง ผู้บริโภคหอยชนิดนี้ดิบ ๆ อาจจะกินตัวอ่อนในระยะติดต่ออันตรายของพยาธินี้เข้าไป ซึ่งจะทำให้เกิดโรคเยื่อหุ้มสมองอักเสบชนิดที่มีอีโอซิโนฟิลสูง หากตัวอ่อนพยาธิดังกล่าวเป็นของ *A.cantonensis* ซึ่งต้องรอการพิสูจน์จากผลการทดลองในหนูต่อไป

TABLE 1. Natural infection with larvae of *Angiostrongylus cantonensis* in *Hemiplecta distincta* collected from Northeast (14 provinces) and +Central (2 provinces) Thailand.

Locality	Collecting date	No. of snails		Size of snails in cm (X±S.D.)	Percentage infection
		examined	infected		
Nakornrachasima	Apr. 26, 87	43	26	6.2 ± 1.7	60.46
Burirum	Apr. 27, 87	18	11	5.7 ± 2.3	61.11
Surin	Apr. 27, 87	23	12	5.4 ± 3.1	52.17
Srisakes	Apr. 28, 87	44	17	6.4 ± 1.3	38.64
Ubolrachathani	Apr. 29, 87	41	19	6.6 ± 2.4	46.34
Roied	May 3, 87	37	9	5.7 ± 1.8	24.32
Khonkaen	May 9, 87	19	11	5.6 ± 2.7	57.89
Karasin	May 10, 87	22	7	4.9 ± 2.3	31.82
Mukdaharn	May 14, 87	38	23	6.3± 2.2	60.53
Nakornpanom	May 16, 87	27	14	6.0 ± 2.2	51.85
Udornthani	May 17, 87	31	22	5.7 ± 2.7	70.97
Sakonnakorn	May 16, 87	16	9	5.4 ± 3.1	56.25
Chaiyapoom	May 23, 87	24	8	6.2 ± 1.6	33.33
Yasotorn	Apr. 28, 87	18	12	5.7 ± 2.4	66.67
+Saraburi	Apr. 25, 87	39	3	6.2 ± 2.7	7.69
+Lopburi	Apr. 23, 87	27	2	5.8 ± 1.8	7.41

Fig. 1 *Hemiplecta distincta* were found entering hibernation in 1987 at Pakchong district, Nakornrachasima province (Bar = 6 cm).

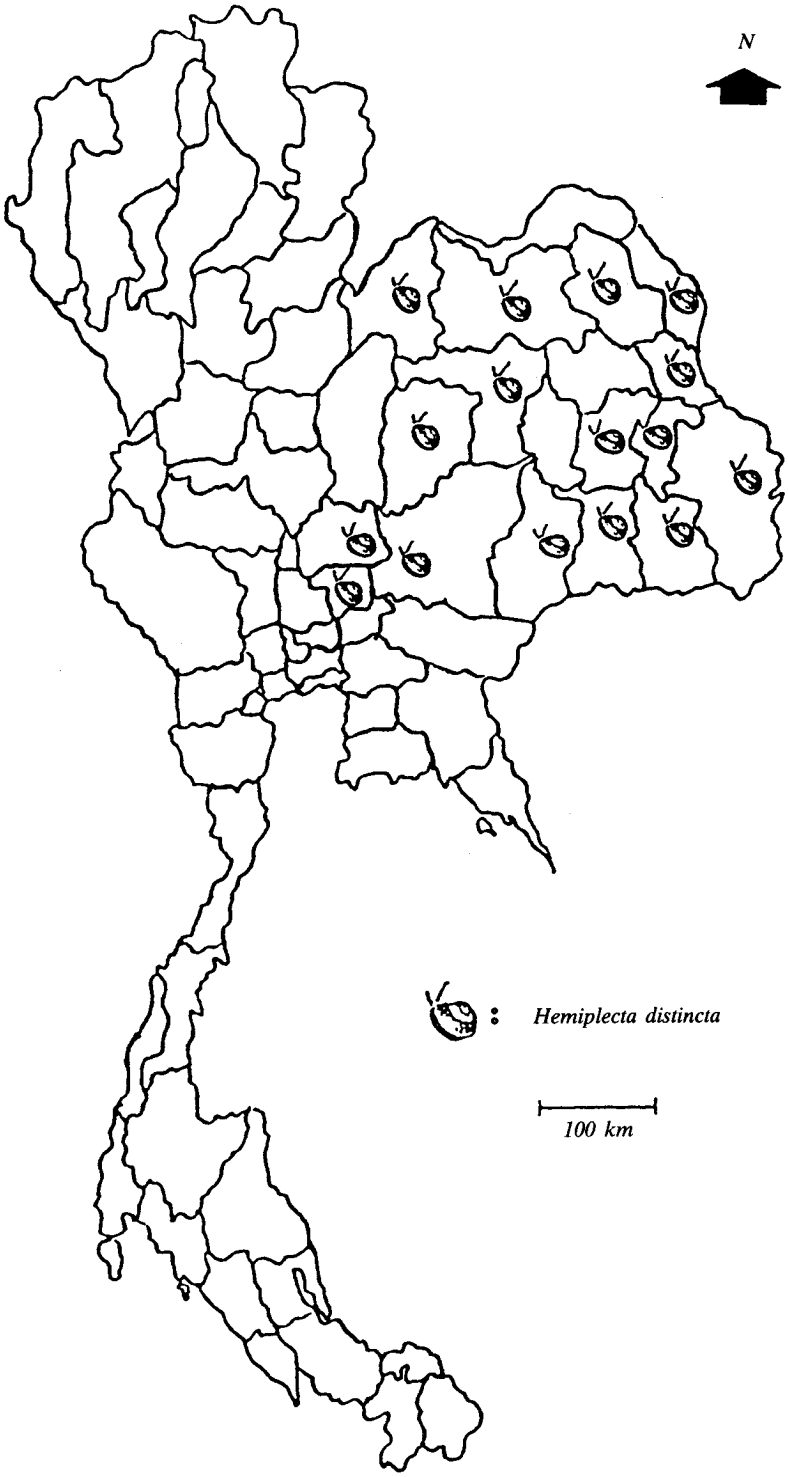

Fig. 2 Map showing the collecting site of *H. distincta* for this study.

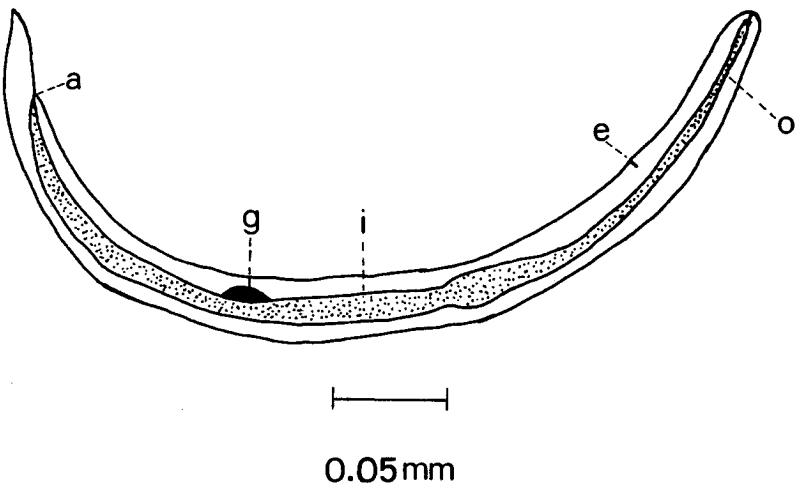

Fig. Third stage larvae of *Angiostrongylus cantonensis* found encapsulated by the lung of *H. distincta*. a, Anus; e, excretory pore; g, genital rudiment; i, intestine; o, oesophagus.