

**A NEW MESOVELIID GENUS AND TWO NEW SPECIES OF
HEBRUS (HETEROPTERA: MESOVELIIDAE, HEBRIDAE)
FROM INTERTIDAL HABITATS IN SOUTHEAST ASIAN
MANGROVE SWAMPS**

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ABSTRACT. - A new genus of Mesoveliidae, *Nereivelia* is described on the basis of a new species, *N. murphyi* from localities in southern Thailand and Singapore. This species occurs in the intertidal zone of mangrove swamps in logs riddled with borer holes. Key characters and a discussion of the relationship of *Nereivelia* to allied genera of Mesoveliidae are provided. Two new species of *Hebrus* also taken in Singapore mangrove swamps, *H. nereis* and *H. mangrovensis* are also described and compared to other hebrid species. This is the first reported occurrence of the family Hebridae in the intertidal zone.

INTRODUCTION

While making collections of aquatic Heteroptera in Kranji mangrove swamp, Singapore, during a recent National Geographic Society expedition to Southeast Asia, we discovered a single female of a new genus and species of Mesoveliidae for which we propose the name *Nereivelia murphyi*. Unaware of our discovery, Dennis H. Murphy of the National University of Singapore later collected two males of this species at Ranong in southwestern Thailand, which he generously provided for this study.

Three genera of the family Mesoveliidae were previously known from marine habitats: *Speovelia* Esaki from Japan and Mexico, *Darwinivelia* Andersen & Polhemus from the Galapagos, Colombia and Brazil, and *Mesovelia* Mulsant & Rey, a primarily freshwater cosmopolitan genus with at least two marine species, one from the eastern tropical Pacific and another from Belize (for a review of marine Gerromorpha, see Andersen & Polhemus, 1976 and Polhemus & Manzano, in press).

Two new species of *Hebrus* for which we propose the names *H. nereis* and *H. mangrovensis*, were also collected from mangrove swamps in Singapore and at Ranong, Thailand, in a variety of situations. These are the first described species of this genus from marine habitats. However, another remarkable undescribed marine hebrid from Sulawesi was mentioned by Polhemus & Manzano (in press) and will be described in a later publication.

All measurements are given in millimeters. CL numbers following locality data refer to codes used by the authors to reference ecological data. Specimens are deposited in the United States National Museum of Natural History (USNM), Smithsonian Institution,

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Washington D. C.; J. T. Polhemus Collection, Englewood, Colorado (JTTC); Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore; and the American Museum of Natural History (AMNH).

TAXONOMY
FAMILY MESOVELIIDAE

GENUS NEREIVELIA, NEW GENUS

Type species. - *Nereivelia murphyi*, new species

Description. - Apterous form: Small; length 1.7 to 2.2 mm, width 0.7 to 1.0 mm. Elongate oval, covered with fine to coarse recumbent to almost erect pubescence, longer on thorax and head.

Head moderately long, matt, quadrate, sides subparallel, broadly rounded anteriorly, strongly declivent anteriorly, with a basal transverse ridge demarcated laterally by the posterior trichobothria; dorsal trichobothria long, prominent, regular, almost equally spaced, with basal pair posteromedial to eyes, median pair anteromedial to eyes, anterior pair on a level with bases of antennal tubercles; without median longitudinal sulcus on vertex but with two longitudinal rows (1+1) of anastomosed pits, evanescent posteriorly. Eyes spherical, normal, adjacent to pronotum, ommatidia large, about 30 in number, with two long, curved ocular setae; ocelli absent. Antenna approximately as long as body, segment 1 shorter than head, segment 2 more slender, about half as long as segment 1, segments 3 and 4 long, flagelliform; set with short stiff setae and scattered longer setae, without spines. Venter of head with a broad raised plate, widening posteriorly, demarcated laterally by a carina on each side; labium long, reaching beyond posterior coxae.

Thorax shining dorsally, matt laterally, sides almost parallel; pronotum longest on midline, subequal to combined length of meso- and metanotum which are subequal in length; shape of segments shown in Figs. 1 and 2; all segments distinctly sutured off dorsally and laterally. Thoracic scent gland orifice large, prominent, opening posteriorly on a posterior elevation of metathorax. Femora stout, unarmed; tibia slender, unarmed; tarsi 3-segmented, first segment shortest, third segment longest. Claws slender, without basal spurs; arolia slender, dorsal arolia dorsoventrally flattened; parempodia setiform.

Abdomen longer than broad (Figs. 1, 2); abdomen of female dorsoventrally much deeper than male, similar in lateral view to that of *Cryptovelia* Andersen & Polhemus (see Andersen & Polhemus, 1980: fig. 3). Tergites of varying lengths (Figs. 1, 2); scent orifice located medially on tergite IV at anterior one third. Paratergites broad, slightly raised. Sternites shining, faintly rugulose; laterally with shallow longitudinal sulcus separating medial and lateral parts, spiracles located medially on latter.

Male genital segments large, segment VIII, pygophore, proctiger and parameres as shown in Figs. 3, 4. Female not dissected, but evidently with large, well developed ovipositor.

Macropterous form not known.

New Mesoveliidae and Hebridae

Etymology. - The generic name is derived from the Latin "Nereis", a sea nymph, daughter of Nereus, a sea-god; pertaining to its association with the sea.

Distribution. - Singapore and southwestern Thailand.

Remarks. - *Nereivelia murphyi*, new genus and species is most closely related to *Speovelia* Esaki, *Phrynovelia* Horvath and *Austrovelia* Malipatil & Monteith. In Andersen & Polhemus' key (1980: 383-384) to the genera of Mesoveliidae, *Nereivelia* keys to *Speovelia* and *Phrynovelia* but differs from these genera and the subsequently described *Austrovelia* (Malipatil & Monteith, 1983) by the characteristics summarised in Table 1. *Nereivelia* is most similar to *Phrynovelia*, but in addition to the differences noted in table 1, it may be separated by the shorter, more declivent head, the raised longitudinal plate-like structure of the ventral head, and the rugulose instead of glabrous abdomen.

TABLE 1
Characters for separation of *Nereivelia*, *Speovelia*, *Austrovelia* and *Phrynovelia*.

Character	<i>Nereivelia</i>	<i>Speovelia</i>	<i>Austrovelia</i>	<i>Phrynovelia</i> .
Size, mm	1.7-2.2	2.6-4.0	1.2-1.5	1.5-1.8
Head length	moderate	long	long	long
Ventral head	long, raised, plate-like	long, simple	long, carinate	long, simple or ridged
Eyes	normal	reduced	normal or reduced	normal
Antennae, form	flagelliform	flagelliform	flagelliform	filamentary
Antennae, length	very long	very long	long	long
Rostrum extending to:	base of abdomen	mesocoxae	metacoxae	mesocoxae, metacoxae
Femoral spines	absent	strong	absent	weak
Posterior margin of metanotum	straight	curved	sinuate	straight
Scent gland pore on tergite IV	before middle	before middle	behind middle	before middle

Nereivelia murphyi, new species

(Figs. 1-4)

Material. - Holotype - Apterous ♂ (USNM), mangrove in Khlong Ngau, 20 km south of Ranong, southern Thailand, leg. D. H. Murphy, 16.xi.1987.

Paratypes - 1 apterous ♂ (JTPC), same data as holotype; 1 apterous ♀ (JTPC) (CL 2215), Kranji mangrove swamp, Singapore, leg. J. T. & D. A. Polhemus, 13.x.1986.

Others - 1 apterous ♀ (ZRC) [not seen by us], Kranji mangrove swamp, Singapore, leg. D. H. Murphy, 1986.

Description. - Apterous male: Length 1.66, width 0.68. Ground colour yellow brown, without significant markings; head and thorax medially yellowish; spot at base of each cephalic trichobothrium dark; venter of abdomen yellowish; venter of head and rostrum, antennae and legs pale except femora darker distally. Head matt; thorax and abdomen rugulose, faintly shining; legs, body and antennae covered with short recumbent to semirect pubescence, with scattered longer setae.

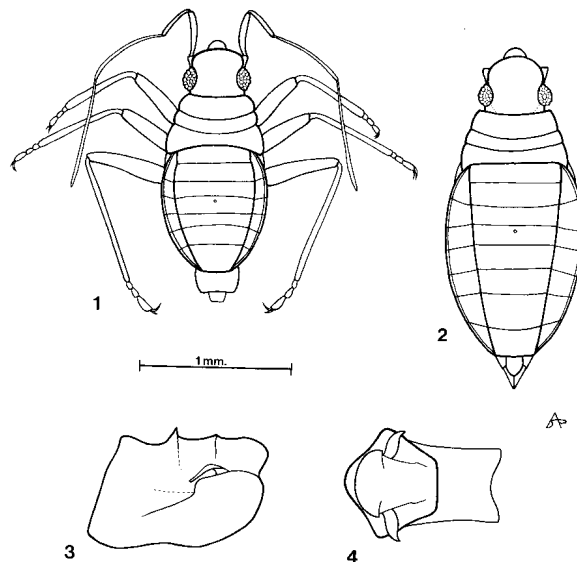
Structural characteristics: Head long, sharply declivent anteriorly; length (from above) 0.40, width across antennal tubercles 0.32; eyes of moderate size, exserted; width of an eye: interocular space 0.07: 0.25; antennae very long, slender, segment I stoutest; length of segments I-IV 0.40, 0.25, 0.58, 0.72 respectively.

Thorax shorter than head, segments distinct, without distinct impressions; midline lengths of pronotum, mesonotum, metanotum 0.15, 0.07, 0.07 respectively.

Proportions of legs as follows:

	Femur	Tibia	Tarsal 1	Tarsal 2	Tarsal 3
Anterior	0.51	0.45	0.03	0.03	0.10
Middle	0.56	0.54	0.03	0.03	0.10
Posterior	0.74	0.78	0.03	0.07	0.12

Genital segments large, protruding; details shown in Figs. 3, 4.



Figs. 1-4. *Nereivelia murphyi*, new genus and species. 1, apterous male, habitus; 2, apterous female, habitus; 3, male abdominal terminalia, lateral view; 4, male abdominal terminalia, dorsal view.

New Mesoveliidae and Hebridae

Apterous female: Length 2.16, width 0.94. Structure and colouration mostly as in apterous male, except larger, broader (Fig. 2), abdomen much deeper; antennae somewhat longer than male, length of segments I-IV 0.47, 0.61, 0.61, 0.90 respectively; apparently with well formed ovipositor, however unique female available was not dissected.

Macropterous form and nymphs not known.

Etymology. - The species name *murphyi* honours Associate Professor D. H. "Paddy" Murphy, who has directed us to many interesting localities in Singapore over the years, and whose knowledge of the local entomofauna has proven invaluable to our work.

Remarks. - see genus.

Habitat data. - All known specimens were collected in mangrove swamps. The two males (holotype and paratype) were collected at Ranong, Thailand by D. H. Murphy "..... in *Rhizophora* timber on ground, with heavy borer attack" (personal communication). The female from Singapore was collected in an intertidal mudflat bordered by thick mangroves on the inland side and by a deep tidal channel on the seaward margin with scattered mangroves in between. At the time we collected the tide was out and a broad expanse of mud was exposed, set here and there with fallen mangrove logs and scattered living mangroves. The female paratype of *Nereivelia murphyi* was taken from the underside of one of these logs that was in a state of partial decay, along with numerous specimens of the two new *Hebrus* species described herein.

FAMILY HEBRIDAE

GENUS *HEBRUS*

Hebrus nereis, new species.

(Figs. 5-7)

Material. - Holotype - submacropterous ♂ (USNM) (CL 2215), Kranji mangrove swamp, underside of log in intertidal zone on mud, Singapore, leg. J. T. & D. A. Polhemus, 13.x.1986.

Paratypes - (all submacropterous) 8♂, 13♀ (JTPC, USNM, AMNH), same data as holotype; 14♂, 6♀ (JTPC, ZRC), Kranji mangrove fringe, holes in 3 inch *Avicennia* pole near high water neaps, Singapore, leg. D. H. Murphy, 19.vi.1986; 1♂ (ZRC), Kranji mangrove, under log, leg. D. H. Murphy, 2.ii.1986; 23♂, 19♀, 8 nymphs (JTPC, ZRC), Mandai mangrove, leg. D. H. Murphy, 1984; 10♂, 6♀, 5 nymphs (JTPC, ZRC), Mandai mangroves, under polyethylene sack, Singapore, leg. D. H. Murphy, 26.xii.1985; 9♂, 6♀ (JTPC, ZRC), Ranong mangrove, running on mud, Thailand, leg. D. H. Murphy, 16.xi.1987.

Description. - Submacropterous male: Length, mean, 2.08 (N = 10, min. 1.94, max. 2.20); width (across humeri), mean, 0.79 (N = 10, min. 0.76, max. 0.83). Elongate, ground colour brownish-black; collar, head ventrally, humeri, acetabulae rufous; legs, rostrum, antennae testaceous; legs flavous distally; eyes reddish-brown, moderately large, coarsely faceted.

Structural characteristics: Head long, declivent anteriorly; median length (from above) 0.44, width across antennal tubercles 0.35; vertex with 2 anastomosing rows of pits ending posteriorly in slight depression on base of head, without median sulcus. Eyes moderately large, exserted, with about 50 ommatidia; width of an eye: interocular space 0.08: 0.25. Ocellar pit located mesad of posterior part of eye; ocelli reduced, very small,

barely visible at 80X. Antennae long, slender, segment I stoutest, segment II less so, both widened distally; segments III-V long, slender, clothed with short setae and set with numerous long setae; length of segments I-V 0.22, 0.22, 0.29, 0.17, 0.25 respectively (separation between IV-V indistinct). Rostrum extending between hind coxae. Bucculae prominent; shape and fovea as in Fig. 7.

Pronotum long, length 0.37; constricted medially, without median longitudinal sulcus; anterior lobe with 2 (1+1) small pits on either side of midline, set off from posterior lobe by transverse row of deep foveae; posterior lobe set with scattered shallow pits and depressions. Collar not prominent, set off with a weak row of pits. Mesoscutellum short, length 0.05. Metanotal elevation triangular, weakly to sharply incised distally; median carina prominent; length 0.17, width 0.35.

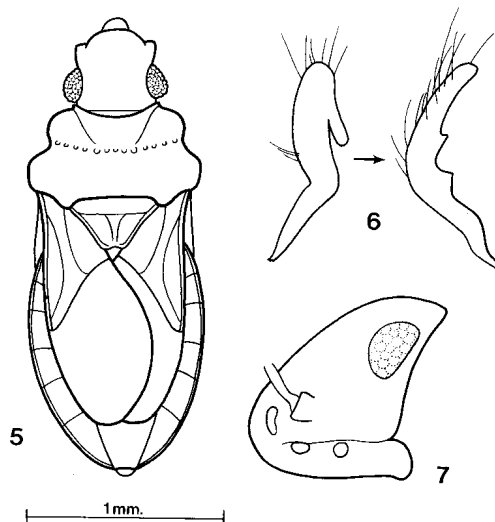
Hemelytra short, reaching posterior margin of tergites V-VI; hindwings somewhat reduced; clavus sordid white tinged with brown; corium smokey brownish, indistinct; membrane fumose, without significant lighter markings, costal margin set with outwardly directed stiff golden setae.

Thoracic venter set with numerous long setae medially. Abdominal venter thickly clothed with short appressed setae, set with scattered longer setae.

Legs stout, covered with short setae; proportions as follows:

	Femur	Tibia	Tarsal 1	Tarsal 2
Anterior	0.45	0.47	0.02	0.12
Middle	0.49	0.45	0.02	0.12
Posterior	0.66	0.69	0.02	0.17

Genital capsule large, protruding; parameres symmetrical, diagnostic details shown in Fig. 6.



Figs. 5-7. *Hebrus nereis*, new species. 5, submacropterous male, habitus; 6, male paramere, two views; 7, head, lateral view.

New Mesoveliidae and Hebridae

Submacropterous female: Length, mean, 2.18 (N = 10, min. 2.02, max. 2.27); width (across humeri), mean, 0.81 (N = 10, min. 0.79, max. 0.86). Structure and colouration mostly as in male, except larger, usually with somewhat brighter markings on hemelytra.

Brachypterous and micropterous forms not known.

Etymology. - The name "Nereis" is Latin for sea nymph, and is a noun in apposition.

Remarks. - The essentially straight hind legs, equal length antennal segments I and II, and shape of the male paramere will separate *Hebrus nereis*, new species from *H. bengalensis* Distant, 1909 (p. 497-8) (see also the redescription by Lundblad, 1933: 272-3). The combination of the essentially unicolourous hemelytral membrane, lack of sculpturing on the pronotum, and a unique male paramere separates *H. nereis* from all other described Asian species.

The unusual intertidal habitat of this and the following new species (*H. mangrovensis*, new species) is unique for the genus *Hebrus* as far as we know. Although we collected specimens of *Hebrus* aff. *nipponicus* Horvath at the mouth of a mangrove estuary near Kota Bharu, West Malaysia, this estuary was separated from the ocean by a low narrow sand dune. Unlike the Kranji mangrove locality, it had a much steeper gradient and some fresh water influence so that the microhabitat was apparently not intertidal. *Hebrus* species have also been collected in coastal marshes in the southeastern United States (Polhemus & Chapman, 1970), however not in intertidal microhabitats.

Habitat data. - All known specimens were collected in the intertidal zone of mangrove swamps below mean high water level, and the species is probably restricted to this habitat. Some specimens were collected along with *Nereivelia murphyi* (see habitat data for that species) and *Hebrus mangrovensis*. The insects were taken under trash or logs, and running on damp earth.

Hebrus mangrovensis, new species

(Figs. 8-10)

Material. - Holotype - micropterous ♂ (USNM) (CL 2215), Kranji mangrove swamp, underside of log in intertidal zone, Singapore, leg. J. T. & D. A. Polhemus, 13.x.1986.

Paratypes - (all micropterous) 1♂, 2♀ (JTPC), same data as holotype; 2♂, 2♀ (JTPC, ZRC), Kranji mangrove, fringe, holes in 3 inch *Avicennia* pole near high water neap, Singapore, leg. D. H. Murphy, 19.vi.1986; 5♂ (ZRC), Kranji mangrove, wet intertidal log, leg. D. H. Murphy, 30.vi.1985; 2♂, 2♀ (JTPC, ZRC), Kranji mangrove, under log, Singapore, leg. D. H. Murphy, 2.ii.1986

Description. - Micropterous male: Length, mean, 2.12 (N = 10, min. 2.05, max. 2.23); width (across abdomen), mean, 0.87 (N = 10, min. 0.83, max. 0.94). Elongate, ground colour brownish-black; head and thorax ventrally, connexiva, acetabulae rufous; legs, rostrum, antennae testaceous; legs flavous distally. Eyes reddish-brown, of moderate size, coarsely faceted.

Structural characteristics: Head long, declivent anteriorly; median length (from above) 0.44, width across antennal tubercles 0.37; vertex with 2 anastomosing rows of pits, without median sulcus. Eyes moderately large, exserted, globose, with about 30 ommatidia; width of an eye: interocular space 0.08: 0.25. Ocellar pit located mesad of posterior part of eye, elongate; ocelli reduced, very small, barely visible at 80X. Antennae long,

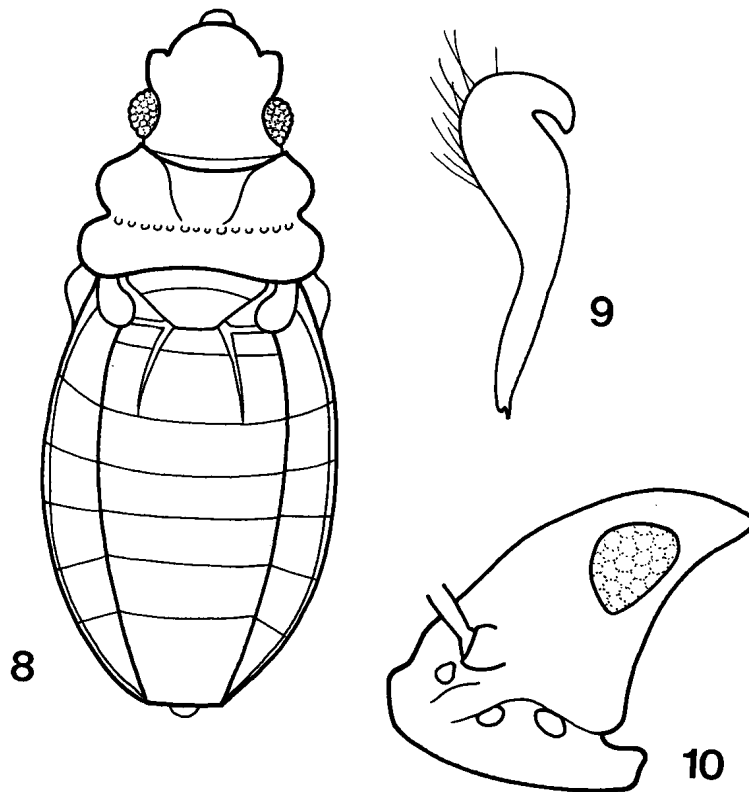
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slender, segment I stoutest, segment II less so, widened distally; segments III-V long, slender, clothed with short setae and set with numerous long setae; length of segments I-V 0.22, 0.22, 0.30, 0.20, 0.25 respectively (separation between IV-V indistinct). Rostrum extending onto base of abdomen. Bucculae prominent; shape and fovea as in Fig. 10.

Pronotum long, length 0.29; constricted medially, without median longitudinal sulcus; anterior lobe with 4 (2+2) deep pits on either side of midline, set off from posterior lobe by a transverse row of deep foveae; posterior lobe without significant pits or depressions posteriorly. Collar not prominent, not demarcated medially. Mesoscutellum short, length 0.05. Metanotal elevation very short, truncate distally; median carina prominent; length 0.10, width 0.37.

Hemelytra reduced to small triangular pads (Fig. 8); brown basally, sordid white distally.

Thoracic venter set with numerous long setae medially. Abdominal venter thickly clothed with short appressed setae, set with scattered longer setae.



Figs. 8-10. *Hebrus mangrovensis*, new species. 8, micropterous male, habitus; 9, male paramere; 10, head, lateral view.

New Mesoveliidae and Hebridae

Legs stout, covered with short setae; proportions as follows:

	Femur	Tibia	Tarsal 1	Tarsal 2
Anterior	0.42	0.47	0.02	0.12
Middle	0.51	0.47	0.02	0.12
Posterior	0.67	0.67	0.02	0.17

Genital capsule large, protruding; parameres symmetrical, diagnostic details shown in Fig. 9.

Micropterous female: Length, mean, 2.26 (N = 6, min. 2.16, max. 2.34); width (across abdomen), mean, 0.95 (N = 6, min. 0.90, max. 1.01). Structure and colouration mostly as in male, except larger.

Brachypterous and macropterous forms not known.

Etymology. - The name "mangrovensis" refers to the habitat of this species.

Remarks. - *Hebrus mangrovensis*, new species, is the only micropterous *Hebrus* species known so far from Asia, although there are some in Europe and the Mediterranean region, and one in New Guinea. Of the Old World species, *H. mangrovensis* most closely resembles the micropterous *H. peculiaris* Horvath from New Guinea in general facies. However, the latter species has a well demarcated collar and a deep median longitudinal sulcus on the head. The microptery of *H. mangrovensis* along with the intertidal habitat will separate this species from all other described Asian species. The broad truncate metanotal elevation is also unique. However, we assume that in the macropterous form, if it exists, this structure will be triangular.

A comprehensive revision of Asian *Hebrus* species has never been undertaken and is badly needed. Lundblad (1933) examined the types of five Asian species as well as three others from Australia and New Guinea and provided excellent figures and redescrptions for some of them. With the addition of the two species described here, there are now 17 described Asian species. There are however, numerous undescribed species in the Polhemus collection (JTPC) as well as other collections. In a later paper, it is anticipated that more species will be described and a checklist and illustrated key provided.

Habitat data. - All known specimens were collected from logs in mangrove swamps. Some specimens were collected along with *Nereivelia murphyi* and *Hebrus nereis* (see habitat data for these species).

Acknowledgements. - We wish to thank Associate Professor D. H. "Paddy" Murphy of the National University of Singapore, who directed us to the type locality for these species. This research was supported in part by a grant from the National Geographic Society, Washington D. C.

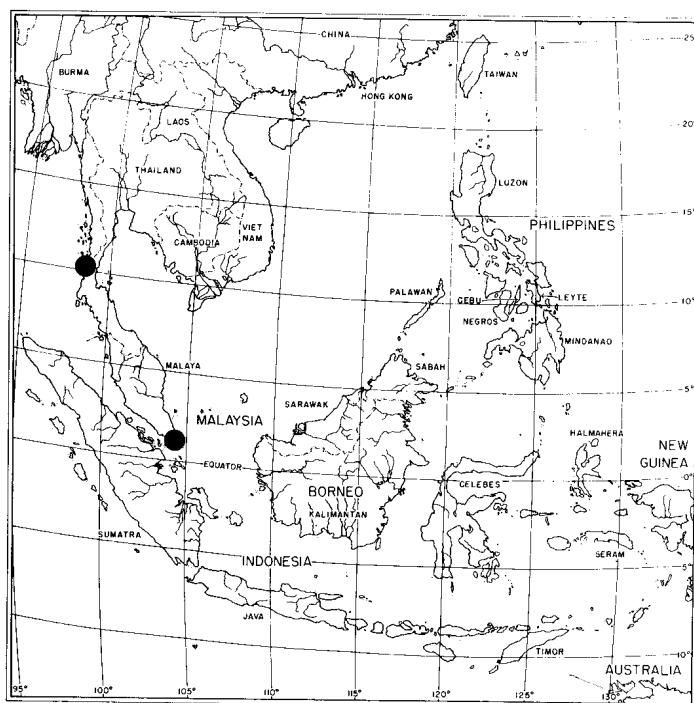


Fig. 11. Distribution of *Nereivelia murphyi*, new genus and species, *Hebrus nereis*, new species and *Hebrus mangrovensis*, new species, in Southeast Asia.

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