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STUDIES ON THE PARASITE FAUNA OF THAILAND
6. THREE NEW HELIGMONELLID NEMATODES
FROM PÈRE DAVID'S VOLE,
EOTHENOMYS MELANOGASTER (MILNE-EDWARDS)¹

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Three new heligmonellid nematodes from the small intestine of the Père DAVID'S vole *Eothenomys melanogaster* (MILNE-EDWARDS), captured at Doi Inthanon, Thailand, are described. They were *Yatinema siamensis* n. sp., which belongs to the subfamily Heligmonellinae DURETTE-DESSET, 1983, and is easily differentiated from *Y. japonicum* by a symmetrical bursa and barely developed ridges of synlophe. *Carolinensis eothenomysi* n. sp. and *Neoheligmonella orientalis* n. sp., which belong to the subfamily Nippostrongylineae DURETTE-DESSET, 1983, respectively, and differentiated from the known species of the both genera by the morphological characteristics of the bursal rays and synlophe. This is the first recording of the genus *Neoheligmonella* DURETTE-DESSET, 1971 in the Oriental subregion.

Key words : *Eothenomys melanogaster*, *Yatinema siamensis* n. sp., *Carolinensis eothenomysi* n. sp., *Neoheligmonella orientalis* n. sp., Thailand

INTRODUCTION

The authors have studied the internal parasitic fauna from small mammals (mainly rodents) of the South-East Asia.^{3,14-16} In this paper, the authors report their findings of heligmonellid nematodes from Père DAVID'S vole, *Eothenomys melanogaster* (MILNE-EDWARDS), captured at Doi Inthanon, Thailand. Up to now, there have been few reports on heligmonellid nematodes from the genus *Eothenomys* (YEN, 1973; ASAKAWA, 1986; ASAKAWA & OHBAYASHI, 1986).

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MATERIALS AND METHODS

Heligmonellid nematodes were obtained from the small intestine of 11 Père DAVID'S voles, *Eothenomys melanogaster* (MILNE-EDWARDS), collected at Doi Inthanon, Thailand, in February, 1979.

The nematodes were fixed with 5% formalin and for microscopic examination were cleared in lacto-phenol solution. Some of the specimens were embedded in paraffin and the sections made were stained with hematoxylin-eosin for observing the ridges of the synlophe.

RESULTS AND DISCUSSION

1) *Yatinema siamensis* n. sp.

Host: Père DAVID'S vole, *Eothenomys melanogaster* (MILNE-EDWARDS)

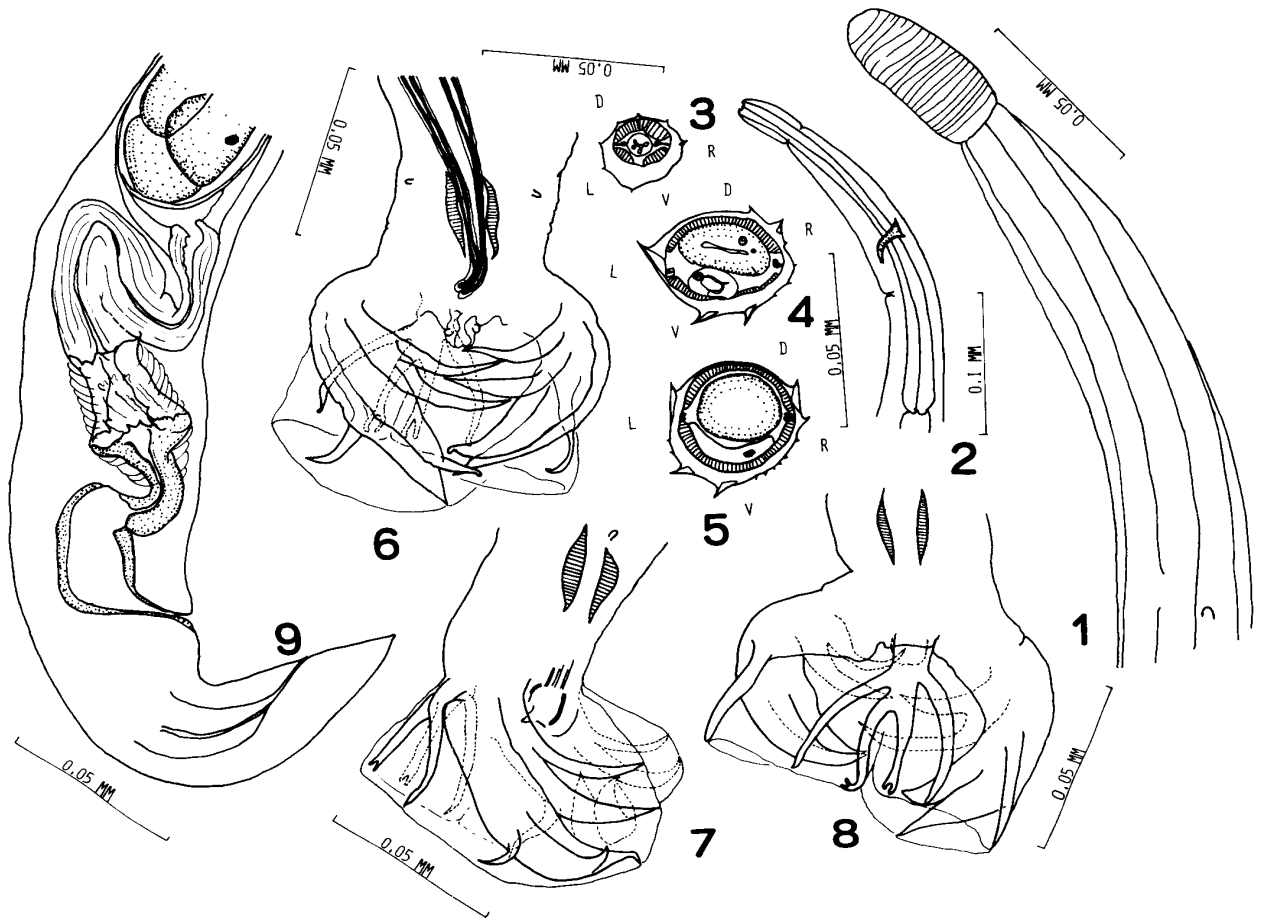
Habitat: Small intestine

Locality: Doi Inthanon, Thailand

Description (All measurements are in mm)

Many nematodes were obtained from the small intestine of 3 voles (Host Nos. 230, 231 & 258). Small nematodes (about 1.8 in length), body coiled. Main measurements are shown in tab. 1. Synlophe and cervical papillae are shown in figs. 1, 3-5 & 24. Cuticle with continuous and longitudinal ridges (synlophe). Longitudinal ridges of ventral and lateral sides more developed than dorsal ones. Number of ridges 9-11 at mid-body and inclination of axis of ridges from sagittal axis 24°-40° (2 males). Gradient in size of ridges is almost from left to right on the ventral side, and from right to left on the dorsal side. Genital organs are shown in figs. 6-9 & 23. Male: Bursa symmetrical, formula of bursal rays type 2-2-1; postero-ventral rays longer than antero-ventrals; antero-lateral and medio-lateral rays well developed and almost the same size; postero-lateral considerably short and originated from base of medio-lateral; externo-dorsal and dorsal rays arising from thick common stem and developed well; prebursal papillae present. Spicules equal (about 0.3 in length), brown in color, enclosed by thin membrane; spicule tips fused, shaped like the letter "L"; gubernaculum obvious and boat-shaped (figs. 6 & 23). Genital cone present with a pair of papillae (fig. 6). Female (one specimen): Monodelphic; vestibule about 0.08 and sphincter 0.03 in length; infundibulum 0.09 in length; uterine eggs in ojector oval, about 0.07×0.04 in size.

The specimens are deposited in the Department of Parasitology, Faculty of Veterinary Medicine, Hokkaido University, Japan



FIGURES 1-9 *Yatinema siamensis* n. sp.

Fig. 1 Anterior extremity of male, left lateral view

Fig. 2 Anterior extremity of male, left lateral view

Fig. 3 Cross-section of anterior extremity of male D.; dorsal side, V; ventral side, R; right lateral side, L; left lateral side

Fig. 4 Cross-section of mid-body of male

Fig. 5 Cross-section of posterior extremity of male

Fig. 6 Posterior extremity of male, ventral view

Fig. 7 Posterior extremity of male, right lateral view

Fig. 8 Posterior extremity of male, dorsal view

Fig. 9 Posterior extremity of female, right lateral view

TABLE 1 Measurements of the three heligmonellid nematodes from *E. melanogaster* (in mm)

GEN. SP.	YATINEMA SIAMENSIS	CALOLINENSIS EOTHENOMYSI	NEOHELIGMONELLA ORIENTALIS
Male	N = 8	N = 6	N = 5
Cephalic vesicle			
length	0.039—0.044	0.040—0.042	0.051—0.056
width	0.020—0.024	0.022—0.026	0.028—0.037
Body			
length	1.67—1.93	1.70—2.13	2.78—3.53
width(mid-body)	0.052—0.062	0.048—0.055	0.136—0.156
Esophagus length	0.260	0.30—0.31	0.31—0.33
Excretory pore from head end	0.240	0.176	0.238
Nerve ring from head end	0.103—0.180	0.132—0.222	0.154—0.198
Spicules	0.255—0.307	0.220—0.242	0.395—0.439
Gubernaculum	0.020—0.029	0.018—0.022	0.026—0.036
Female	N = 4	unknown	N = 6
Cephalic vesicle			
length	0.033—0.043		0.050—0.055
width	0.021—0.023		0.031—0.035
Body			
length	1.75—1.94		3.37—3.90
width(at vulva)	0.050—0.061		0.119—0.158
Esophagus length	0.210—0.260		0.33—0.34
Excretory pore from head end	0.132		0.222—0.253
Nerve ring from head end	0.141—0.187		0.154—0.180
Tail length	0.020—0.022		0.046—0.055
Vulva from tail end	0.066—0.088		0.154—0.216
Egg	0.064—0.075		0.059—0.075
	X		X
	0.036—0.044		0.040—0.046

N: Number of specimens examined

Discussion

This species belongs to the subfamily Heligmonellinae DURETTE-DESSET, 1983, because of the following characteristics: 1) axis of orientation of ridges inclined no more than 45° from sagittal axis, 2) carene absent, 3) gradient in size of ridges from left to right on ventral side and from right to left on dorsal side, 4) parasites of archaic rodents (DURETTE-DESSET, 1983). Among 7 genera of Heligmonellinae (DURETTE-DESSET, 1983; ASAKAWA & OHBAYASHI, 1986), this species accords with *Yatinema* ASAKAWA & OHBAYASHI, 1986, because in the present species; 1) postero-lateral ray remarkably short, 2) dorsal lobe not separated, 3) spicule tip blunt and curved like the letter "L", 5) host is Oriental Cricetidae (*Eothenomys*). Up to now, in the genus *Yatinema* there is only one species, *Y. japonicum*, from three species of the Japanese voles, *Eothenomys smithi* THOMAS, *E.* (= *Aschizomys*) *niigatae* (ANDERSON) and *E.* (= *Aschizomys*) *andersoni* (THOMAS) (ASAKAWA, 1986; ASAKAWA & OHBAYASHI, 1986), and the present species manifests these characteristics. The present specimen, however, is distinguished from *Y. japonicum* because the bursa is symmetrical and the ridges are few in number and not well-developed. Therefore, a new species, *siamensis*, was established for the present specimens.

2) *Carolinensis eothenomysi* n. sp.

Host: Père DAVID'S vole, *Eothenomys melanogaster* (MILNE-EDWARDS)

Habitat: Small intestine

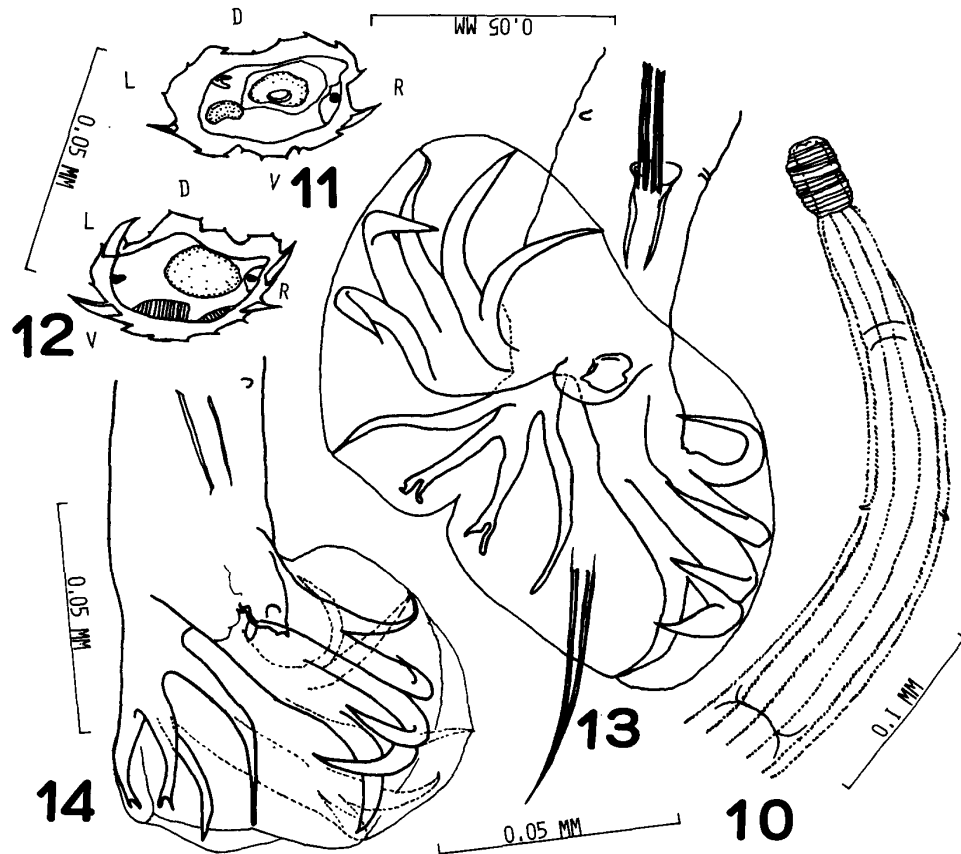
Locality: Doi Inthanon, Thailand

Description (All measurements are in mm)

A few male nematodes were obtained from the small intestine of 3 voles (Host Nos. 230, 231 & 276).

Small nematode (about 2.0 in length). Main measurements are shown in tab. 1. Synlophe and cervical papillae are shown in figs. 10–12 & 26. Cuticle with continuous and longitudinal, conspicuous, sharply pointed ridges. One or two ridges of both lateral ones well-developed and other ridges small and almost the same in size (gradient in size of ridges is latero-median). Number of ridges 17–18 at mid-body. Inclination of axis of ridges from sagittal axis and carene obscure (probably carene of type A present). Genital organs are shown in figs. 13, 14 & 25. Male: Bursa symmetrical, formula of bursal rays type 2–2–1; postero-ventral ray slightly longer than antero-ventral; three lateral rays almost the same in size; externo-dorsal and dorsal rays arising from thick common stem; prebursal papillae present. Spicules equal (about 0.2 in length) and light-yellow in color; spicule tips fused, spinous shaped; gubernaculum reduced (figs. 13 & 25). Genital cone blunt. Female: unknown.

The specimens are deposited in the Department of Parasitology, Faculty of Veterinary Medicine, Hokkaido University, Japan.



FIGURES 10–14 *Carolinensis eothenomysi* n. sp.

Fig. 10 Anterior extremity of male, dorsal view

Fig. 11 Cross-section of mid-body of male, D; dorsal side, V; ventral side, R;
right lateral side, L; left lateral side

Fig. 12 Cross-section of mid-body of male

Fig. 13 Posterior extremity of male, ventral view

Fig. 14 Posterior extremity of male, right lateral view

Discussion

This taxon belongs to the genus *Carolinensis* (TRAVASSOS, 1937) of the subfamily Nippostrongylinae DURETTE-DESSET, 1983, because of the following characteristics: 1) gradient in size of ridges latero-median, 2) synlophe well-developed with conspicuous, sharply pointed ridges, 3) ridges of synlophe unequal, 4) dorsal left ridges smaller than lateral left ridges, 5) bursa symmetrical, 6) number of ridges 17–18, 7) parasite of cricetid rodent (*Eothenomys*).

Among the 5 species of the genus *Carolinensis* (TRAVASSOS, 1937)^{6,7,8,10,12,19} externo-dorsal and dorsal rays of the present species resemble those of *C. seurati*, *C. minuta* and *C. romerolagi*. However, the present taxon is distinguishable from the above-noted three species of *Carolinensis* by the number of ridges (*minuta* = 13–16, *seurati* = 14, *romerolagi* = 14) and the morphological characteristics of the ridges. Furthermore, the present taxon does not accord with the three species by hosts and zoogeographic localities (*minuta* from the genera *Arvicola* and *Pitymys* of Palaearctic subregion, *seurati* from the genus *Meriones* of Ethiopian subregion, *romerolagi* from *Romerolagus* of Nearctic subregion).

3) *Neoheligmone orientalis* n. sp.

Host: Père DAVID'S vole, *Eothenomys melanogaster* (MILNE-EDWARDS)

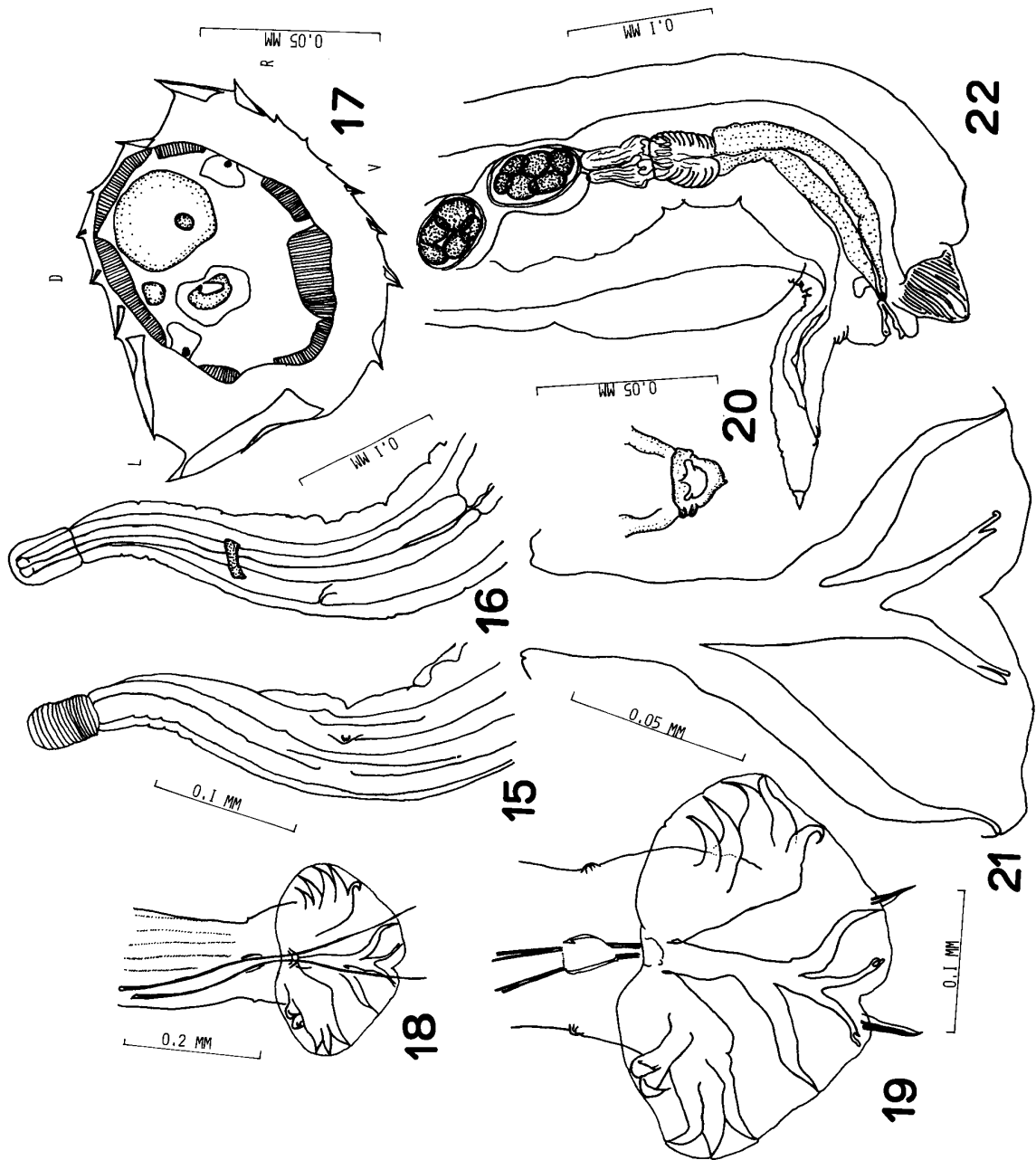
Habitat: Small intestine

Locality: Doi Inthanon, Thailand

Description (All measurements are in mm)

A few nematodes were obtained from the small intestine of 4 voles (Host Nos. 230, 234, 258 & 276).

Comparatively large nematodes (male about 3.1 and female 3.7 in length), body straight without coiling. Measurements are shown in tab. 1. Synlophe and cervical papillae are shown in figs. 15, 17, 18 & 28. Cuticle with continuous and longitudinal ridges. Gradient in size of ridges latero-median. Carene present, carene supported by hypertrophied left lateral ridge and adjacent ridge on dorsal side (type A by Durette-Desset, 1983). Number of ridges of synlophe 15–25 and inclination of axis of ridges from sagittal axis 65°–75° at mid-body in 2 females. Genital organs are shown in figs. 18–22, 27 & 29. Male (one specimen was used.): Bursa symmetrical, formula of bursal rays type 2–2–1; postero-ventral rays slightly longer than antero-ventrals; three lateral rays almost the same in size; extero-dorsal and dorsal rays remarkably well-developed and arising from thick common stem; right externo-dorsal diverged at 0.048 and left at 0.064 from base of stem; length of right externo-dorsal 0.13 and left 0.08; length of dorsal ray 0.13 with two branches; prebursal papillae present. Spicules equal (about 0.4) and brown in color; spicule tip spinous shaped (fig. 19); gubernaculum reduced (figs. 19 & 27). Genital cone conical (fig. 20). Female (one specimen): Monodelphic; vestibule about 0.08, sphincter 0.05 and



FIGURES 15-22 *Neoheligionella orientalis* n. sp.

Fig. 15 Anterior extremity of male, left lateral view

Fig. 16 Anterior extremity of male, left lateral view

Fig. 17 Cross-section of mid-body of female, D; dorsal side, V; ventral side, R; right lateral side, L; left lateral side

Fig. 18 Posterior extremity of male, ventral view

Fig. 19 Posterior extremity of male, ventral view

Fig. 20 Genital cone

Fig. 21 Externo-dorsal and dorsal rays

Fig. 22 Posterior extremity of female, left lateral view

infundibulum 0.05 in length; triangular appendage present at vagina vera (fig. 22); uterine eggs oval, about 0.06×0.04 in size, 5–6 cell stage.

Specimens are deposited in the Department of Parasitology, Faculty of Veterinary Medicine, Hokkaido University, Japan.

Discussion

The present taxon belongs to the genus *Neoheligionella* DURETTE-DESSET, 1971. This genus belongs also to the subfamily Nippostrongylineae because of the following characteristics: 1) gradient in size of ridges latero-median, 2) synlophes well-developed with conspicuous, sharply pointed ridges, 3) carene (type A) present, 4) dorsal left ridges smaller than left ridge, 5) bursa symmetrical, 6) ridges of synlophes unequal.

The eleven species^{4,5,8,9,10,17,20} of the genus *Neoheligionella* DURETTE-DESSET, 1971 do not accord with the present taxon, which is characterized by 1) a large number of ridges, 2) externo-dorsal rays diverging asymmetrically, 3) triangular appendage at antero-vagina vera.

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EXPLANATION OF PLATE

FIGURES 23 & 24 *Yatinema siamensis* n. sp.

Fig. 23 Posterior extremity of male (scale 0.02 mm long)

Fig. 24 Cross-section of mid-body of male (scale 0.01 mm long)

FIGURE 25 & 26 *Carolinensis eotheromysi* n. sp.

Fig. 25 Posterior extremity of male (scale in 0.02 mm long)

Fig. 26 Cross-section of mid-body of male (scale 0.01 mm long)

FIGURE 27 & 29 *Neoheligmonella orientalis* n. sp.

Fig. 27 Posterior extremity of male (scale 0.1 mm long)

Fig. 28 Cross-section of mid-body of female (scale 0.03 mm long)

Fig. 29 Posterior extremity of female and a triangular appendage at vagina vera (→) (scale 0.1 mm long)

