

GNATHOSTOME INFECTION IN SWAMP EELS, *FLUTA ALBA*, IN CENTRAL THAILAND

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Abstract. To investigate the distribution of gnathostome worms in central Thailand, the infective larvae of *Gnathostoma* spp were examined from the flesh and liver of swamp eels, *Fluta alba*. Seven hundred and eighty-eight eels were purchased from markets in 11 provinces; Ang Thong (30), Ayutthaya (36), Chachoengsao (30), Lop Buri (30), Nakhon Nayok (437), Pathum Thani (30), Prachin Buri (48), Ratchaburi (53), Saraburi (30), Samut Prakan (30) and Suphan Buri (34). The highest rate of gnathostome infection was observed in swamp eels from Nakhon Nayok (68.7%). The infection rates in Ayutthaya, Ang Thong, Prachin Buri, Ratchaburi, Saraburi and Lop Buri were 33.3%, 26.7%, 25.0%, 18.9%, 13.3% and 10.0% respectively. Gnathostome larvae were not found in swamp eels from Chachoengsao, Pathum Thani, Samut Prakan and Suphan Buri. Among the 9,573 larvae recovered, almost all were the advanced third stage larvae of *G. spinigerum*, except one larva from Nakhon Nayok and two larvae from Ratchaburi which were identified as the advanced third stage larvae of *G. vietnamicum* and *G. hispidum* respectively. This study is the first report of swamp eels as natural intermediate hosts of *G. vietnamicum* and *G. hispidum*.

INTRODUCTION

In Thailand, gnathostomosis patients are increasing every year. Most of the cases are from the central region. The understanding of the distribution of gnathostome infective larvae in second intermediate hosts is probably helpful for the people living in the high-risk area to protect themselves from exposure. There are several species of freshwater fish serving as second intermediate hosts of *Gnathostoma* (Daengsvang, 1980; Rojekkittikhun *et al*, 1989). Among all the species of freshwater fish surveyed, the highest infection is found in swamp eels. This study investigated the prevalence of gnathostome larvae in swamp eels from 11 provinces of central Thailand.

MATERIALS AND METHODS

Seven hundred and eighty-eight swamp eels were purchased from every wandering vendor in local markets from 11 provinces in central Thailand (Fig 1), Ang Thong (30), Ayutthaya (36), Chachoengsao (30), Lop Buri (30), Nakhon Nayok (437), Pathum Thani (30), Prachin Buri (48), Ratchaburi (53), Saraburi (30), Samut Prakan (30) and Suphan Buri (34). The eels were sacrificed and their flesh individually sliced into small pieces.

These sliced muscle were pressed between two glass plates and examined under a dissecting microscope. The individual livers were chopped into smaller pieces and mixed with a small amount of 1% hydrochloric acid-pepsin solution. The preparation was then incubated in a 37°C water bath for 1-2 hours. After artificial digestion, the liver suspension was washed in 0.85% normal saline for several times until the supernatant became clear. The sediments were examined for the presence of gnathostome larvae under the dissecting microscope. Larvae from both muscle and liver of individual eels were counted and then identified under the microscope.

RESULTS

The prevalence of gnathostome larvae in swamp eels purchased from 11 provinces in central Thailand is summarized in Table 1. Among the highest were Nakhon Nayok and Prachin Buri provinces. The number of larvae per eel were also highest in these two provinces with the highest number of 2,283 larvae in one eel from Nakhon Nayok. Of the 9,573 gnathostome larvae recovered, almost all were identified as *Gnathostoma spinigerum* except for one larva from Nakhon Nayok and two larvae from Ratchaburi which were identified as *G. vietnamicum* and *G. hispidum* respectively. The

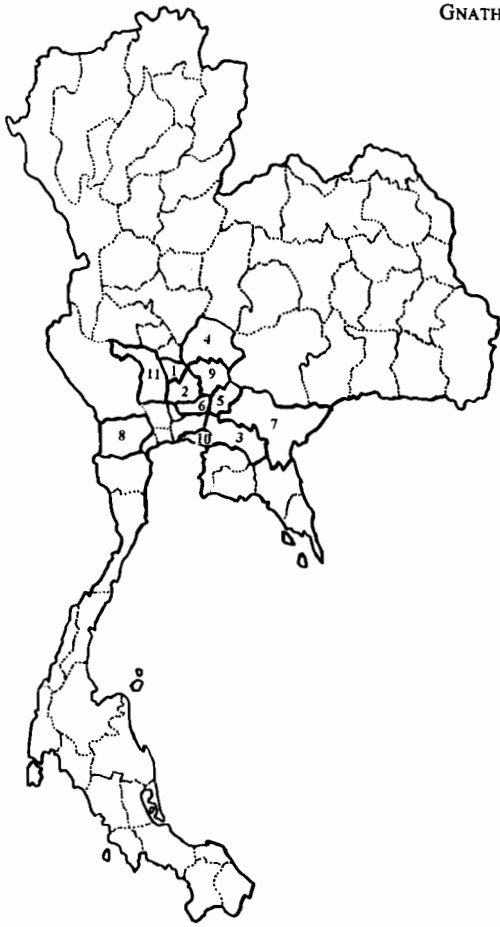


Fig 1—Map of Thailand showing 11 provinces in central part, 1. Ang Thong 2. Ayutthaya 3. Chachoengsao 4. Lop Buri 5. Nakhon Nayok 6. Pathum Thani 7. Prachin Buri 8. Ratchaburi 9. Saraburi 10. Samut Prakan 11. Suphan Buri.

morphological characteristics of *G. vietnamicum* and *G. hispidum* larvae were microscopically studied (Table 2; Fig 2).

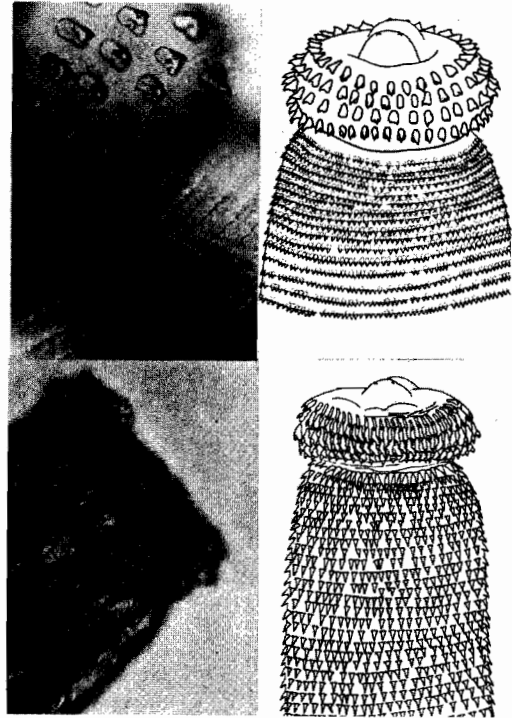


Fig 2—The morphological characteristics of *G. hispidum* (a and b) and *G. vietnamicum* (c and d) third stage larvae from swamp eels.

Table 1

Prevalence of gnathostome larvae in swamp eels purchased from markets in 11 provinces of central Thailand.

Province	No. positive/No. examined (% positive)	No. of larvae per eel	
		Mean \pm SD	Range
Ang Thong	8/30 (26.7)	2.9 \pm 4.6	1-15
Ayutthaya	12/36 (33.3)	5.3 \pm 3.9	1-11
Chachoengsao	0/30 (0)	0	0
Lop Buri	3/30 (10.0)	2.3 \pm 1.9	1-5
Nakhon Nayok	300/437 (68.7)	29.7 \pm 137.0	1-2,283
Pathum Thani	0/30 (0)	0	0
Prachin Buri	24/48 (50.0)	21.7 \pm 34.9	1-133
Ratchaburi	10/53 (18.9)	2.7 \pm 1.5	1-5
Saraburi	4/30 (13.3)	7.8 \pm 8.9	1-23
Samut Prakan	0/30 (0)	0	0
Suphan Buri	0/34 (0)	0	0

Table 2

The morphological study of *G. vietnamicum* and *G. hispidum* third-stage larvae from swamp eels.

Morphological characters	<i>G. vietnamicum</i>	<i>G. hispidum</i>
Size (mm):		
length	2.23*	4.00-4.90
width	0.16*	0.48-0.59
Head bulb:		
Size: length × width (mm)	0.04 × 0.14	0.12 × 0.26
Cephalic hooklets		
No. of rows	4	4
1 st row: No.	44	32-34
Size in av (µm)	ND	11.3-13.8 × 10.0-11.3
2 nd row: No.	44	38-42
Size in av (µm)	11.3 × 3.8	13.8-17.5 × 10.0-12.5
3 rd row: No.	46	34-36
Size in av (µm)	12.5 × 3.8	13.8-17.5 × 10.0-12.5
4 th row: No.	50	36-44
Size in av (µm)	6.3 × 2.5	12.5-15.0 × 10.0-12.5
Cuticular spines:	Single pointed with wide base. Approx 60 µm from the neck, they were "T-shaped" with measuring 7 µm in length. They were then inconspicuous based spines and gradually increased size and density to approx 400 µm from the neck. The spines were deminished in size and density thereafter throughout the body.	Similar to <i>G. spinigerum</i> . They were tear drop like shape with measuring 3-5 µm in length. They were densely arranged at anterior portion and gradually decreased in size and density posteriorly.

* Not true figure because of damaging of specimen

ND = Not done

DISCUSSION

The fact that prevalence of gnathostome larvae in swamp eels was highest in Nakhon Nayok and Prachin Buri goes hand in hand with data referring to gnathostomosis patients being mostly from these provinces. As a general precaution, therefore, residents in high risk provinces should be aware of this fact when eating raw or improperly cooked freshwater fish and/or other second intermediate hosts of gnathostomes. In previous studies, third stage larvae of *G. spinigerum* were found in many species of freshwater fish, amphibians, reptiles, avians and

mammals (Daengsvang, 1980). Daengsvang (1980) also found *G. vietnamicum* adults and larvae in the urinary system of otters from southern Thailand. Yingyouard *et al* (1990) found one *G. vietnamicum* third stage larva in a snake-headed fish caught from Nakhon Si Thammarat, southern Thailand. *G. hispidum* adults were first reported in pigs from the southern region. Furthermore, freshwater fish (*Anabas* spp and *Ophicephalus striatus*) had experimentally served as intermediate hosts of *G. hispidum* (Dissamarn *et al*, 1966). The results of this study further indicate host species preference among the various gnathostomes endemic to Thailand.

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