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NEPHTYIDAE (POLYCHAETA : ERRANTIA) FROM AUSTRALIA

SEBASTIAN RAINER
CSIRO Division of Fisheries & Oceanography, Cronulla, N.S.W.
and
PAT HUTCHINGS
The Australian Museum, Sydney

SUMMARY

The Australian Nephtyidae are represented by 13 species in four genera, *Aglaophamus* (4 species), *Inermonephtys* (1 sp.), *Micronephthys* (1 sp.) and *Nephtys* (7 spp.). Five new species are described, *Aglaophamus gippslandicus* n.sp., *A. profundus* n.sp., *Nephtys inornata* n.sp., *N. mesobranchia* n.sp., and *N. semiverrucosa* n.sp. *Nephtys vikingensis* Paxton, 1974 is synonymised with *N. longipes* Stimpson, 1856 and *Micronephthys sphaerocirrata* (Wesenberg-Lund, 1949) is recorded from Australia for the first time. Descriptions are provided for all species examined.

INTRODUCTION

Nephtyids were first recorded from Australian waters by Stimpson (1856), who briefly described *Nephtys longipes* from Botany Bay, N.S.W. By 1922 the number of recorded species had grown to four: Augener (1913) described *N. gravieri* from near Fremantle, W.A. Benham (1915, 1916) found *Aglaophamus macroura* (Schmarda) from deep water east of Bass Strait, and Augener (1922) recorded *A. dibranchis* from south-east Australia, N.S.W. No new species were found until 1963, when Fauchald described *N. mirocirris* from Spencer Gulf, S.A. and the widely-distributed *N. australiensis*. *Aglaophamus verrilli* (McIntosh) was recorded from Moreton Bay by Rullier (1965) and *Nephtys picta* Ehlers from Port Phillip Bay by Knox and Cameron (1971). In 1974, Paxton reviewed a number of these species, described *Inermonephtys palpata* from Bowen, Qld, described *Nephtys picta* Knox and Cameron as a new species, *N. vikingensis*, recorded *N. paradoxa* Malm from deep water off southern New South Wales, and synonymised *N. mirocirris* with *N. gravieri*.

Our examination of material from a number of recent studies has indicated that some mistakes remained in earlier identifications and has added further new species and records. A large amount of material has become available from ecological studies, particularly those being carried out in Moreton Bay (W. Stephenson *et al.*, Univ. Queensland), Botany Bay (N.S.W. State Fisheries), Port Hacking (CSIRO Division of Fisheries and Oceanography), Western Port and Port Phillip Bay (Western Port Environmental Study, WPES, and Port Phillip Bay Environmental Study, PPBES, Fisheries and Wildlife Divison, Victoria) and in many coastal and estuarine areas of New South Wales by the Australian Museum.

We have used this material and re-examined much of the previously-described material for this systematic account. Specimens were examined of all species except *Aglaophamus dibranchis* (Grube, 1878).

Records of The Australian Museum, 1977, **Vol. 31, No. 8,** 307-347, Figures 1-43.

The synonymy of *N. mirocirris* Fauchald and *N. gravieri* Augener suggested by Paxton (1974) is confirmed by examination of type material of *N. gravieri*. *Nephtys longipes* Stimpson, considered indeterminable by Augener (1922) and Paxton (1974), is regarded as a prior synonym of *N. vikingensis* Paxton. *Aglaophamus macroura* (Schmarda), recorded by Benham (1915, 1916) is a new species, *A. profundus* n.sp. Some confusion has existed between *N. gravieri, N. australiensis* and a third species, *N. inornata* n.sp.: no valid record now exists for *N. australiensis* in Western Australia, and some records of *N. australiensis* in New South Wales and South Australia are referred to *N. inornata n.sp. and N. gravieri* respectively. The referral of Queensland records of *N. gravieri* and *N. dibranchis* to *N. australiensis* and *Aglaophamus verrilli* respectively (Paxton, 1974) is agreed with. Three additional new species were found in our material: *Aglaophamus gippslandicus* from Bass Strait, *Nephtys mesobranchia* from Gladstone, Qld, and *N. semiverrucosa* from near Darwin. The genus *Micronephthys* is newly recorded from Australia, *M. sphaerocirrata* (Wesenberg-Lund, 1949) being found in two localities in Queensland.

In addition to the features usually considered important in the taxonomy of nephtyids, we have paid particular attention to (1) the distribution on the pharynx of the verrucae (= 'warts', prickles or tubercles of other authors), (2) the presence of supra- and subacicular lobes in some species and (3) the precise distribution along the body of the various types of setae.

The material examined is deposited with the Australian Museum, Sydney (AM), the National Museum of Victoria, Melbourne (NMV), the Queensland Museum, Brisbane (QM), the Tasmanian Museum, Hobart (TM), and the Allan Hancock Foundation, Los Angeles (AHF), the British Museum (Natural History), London (BM), and the Smithsonian Institution, Washington (USNM).

Additional material is held by the Fisheries and Wildlife Division, Victoria (Marine Pollution Studies Group).

Collecting localities indicated in the distribution diagrams (figs 41-43) have been given a numerical reference corresponding to localities indicated in the text for individual species.

KEY TO AUSTRALIAN GENERA AND SPECIES OF NEPHTYIDAE

1. Interramal cirri present 2
   Interramal cirri absent; postacicular setae include lyrate setae ..... *Micronephthys sphaerocirrata*
2. Interramal cirri curved inwardly 3
   Interramal cirri curved outwardly ..... *Nephtys* 7
3. Pharynx with papillae; one pair of antennae, one pair of palps *Aglaophamus* 4
   Pharynx without papillae; one pair of palps only .. *Inermonephtys palpata*
4. Postacicular setae include lyrate setae 5
   Lyrate setae absent 6
5. Pharynx with 14 rows of subdistal papillae and with median dorsal papilla; position of 1st interramal cirrus not known. ..... *A. dibranchis* 7
   Pharynx with 22 rows of subdistal papillae, lacking median dorsal papilla; interramal cirri from setigers 7-8 ..... *A. verrilli*
6. Interramal cirri from setiger 3; pharynx with 14 rows of subdistal papillae, no median dorsal papilla ..... *A. gippslandicus* n.sp.
   Interramal cirri from setiger 7; pharynx with 22 rows of subdistal papillae; deep water ..... *A. profundus* n.sp.

7. Prostomium produced anteriorly ..... *N. longipes*
   Prostomium not produced anteriorly 8
8. Interramal cirri from setigers 8-10, with lateral foliaceous lobes *N. paradoxa*
   Interramal cirri from setigers 3-8, without foliaceous lobes 9
9. Postacicular setae of middle and posterior setigers lacking spinose setae, interramal cirri from setigers 5-8, pharynx lacking verrucae 10
   Postacicular setae include spinose setae, interramal cirri from setigers 3-4, pharynx with verrucae 11
10. Interramal cirri from setiger 5, continuing almost to pygidium; pharynx lacking median dorsal papilla ..... *N. inornata* n.sp.
    Interramal cirri from setigers 7-8, absent in posterior half of body; pharynx with median dorsal papilla ..... *N. mesobranchia* n.sp.
11. Pharynx with verrucae on proximal portion only of basal region; interramal cirri from setiger 4 ..... *N. semiverrucosa* n.sp.
    Pharynx with verrucae over entire surface of basal region 12
12. Pharynx with median dorsal subdistal papilla; interramal cirri from setiger 4 ..... *N. australiensis*
    Pharynx lacking median dorsal subdistal papilla; interramal cirri from setiger 3 ..... *N. gravieri*

SYSTEMATICS

Aglaophamus Kinberg, 1866
(*sensu* Hartman, 1950)

Aglaophamus dibranchis (Grube, 1878)

Nephthys dibranchis. — Augener, 1922 : 17-20, fig. 5; 1927 : 116-118.
— Fauvel, 1932 : 117-118 (in part).
Nephtys (Aglaophamus) dibranchis. — Day, 1967 : 341, fig. 15.I a-h.

Aglaophamus dibranchis Hartman, 1950 : 121.

REMARKS: No specimens available.

DISTRIBUTION: Australia; New Guinea, New Zealand, Indian Ocean.

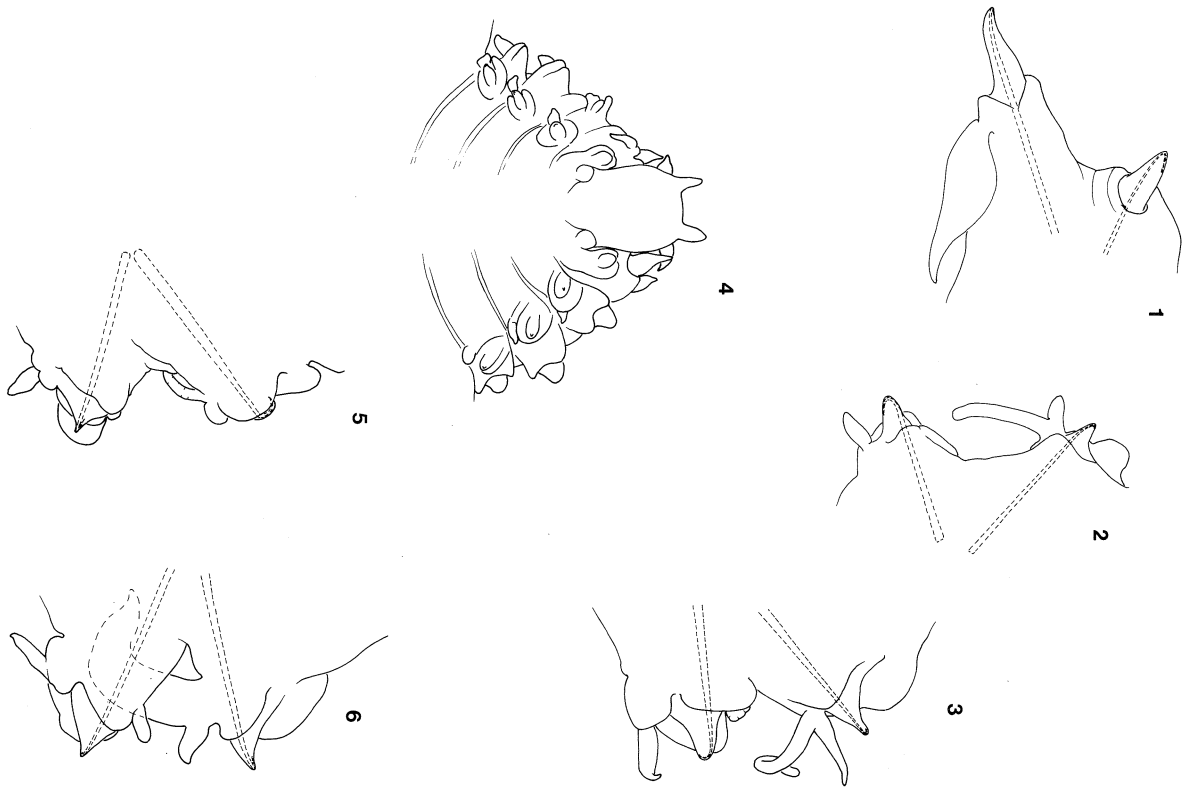
Aglaophamus gippslandicus n.sp. (Figs 1-3, 41; Table 1)

MATERIAL EXAMINED: Victoria: — 39°00'00''S 148°28'50''E (3.4), anterior fragment of 27 setigers (HOLOTYPE — AM W4911), 95 m, coll. C. Phipps, May 1969.

DESCRIPTION: Anterior fragment of 27 setigers, pharynx not everted (examined by dissection); length 7 mm, maximum width 1.4 mm, excluding setae. Segments short, 0.2 mm long near head, 0.3 mm long towards posterior end of fragment. Body colourless, no eyespots visible.

Prostomium 0.35 mm long, 0.3 mm wide, with anterolateral margin obliquely angled between subequal frontal antennae and ventrolateral palps; antennae short, on outer edge of frontal margin of prostomium, 0.1 mm apart, palps on lateral margin of prostomium, about 0.1 mm distant from 1st pair.

Pharynx with extrovert divided into short muscular distal region and longer inflated proximal region; distal region with 20 bifid distal papillae, proximal region with 14 longitudinal rows of subdistal papillae, 12-15 per row. No dorsal median subdistal papilla, proximal region without verrucae. Distal papillae 10 on each side of a dorsoventral slit; length of papillae up to 0.5 mm, with both portions similar in diameter but outer about 1½



Figs 1-6. *Aglaophamus gippslandicus* n.sp.:1, first setiger (L, post. view, x 170); 2, ninth setiger (R, ant. view, x 68); 3, twentieth setiger (L, ant. view, x 68). Figs 4-6. —*Aglaophamus profundus* n.sp.: 4, anterior end (dorsal view, x 65); 5, seventh setiger (L, ant. view x 42); 6, twenty-seventh setiger (L, ant. view, x 42).

times length of inner. Subdistal papillae longest distally (up to 0.7 mm long), minute at proximal end of rows. Jaws paired, brown, unidentate, with triangular base embedded in pharyngeal muscles.

All parapodia biramous, projecting up to 0.7 mm (including setae) from body. First parapodium (fig. 1) reduced, directed anteriorly and lying adjacent to prostomium; notopodium with inconspicuous dorsal and ventral lamellae and a conical acicular lobe; neuropodium projecting beyond notopodium, with prominent conical acicular lobe and an elongate triangular ventral cirrus arising near distal end of neuropodium. Dorsal cirrus present by 2nd and subsequent setigers; small and pear-shaped on 2nd setiger; with distal elongation on 3rd setiger, becoming digitiform in later setigers, then elongate conical. Interramal cirrus present on 3rd parapodium, cirriform, gradually increasing in length in later setigers. By 10th setiger (fig. 2), parapodia with prominent conical acicular lobes, not obscured by pre- or postsetal lamellae; notopodial postsetal lamella obscured behind acicular lobe, well-developed above level of acicular lobe, broadly rounded, extending about as far as acicular lobe; notopodial presetal lamella low, obliquely rounded, best developed below level of acicular lobe; dorsal cirrus digitiform, nearly twice as long as wide (0.07 x 0.04 mm); neuropodial postsetal lamella obliquely rounded, about ½ length of acicular lobe and slightly wider, better developed above acicular lobe than below; neuropodial presetal lamella low, rounded, smaller than notopodial presetal lamella; ventral cirrus digitiform and a little longer than dorsal cirrus (0.09 x 0.04 mm); interramal region about 1/3 parapodial height, with interramal cirrus arising from base of dorsal cirrus and glandular cushion situated in ventral angle above neuropodial acicular lobe; interramal cirrus simple, not strongly curved inwardly, about as long as height of interramal region. By 20th setiger (fig. 3), parapodial lobes generally more strongly developed; notopodium with postacicular lamella broader, still obscured behind acicular lobe, dorsal cirrus nearly twice length of acicular lobe, and tapered; neuropodium with postacicular lamella extending almost as far as acicular lobe, preacicular lamella longer, and divided, with dorsal portion extending above level of acicular lobe to almost obscure the glandular cushion, ventral portion below level of setae, extending ventrally to base of ventral cirrus; latter as long as dorsal cirrus but not tapering as strongly.

Acicula stout, clear, colourless, extending to apex of acicular lobes but not projecting, with tips fine, strongly curved. A single aciculum in all parapodial rami.

Setae of three types: barred, spinulose and capillary. Barred setae restricted to preacicular positon, spinulose setae present only in postacicular position in anterior setigers and predominantly so in later setigers (Table 1). First setiger with barred setae and minutely-spinulose setae in notopodium, capillary setae in neuropodium.

DISCUSSION: The description of *Aglaophamus gippslandicus* n.sp. is based on an incomplete and poorly-preserved specimen, and the collection of further material will be needed for a fuller description. Three species have been described with 14 rows of subdistal papillae on the pharynx, cirriform dorsal cirri, distinct pre- and postsetal lamellae, and lacking lyrate setae: *A. erectans* Hartman, 1950, *A. malmgreni* (Théel, 1879) and *A. rubella* (Michaelsen, 1897). Both *A. erectans* and *A. malmgreni* have interramal cirri commencing on the ninth setiger rather than the third. *Aglaophamus rubella,* and particularly *A. rubella anops* Hartman, 1950, are very close to *A. gippslandicus* n.sp. *Aglaophamus rubella* has interramal cirri commencing on the third setiger, but has eyespots, 30-40 papillae in each row of pharyngeal subdistal papillae, a small erect cirrus on the dorsal side of the neuropodial postacicular lamella, and has a pigmented body. Fauchald (1963) further describes *A. rubella* as having pointed notopodial acicular lobes. *Aglaophamus rubella anops* lacks eyespots and has only 15-20 papillae in each row of pharyngeal subterminal papillae, but has interramal cirri commencing on the fourth

Table 1. *Aglaophamus gippslandicus* **n.sp. — setal formulae of setigers 1, 10 and 20. The number of each setal type are given as:**

preacicular notosetae	postacicular notosetae
preacicular neurosetae	postacicular neurosetae

Setiger	Setal Type			
	Barred	Spinose	Spinulose	Capillary
1 (left)	8 / — | — / —	— / — | — / —	— / — | 4 / —	— / — | — / —
10 (right)	10 / 16 | — / —	— / — | — / —	1 / 2 | > 30 / > 25	— / — | — / —
20 (left)	9 / 16 | — / —	— / — | — / —	2 / 2 | c.45 / c.40	— / — | — / —

setiger, acicula with exposed tips, notched notopodial pre- acicular lamellae, a slight prolongation or spur on the superior edge of the neuropodium, and has a reddish-brown body; no mention is made of the presence of spinulose setae in a preacicular position as occurs in *A. gippslandicus* n.sp.

Aglaophamus gippslandicus n.sp. can be distinguished from other species so far described from Australia by the combined features of having 14 rows of pharyngeal subdistal papillae and and no median dorsal subdistal papilla, pre- and postacicular lamellae not obscure, interramal cirri commencing on the third setiger, and cirriform dorsal and interramal cirri. This species in named after Gippsland in Victoria, the region where the holotype was found.

DISTRIBUTION: Australia (fig. 41).

ECOLOGY: The holotype was collected in 95 m from a sandy bottom.

Aglaophamus profundus n.sp. (Figs. 4-6, 41; Table 2)

Nephthys macrura (sic). – Benham, 1915 : 203-205, fig. 57. — Benham, 1916: 130. — Augener, 1927: 116.

Aglaophamus macroura. – Fauchald, 1963: 336. *(non* – Schmarda, 1861.)

Aglaophamus verrilli. – Paxton, 1974: 199, fig. 1.

MATERIAL EXAMINED: — Tasmania: — approx. 39°04'S 148°43'E (4.1), 1 spec. (HOLOTYPE — AM E5113), ant. fragment of 28 setigers, 2195 m, *F.I.S. Endeavour.*

DESCRIPTION: Anterior fragment (pharynx missing) of 27 setigers, 12 mm long; width 3 mm at 15th setiger (widest part of fragment); segments 0.4 mm long, segmentation not apparent across dorsum. Body light brown, prostomium mottled brown, no eyespots visible.

Prostomium (fig. 4) subovate, 0.75 mm long, 0.5 mm wide, narrower posteriorly, broadly rounded anteriorly; antennae and palps triangular, subequal, 0.2 mm long, 0.1 mm wide at base, antennae on anteroectal margin of prostomium, palps just behind and below antennae, directed ventrolaterally; a pair of nuchal organs near posteroectal margin of prostomium, everted.

Pharynx (after Benham, 1915) distally with 20 rather long bifid papillae and single dorsal and ventral median papillae surrounding buccal aperture; proximal region with shorter subdistal papillae decreasing in length towards base of pharynx, arranged in 20-22 longitudinal rows distally, reduced to 14 rows proximally. Jaws paired, brown, conical.

Parapodia biramous, moderately projecting. Parapodia of 1st setiger (fig. 4) displaced anteriorly and directed forward, lying adjacent to prostomium, parapodia of 2nd setiger directed anterolaterally. Parapodia of 1st setiger reduced, notopodium with low, rounded acicular lobe and obscure pre- and postacicular lamellae, neuropodium with prominent conical acicular lobe, obscure pre- and postacicular lamellae and with conical ventral cirrus about size of antennae and palps (0.18 mm long, 0.08 mm wide at base). Parapodium of 2nd setiger basically similar to remaining parapodia, with acicular lobes and pre- and postacicular lamellae in both rami, with dorsal and ventral cirrus but lacking interramal cirri. Interramal cirri first present by 7th setiger (fig. 5). At 7th setiger, notopodium with low rounded acicular lobe almost obscured by broadly-rounded preacicular lamella, postacicular lamella best developed above level of acicular lobe,

rounded, not extending beyond acicular lobe, dorsal cirrus small, rounded (0.07 mm long, 0.09 mm diameter); neuropodium with broad, conical acicular lobe with elongate apex and small rounded subacicular lobe, preacicular lamella wide, better developed above level of acicular lobe but not extending beyond it, postacicular lamella narrower than preacicular lamella, rounded, extending beyond acicular lobe, ventral cirrus digitate (0.14 mm long, 0.08 mm diameter), arising below subacicular lobe; interramal region ¼ parapodial height, with slender inwardly curved dorsal interramal cirrus (0.2 mm long, 0.04 mm diameter) and low rounded ventral interramal cirrus arising near dorsal margin of neuropodial postacicular lamella. At 27th setiger (fig. 6), parapodial lobes and lamellae better developed; notopodium with projecting conical acicular lobe, convex below, concave above, preacicular lamella low, rounded, best developed below level of acicular lobe, postacicular lamella broadly rounded, better developed above level of acicular lobe, dorsal cirrus longer than in 7th setiger, tapering (0.15 mm long, 0.09 mm diameter at base); neuropodium with conical, projecting acicular lobe, broader than in notopodium, with rounded subacicular lobe, preacicular lamella low, similar to 7th setiger, postacicular lamella rounded not extending as far as apex of acicular lobe, ventral cirrus digitate (0.35 mm long, 0.1 mm diameter); interramal region compressed, with stout tapering inwardly curved dorsal interramal cirrus (1.0 mm long, 0.3 mm diameter at base) and shorter flattened ventral interramal cirrus (0.2 mm long, 0.1 mm wide).

Acicula prominent, extending to but not projecting beyond apex of acicular lobes, usually with tip broadly curved, dorsad in notopodia, ventrad in neuropodia. A single aciculum in all parapodial rami. Acicula clear, colourless.

Setae of three types: barred, spinulose and capillary. Barred setae restricted to preacicular position, spinulose setae predominantly postacicular, absent in preacicular fascicles of anterior setigers. First setiger with barred and capillary setae in notopodium, capillary setae in neuropodium; barred setae present to last setiger of fragment, accompanied by several spinulose setae in later setigers (Table 2). Barred setae up to 0.2 — 0.25 mm long, spinulose setae up to 0.5 — 0.8 mm long, longest in posterior segments.

REMARKS: All records in the synonymy refer to the specimen originally described by Benham (1915). The description above differs from others in assigning the 7th setiger as the position of the first occurrence of the interramal cirri, rather than the 8th (Paxton, 1974) or 9th (Benham, 1915).

The holotype is in poor condition, and the shape of some parapodial lobes was difficult to determine: the notopodial postacicular lamellae, in particular, tended to be folded over on themselves, and they should probably be more prominent than indicated in figs 5, 6.

Although the holotype is incomplete, it can be distinguished from other species of *Aglaophamus* on the basis of the setae and parapodial structure. *Aglaophamus macroura* (Schmarda), to which the specimen was originally assigned, has long pointed postacicular lamellae (Hartman, 1967), among other differences. *Aglaophamus profundus* n.sp. is close to *A. verrilli* (McIntosh), but differs in lacking lyrate setae, lacking a dorsal cirrus on the 1st setiger, and in the proportions of the various parapodial lobes. The species name comes from the latin for deep, referring to the great depth at which the holotype was collected.

DISTRIBUTION: Australia (fig. 41).

ECOLOGY: Deep water (2195 m).

Table 2. *Aglaophamus profundus* **n.sp. — setal formulae of setigers 1, 7, 11 and 27, left side, expressed as in Table 1.**

Setiger	Setal Type: Barred	Spinulose	Capillary
1	11 | — / —	— | — / —	— | 12 / c.15
7	16 | — / 17 | —	1 | c.25 / — | c.30	— | — / — | —
11	15 | — / 17 | —	7 | c.30 / — | c.35	— | — / — | —
27	17 | — / 18 | —	1 | > 45 / 3 | > 45	— | — / — | —

Aglaophamus verrilli (McIntosh, 1885) (Figs 7-11, 41; Table 3)

Nephthys verrilli McIntosh, 1885: 163-164, pls 26 (figs 6, 7), 32A (fig. 8).

Nephthys dibranchis. — Hartman, 1938: 146 (in part). — Hartman, 1940: 237 (in part). — Rullier, 1965: 182-183. — Stephenson *et al.*, 1970:470.

Nephtys dibranchis. – Stephenson *et al.*, 1974: 113.

Aglaophamus dicirris Hartman, 1950: 122-124, pl. 18 (figs 1-8).

Aglaophamus verrilli. – Knox, 1960: 115. — Paxton, 1974: 199, fig. 1.

MATERIAL EXAMINED: LECTOTYPE, *A. verrilli* (BM 1885: 12:1:127). HOLOTYPE series, *A. dicirris*, 1 spec. (AHF Poly 0786).

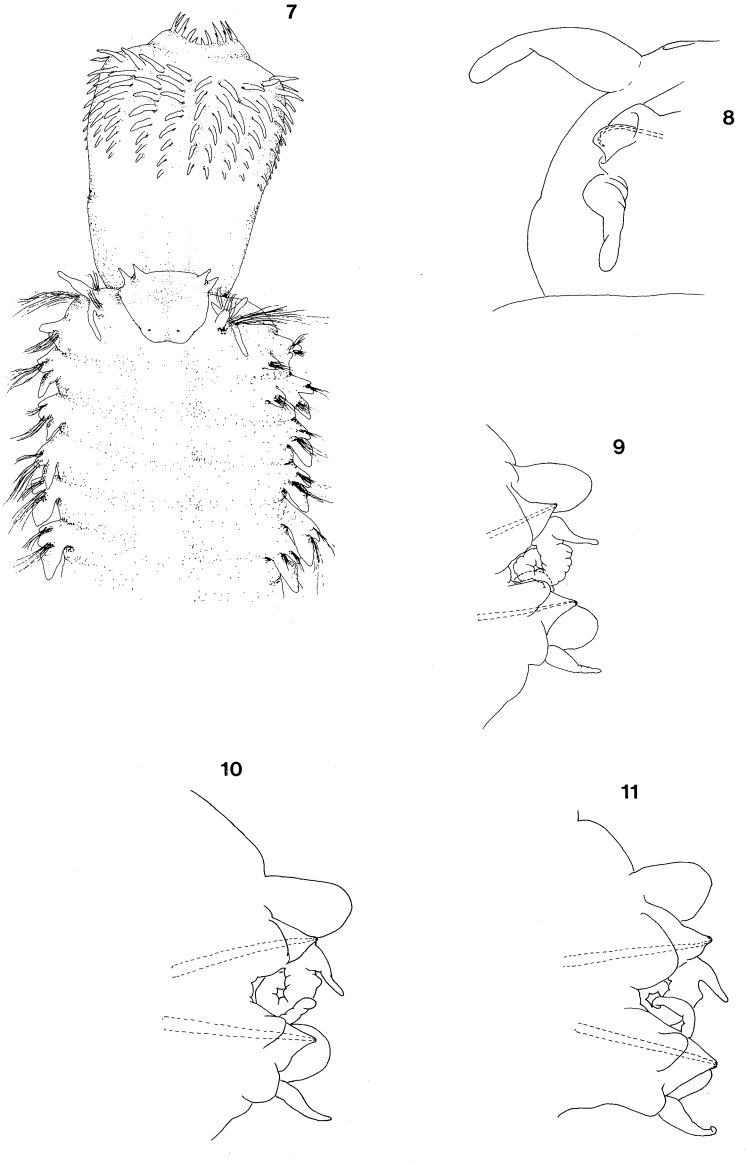
Queensland: Townsville (1.1), 6 specs, coll. P. Arnold, comprising: 2 specs (AM W8456, 8457), 1 entire, 85 setigers, 1 ant. fragment of 49 setigers, from 19°18'S 147°11'E, 10.5 m, stns I19A, B, 18 June 1975; 1 spec. (AM W8458), ant. fragment of 64 setigers from 19°06'S 146°43'E, 11 m, stn U47A, 30 July 1975; 3 specs (AM W8459), 1 entire, 85 setigers, 2 ant. fragments of 43, 57 setigers, from 19°8'S 146°54'E, stn S36, 26 October 1974. — Moreton Bay (1.7), numerous specimens, coll. W. Stephenson and others, including 3 specimens (AM W8465, 8466), 2 entire, 84 and 85 setigers, 1 ant. fragment of 37 setigers, from stns 4C, D, 30 m, 2 km W of Shark Spit, April 1975; 1 specimen (QM G9549), entire, 85 setigers, from stn 1E2, 4 m, 1.6 km SE of South West Rocks, Peel Is., March 1970; 1 spec., from stn 1D5, locality as for stn 1E2, March 1970.

DESCRIPTION: (Based on a specimen here designated the lectotype.)

Anterior fragment of 53 setigers, with pharynx fully everted. Length 11 mm, maximum width 1.6 mm excluding setae, pharynx 1.5 mm wide, extending 2.4 mm beyond prostomium. In anterior segments, dorsal and ventral surfaces not obviously segmentally delineated. Anterior dorsum and ventrum with diffuse creamy-brown pigmentation, gradually lighter after 30th setiger; two faded eyespots present on posterior border of prostomium, widely separated. Epidermis smooth, somewhat iridescent dorsally.

Prostomium (fig. 7) approximately square, 0.4 mm wide and 0.35 mm long; anteriorly slightly excavate, posteriorly rounded; antennae and palps on anteroectal margins, short and digitate, palps 1½ times length of antennae. Body widest anteriorly, 2nd setiger 1.2 mm wide, with maximum body width 1.6 mm, between 15-25th setiger, thereafter tapering gradually posteriorly to 1.2 mm by 53rd setiger; segments compressed, much wider than long in anterior segments, varying from 0.1 mm long behind head to 0.3 mm long after 30-35th setiger.

Pharynx with extrovert divided into muscular distal region and inflated proximal region (fig. 7); distal region with 10 pairs bifid papillae and a pair of short, simple middorsal and midventral papillae surrounding a dorsoventral slit, papillae smaller in ventral and dorsal position on pharynx, each with cirriform outer portion and shorter radially-flattened inner portion; proximal region with 22 longitudinal rows of 6-8 subdistal papillae decreasing in size towards base of pharynx, covered with numerous verrucae. No median subdistal papilla. Verrucae irregularly arranged, more abundant in basal region of pharynx. Jaws not dissected but their bases visible externally in middorsal and midventral position between terminal and subterminal papillae.



Figs 7-11. *Aglaophamus verrilli* (BM 1885:12:1):7, anterior end, pharynx everted (dorsal view, x 38); 8, first setiger (L, dorsal view, x 160); 9, ninth setiger (L, ant. view, x 100); 10, twentieth setiger (L, ant. view, x 100); 11, fortieth setiger (L, ant. view x 100).

All parapodia biramous, projecting about ¼ body width or less. First parapodium reduced (fig. 8), directed anteriorly; notopodium with dorsal cirrus, a pair of inconspicuous dorsal and ventral lamellae surrounding a low, rounded acicular lobe; neuropodium with ventral cirrus but lacking obvious lamellae or projecting acicular lobe; dorsal and ventral cirri as long as posterior pair of prostomial antennae, enlarged basally. Second parapodium basically similar to remaining parapodia; noto- and neuropodia each with pre- and postacicular lamellae, acicular lobe and cirrus. Dorsal cirrus of 2nd setiger lamelliform, rounded, pre- and postacicular lamellae of both rami low, ventral cirrus similar to that of 1st setiger. Dorsal cirrus and notopodial postacicular lamella expanded to about full size by 4th setiger; neuropodial postacicular lamellae reach about full size by 6th setiger. Dorsal interramal cirrus from 7th setiger, short, rapidly developing to fill interramal region. Ventral interramal cirrus present from 8th setiger, digitate, often inwardly curved. Parapodium of 9th setiger (fig. 9) with prominent conical acicular lobes; notopodial postacicular lamella rounded, about twice length of acicular lobe and about 1½ times as long as high, arising above level of acicular lobe; notopodial preacicular lamella low, almost straight, not obscuring acicular lobe; dorsal cirrus digitiform, with expanded base, projecting as far as notopodial postacicular lamella; neuropodial postacicular lamella rounded, about 1½ times length of acicular lobe and about as long as wide, extending more below acicular lobe than above; neuropodial preacicular lamella present in anterodorsal position on neuropodium, low, narrow, not obscuring acicular lobe; a broadly rounded, low, subacicular lobe present at level of ventral cirrus, obscuring its base; ventral cirrus a little longer than dorsal cirrus, proximally expanded; interramal region about ¼ total parapodial height, completely filled by inwardly curved dorsal interramal cirrus and shorter digitate ventral interramal cirrus (obscured in fig. 9). Twentieth parapodium (fig. 10) similar except postacicular lamellae slightly larger and interramal region increased to about 1/3 parapodial height. By 40th setiger (fig. 11), acicular lobes enlarged and postacicular lamellae reduced so that notopodial postacicular lamella little larger than corresponding acicular lobe, and neuropodial postacicular lamella projecting somewhat less than acicular lobe.

Acicula usually prominent, extending to apex of acicular lobes, with tips variable in shape. A single aciculum present in both parapodial rami except perhaps in neuropodium of 1st setiger (not dissected). Acicula clear, yellowish in most setigers, tips of acicula generally curved, dorsad in notopodia, ventrad in neuropodia; in some setigers between 10-40th, tips straight, striated, bluntly acute.

Setae of four types: barred, spinulose, lyrate and capillary; barred setae restricted to preacicular position, lyrate setae to postacicular position, while spinulose setae predominantly postacicular (Table 3). Setae occur in two rows in each ramus, more or less continuous medially. First setiger with barred and capillary setae in notopodium, capillary setae in neuropodium; spinulose setae occur soon after 1st setiger, and lyrate setae are present by at least the 9th setiger. Barred and lyrate setae relatively short, about 0.15 mm long; spinulose setae much longer, especially those in the middle of each postacicular row, 0.23-0.65 mm long.

REMARKS: The relegation of *Aglaophamus dicirris* Hartman to synonymy with *A. verrilli* was made by Knox (1960), without comment, and was accepted by Paxton (1974), also without comment. In early work, Hartman (1938, 1940) grouped similar specimens with 14 and 22 rows of subdistal proboscidial papillae in *A. dibranchis* (Grube). Later, *Aglaophamus dicirris* was erected (Hartman, 1950) for specimens with 22 rows of subdistal papillae, and, at the same time *(ibid., p. 121) A. verrilli* and *A. dibranchis* were synonymised without comment. McIntosh (1885) described the different number of rows of subdistal papillae in the two species. The description of *A. dicirris* fits *A. verrilli* well;

Table 3. *Aglaophamus verrilli* **— setal formulae of setigers 1, 9, 20 and 40, left side, expressed as in Table 1.**

Setiger	Setal Type: Barred	Spinulose	Lyrate	Capillary
1	7 | — / —	— | — / —	— | — / —	6 | — / c.15
9	17 | — / 19 | —	— | 26 / — | > 30	— | 4 / — | 4	— | — / 1 | —
20	12 | — / 14 | —	1 | > 30 / 2 | > 30	— | 5 / — | 3	— | — / — | —
40	12 | — / 11 | —	— | 26 / — | > 20	— | 3 / — | 5	2 | — / 2 | —

our examination of a holotype specimen of *A. dicirris* confirms the synonymy established by Knox (1960).

DISTRIBUTION: Australia (fig. 41); New Zealand, India, North America to Panama.

ECOLOGY: In Australia, sheltered shallow subtropical waters, in sand to mud substrates to 30 m.

Inermonephtys Fauchald, 1968

Inermonephtys palpata Paxton, 1974 (Fig. 41)

Inermonephtys palpata Paxton, 1974: 200-202, figs 2-6.

MATERIAL EXAMINED: Queensland: Queens Beach, Port Denison, Bowen (1.2), approx. 20°03'S 148°15'E, 1 spec. (HOLOTYPE — AM W1710).

DESCRIPTION: Body pale, with pale orange pigmentation covering prostomium. Two orange stripes from nuchal organ to 2nd setiger. Pigmentation around bases of neuropodia of anterior 30 setigers. Prostomium subrectangular; frontal antennae absent; palps attached ventrally, large, each with a small projecting papilla. Nuchal organs present at posteroectal margins of prostomium.

Pharynx totally lacking papillae, with pair of spindle-shaped jaws. First segment directed forwards at either side of prostomium, continuous across mid-dorsum. Notopodia with digitiform acicular lobe, slender preacicular lamella and elongate postacicular lamella with rounded tips. Postacicular lamellae expanded in first 30 segments. Dorsal cirrus digitiform, extending beyond tips of notopodial lobes. Neuropodial acicular lobe with bulbous base and small inferior digitiform lobe. Pre- and postacicular neuropodial lamellae present, ventral cirrus well-developed. Interramal cirrus from second setiger, present on all subsequent setigers except last six. Interramal cirrus outwardly curved, with small basal lobe present after first 10 segments. Setae barred, spinose and lyrate. Two acicula per acicular lobe. Acicula project together, capped with single reddish plaque.

DISTRIBUTION: Australia (fig. 41).

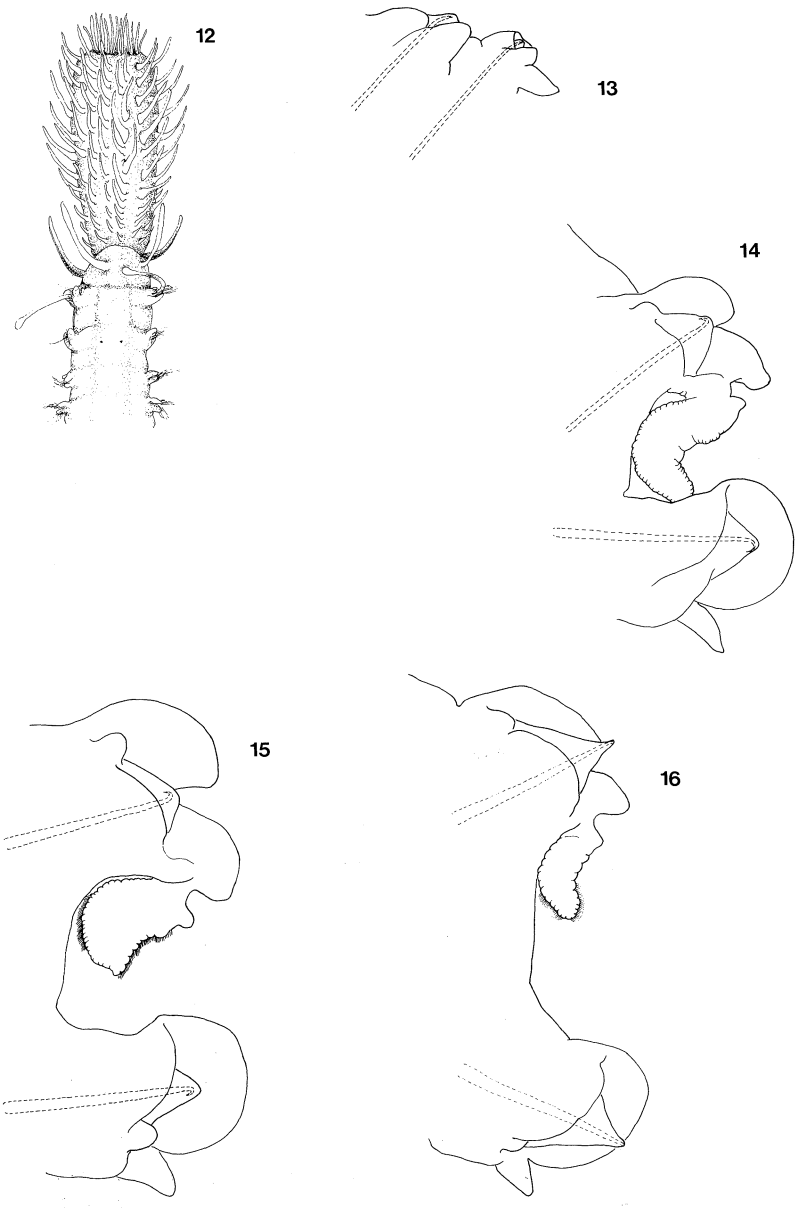
ECOLOGY: Intertidal on sand flats, subtropical.

Micronephthys Friedrich, 1939

Micronephthys sphaerocirrata (Wesenberg-Lund, 1949) (Figs 12, 41)

Nephthys sphaerocirrata Wesenberg-Lund, 1949: 294-296, figs 24-26. — Day, 1953: 431.
Micronephthys sphaerocirrata Hartman, 1950: 130-131. (*non* Fauchald, 1968: 17-18, figs 36-40.)
Nephtys (Micronephthys) sphaerocirrata. — Day 1967: 347-349, figs 15.3 a-d.

MATERIAL EXAMINED: Queensland: — Townsille (1.1), 5 specs, coll. P. Arnold, comprising: 3 specs (AM W8963), stn E15C, 19°21'S 147°15'E, 4 m, 16 April, 1975; 2 specs (AM W8658), stn E15A, location, etc., as for stn E15C. — Middle Banks, near Tangalooma, Moreton Bay (1.7), 4 specs (AM W8463, 8464, QM G9547), coll. W. Stephenson and others, 1973.



Figs 12-16. *Micronephthys sphaerocirrata*: anterior end, pharynx everted (dorsal view, x 21). Figs 13-16. — *Nephtys australiensis* (AM W5786): 13, first setiger (R, dorsal view, x 67); 14, tenth setiger (L, ant. view, x 67); 15, twenty-second setiger (L, ant. view, x 67); 16, fiftieth setiger (L, ant. view x 67).

DESCRIPTION: Complete individual, 10 mm, with 62 setigers. Colourless, one pair of eyespots visible dorsally between 1st and 2nd setiger. Prostomium short and broad; antennae long and thin at frontal edge, palps longer, at base of prostomium. Pharynx with 10 pairs of bifid distal papillae and unpaired median dorsal papilla; proximal region of pharynx with 22 irregular rows subdistal papillae, 8-11 in each row, diminishing in size towards base of pharynx. No median dorsal subdistal papilla. No verrucae. First setiger directed forwards to lie parallel to prostomium. Distance between 1st and 2nd setiger greater than between subsequent setigers. Parapodia biramous with poorly-developed lamellae. Noto- and neuropodia with bluntly conical acicular lobes and small pre- and postacicular lamellae. First setiger with long ventral cirrus, following ventral and dorsal cirri small and globular. Interramal cirri completely absent. Parapodia with barred, capillary and deeply-bifurcate lyrate setae. Pygidium with long hair-like anal cirrus.

REMARKS: *Micronephthys sphaerocirrata* was described as having parapodial lamellae very sparsely developed (Wesenberg-Lund, 1949), and was figured with 8-11 papillae in each row of pharyngeal subdistal papillae. Day (1953) described material of *M. sphaerocirrata* from South Africa that lacked preacicular lobes and had 9 papillae in each subdistal row. Fauchald (1968) identified as *M. sphaerocirrata* material from Vietnam with prominent preacicular lamellae and with 14-16 papillae in each subdistal row. He noted the differences between the Vietnamese and South African material and suggested that they belonged to separate species, but was uncertain which, if either, should properly be identified as *M. sphaerocirrata*. The Australian material, with obsolete preacicular lamellae and 8-11 papillae in each subdistal row, is closest to Day's description. No significant difference is apparent between these and the original description; *M. sphaerocirrata* of Fauchald (1968) should probably be considered as a closely related but separate species.

DISTRIBUTION: Australia (fig. 41); Gulf of Iran, South West Africa, South Africa.

ECOLOGY: From sand or muddy sand; shallow subtidal to 500 m.

Nephtys Cuvier, 1817

(sensu Hartman, 1950)

Nephtys australiensis Fauchald, 1965 (Figs 13-16, 42)

Nephtys australiensis Fauchald, 1965: 334-335, figs 1-2. — Hutchings, 1974: 180. — Hutchings and Recher, 1974: 105, 108. — Paxton, 1974: 202-203, fig. 7 (in part). — Weate, 1975: 108.

Nephthys gravieri. — Augener, 1927: 116. — Rullier, 1965: 182 (*non* Augener, 1913).

MATERIAL EXAMINED: Queensland: — Hervey Bay (1.4) (AM W5362, 5365-5369), mangroves. — Fraser Is. (1.5) (AM W5363-5364). — Tin Can Bay (1.6) (AM W4980), mud flats. — Moreton Bay (1.7) (AM W5403, 6034, 8416, 8417), coll. W. Stephenson. — Moreton Bay (1.7) (QM G3635, 3637), det. Rullier. — Brisbane R. (1.8) (AM W7486, QM G9546).

New South Wales: — Wooli Ck (2.1) (AM W5268, 5269), intertidal. — Wallis L. (2.2) (AM W4220, 4223, 4229, 4230, 4233-4235, 4869-4874). — Myall L. (2.3) (AM W6125, 6127). — Fullerton Cove and Hunter R. (2.5-6) (AM W4733-4738), mud flats. — Careel Bay (2.9) (AM W5256, 5257, 5259, 5283, 5284, 5784-5793, 5846, 5847, 8232-8234), weed beds. — Port Jackson (2.10) (AM W5248, 5263, 5264). — Botany Bay (2.11) (AM W179, 184, 4498, 5264, 5271, 5272, 5694, 5695, 5736), coll. L. Collett. — Georges R. (2.12) (AM W7592,

7655-7665, 7672, 7673, 7682, 7689, 7697). — Bonnet Bay, Woronora R. (2.13) (AM W8189-8191), mud flats. — L. Conjola (2.17) (AM W5265). — Batemans Bay (2.18) (AM W5249, 8126).
— Clyde R. (2.19) (AM W8055-8099, 8115, 8116). — Wallaga L. (2.20) (AM W8100-8114). — Tuross L. (2.21) (AM W7792-8054, 8119-8125), weed beds and mud flats. — Broulee Bch (2.22) (AM W5266). — Merimbula (2.23).

Victoria: — Mallacoota (3.1) (AM W4832, 4833, 5267, 5516). — Bekta R. (3.2) (AM W8429-8431), weed beds. — L. Victoria (3.5) (AM W8651, 8652). — Western Port (3.7), WPES stns 1701-1741, abundant. — Port Phillip Bay (3.8) PPBES stns 131-139, in Hobsons Bay, common. — Hopkins R., Warrnambool (3.9) (AM W8469). — Fitzroy R. (3.11) (AM W8650). — Nelson (3.12) (AM W8468).

Tasmania: — Midway Pt, SE Tasmania (4.2) (TM K816, 817), coll. G. Prestedge. — Great Bay, Bruny Is. (4.3) (TM K813, 814), coll. I Mesibov.

South Australia: — Onkaparinga Est. (5.2) (AM W6063). — Port Vincent, Yorke Peninsula (5.3) (HOLOTYPE — AM W3873). — upper Spencer Gulf (5.4) (AM W5961), coll. S. Shepherd. — Chinamans Ck (5.5) (AM W5955-5959, 5961).

DESCRIPTION: Size range 7-85 mm, with 42-87 setigers. Anterior body oval in cross section, becoming rectangular towards posterior as distance between noto- and neuropodium increases, expanding interramal space. Body pale brown, typically with characteristic brown pigment (Paxton 1974). Intensity of pigmentation varies considerably in different populations, may be totally absent in juveniles. Prostomium pentagonal when pharynx fully withdrawn, rectangular when pharynx fully or partially everted. Pharynx divided into muscular distal region and inflated proximal region. Twenty-two longitudinal rows of subdistal papillae, each row of 6-9 papillae with slightly angular bases, decreasing in size towards base of pharynx. A single median dorsal subdistal papilla. Remainder of pharynx covered in numerous verrucae. Juveniles with full complement of papillae and verrucae.

First setiger (fig. 13) deflected forwards to lie adjacent to prostomium. Notopodium with triangular acicular lobe; small oval postacicular lamella and poorly developed notopodial cirrus; neuropodium with triangular acicular lobe with slightly expanded postacicular lamella. By 5th setiger, notopodium with entire triangular acicular lobe, expanded postacicular lamella and smaller foliaceous notopodial cirrus, preacicular lamella small and rounded, a small rounded supraacicular lobe on anterodorsal surface of acicular lobe; neuropodium with asymmetrical triangular acicular lobe, well-developed foliaceous postacicular lamella and digitiform neuropodial cirrus. Interramal cirrus present from 4th to about 50-60th setiger, absent thereafter. Inwardly curved interramal cirrus often completely fills the interramal space after first few anterior segments but only ½-⅓ fills the space in posterior segments. Base of interramal cirrus with small swelling. Surface of cirrus may be highly convoluted with a well ciliated epithelium. From 5th-22nd setiger (figs 14, 15), all parapodial lobes larger, except neuropodial cirrus; notopodial postacicular lamella 2 to 3 times as large as notopodial cirrus. Beyond 30th setiger (fig. 16), all parapodial lamellae less well developed.

Acicula with tips strongly curved, reflected towards dorsum and ventrum respectively, protruding slightly beyond tip of acicular lobe.

Setae of four types: capillary, barred, spinulose and spinose. Postacicular noto- and neurosetae of 1st setiger capillaries, preacicular notosetae barred. In holotype, barred preacicular notosetae continue to about 30th setiger, with approximately 10 in 5th setiger, 5-6 in 10th, 2-4 in 22nd and 1 at 30th. Rest of preacicular notosetae spinose or

spinulose with spinose dominant in posterior segments. Postacicular notosetae spinose and spinulose, with spinose setae dominating, plus a few capillaries. Barred setae present among preacicular neurosetae, approximately 11 in 5th setiger, 7-8 in 10th, 1-5 in 22nd, and 1-2 thereafter. Rest of neurosetae are spinose or spinulose, with spinulose dominant in preacicular and spinose in postacicular fascicles.

REMARKS: The description of *N. australiensis* by Fauchald (1965) omits any mention of the supra-acicular lobe which is clearly present in all setigers of the holotype apart from the first. This lobe could be mistaken for part of the divided acicular lobe characteristic of *N. gravieri*. Rullier (1965) presumably did confuse these lobes and referred his specimens to *N. gravieri*. Re-examination of this material confirmed Paxton's (1974) view that these specimens should be referred to *N. australiensis*. Fauchald (1965) does not mention the terminal papillae on the pharynx or presence of jaws, and he does not indicate the change in setal composition along the body.

Within the material examined there is some variation in the relative proportions of the parapodial lobes and interramal cirrus, which seems to be correlated with the size of the individuals and the substrate in which they are living. For example, individuals living in clean sand had smaller interramal cirri than those living in *Zostera* or *Posidonia* beds. There is also some variation in the segment on which barred setae terminate and in the intensity of pigmentation; specimens from Western Port in particular were heavily pigmented all over.

DISTRIBUTION: Australia (fig. 42).

ECOLOGY: Common in coastal lagoons, estuarine or sheltered bay conditions, often in *Zostera* or *Posidonia* beds. It is more common in muddy sand than clean sand, where it is replaced by *N. longipes*.

Nephtys gravieri Augener, 1913 (Figs 17-22, 42; Table 4)

Nephthys gravieri Augener, 1913: 123-125, pl.2 (fig. 5), text-figs 6a-c.

Nephtys mirocirris Fauchald, 1965: 335-336, figs 3, 4.

Nephtys gravieri. — Paxton, 1974: 203.

Nephtys australiensis. — Paxton, 1974: 202-203 (in part).

MATERIAL EXAMINED: SYNTYPE, *N. gravieri* (V-7896, Zoologisches Museum, Hamburg).

South Australia:— Clinton, Yorke Peninsula (5.3), 1 spec. (AM W3782) — HOLOTYPE of *N. mirocirris*). — upper Spencer Gulf, E side (5.4), 2 specs (AM W5960), ant. fragments of 42, 61 setigers, 9 m, coll. S. Shepherd, 11 September 1973.

Western Australia: — Bunbury Hbr (6.1), 3 specs (AM W8179), ant. fragments of 52, 54, 64 setigers, coll. A. Snell, March 1965. — Fishermans Jetty, Bunbury Hbr (6.1), 2 specs (AM W8180), ant. fragment of 66 setigers and 1 entire, 95 setigers, coll. A. Snell, 24 July 1965. — Leschenault Estuary plug, Bunbury (6.2), 1 spec. (AM W8178), ant. fragment of 70 setigers, coll. A. Snell, 20 June 1965. — Leschenault Est., Bunbury (6.2), 1 spec. (AM W4335), ant. fragment of 46 setigers, 0-1.2 m, coll. B. Collette, 8 February 1970. — Woodmans Pt, S of Fremantle (6.3), 2 specs (AM W8177), 15-30 cm, coll. L. Joll, 15 September 1975.

DESCRIPTION: (From AM W3782, holotype of *N. mirocirris*). Entire, pharynx not everted but dissected; length 49 mm for 87 setigers, maximum width 2.2 mm, excluding setae. Colour of body cream, browner towards posterior segments; surface pigmentation as a reddish-brown band on antennae and as small brown patches on posterodorsal surface of prostomium, and on postacicular lamella in anterior setigers.

Prostomium flattened, quadrate, 0.5 mm wide, slightly concave anteriorly, with short, tapering antennae and palps on dorsoectal margins (fig. 17). No eyespots visible. Body widest anteriorly, between 5-15th setigers, tapering gradually to last 5-10 setigers, when it tapers rapidly to the pygidium; a slender caudal cirrus, as long as last five setigers.

Proboscis with extrovert divided into short muscular terminal region with distal papillae and larger proximal region with subdistal papillae and verrucae; distal papillae bifid, subequal, in 10 pairs surrounding a dorsoventral slit; subdistal papillae in 22 longitudinal rows, each of 6-10 conical papillae directed proximally, up to 0.5 mm long, 0.1 mm wide, decreasing in size towards base of pharynx; verrucae numerous, randomly arranged. No median dorsal subdistal papilla. Jaws at position of 12th setiger, paired, brown, with conical tooth and widely-divergent support.

Parapodia biramous, projecting, about ⅕ body width in anterior setigers, increasing to ½ body width in posterior setigers. First parapodium (fig. 18) reduced, directed anteriorly, adjacent to prostomium; notopodium with a pair of inconspicuous dorsal and ventral lamellae enclosing a relatively prominent acicular lobe; neuropodium without lamellae or projecting acicular lobe, ventral cirrus digitiform, about ½ length of and situated immediately behind and below palps. Second parapodium generally similar to remaining parapodia; notopodium with pre- and postacicular lamellae, acicular and supra-acicular lobes and dorsal cirrus; neuropodium with pre- and postacicular lamellae, acicular and subacicular lobes and ventral cirrus. Interramal cirrus first present by 3rd setiger, small, with a low rounded papilla on dorsoectal margin, below dorsal cirrus. At 10th setiger (fig. 19), postacicular lamellae prominent, much larger than acicular lobes and preacicular lamellae; preacicular notopodial lamella low, supra-acicular lobe rounded, about same size as conical acicular lobe, dorsal cirrus angled ventrally; neuropodial preacicular lamella low, longer than notopodial, subacicular lobe similar, postacicular lamella large, auricular, ventral cirrus arising close to base of postacicular lamella, short; interramal region about ¼ parapodial height, ciliated; interramal cirrus short, barely curved outwardly, filling most of interramal space, with dorsoectal papilla unciliated. Twenty-first setiger (fig. 20) similar, except preacicular lamellae and supra- and subacicular lobes slightly larger, interramal space about ⅓ parapodial height, and interramal cirrus distinctly curved outwardly. By 40th setiger (fig. 21), parapodial lobes further separated; preacicular lamellae lower, exposing anterior face of acicular lobes, postacicular lamellae less prominent, supra- and subacicular lobes still apparent; interramal cirrus longer but extending only half-way to neuropodium. At 80th setiger (fig. 22), parapodia widely divergent, with interramal region about ⅗ parapodical height; acicular lobes project almost as far as postacicular lamellae, supra- and subacicular lobes low but still distinct, dorsal cirrus reduced to about size of dorsoectal papilla of interramal cirrus; interramal region not ciliated, interramal cirrus extending about ¼ distance to neuropodium.

Acicula usually prominent in acicular lobes, with expanded tips projecting beyond and overlying the acicular lobes. No aciculum visible in neuropodium of 1st setiger, occasionally two in remaining neuropodia but usually occurring singly in both noto- and neuropodia. Tips of acicula gently curved, dorsad in notopodia and ventrad in neuropodia. Acicula clear, yellow, except in anterior and middle segments, where acicular tips are opaque, red.

Table 4. *Nephtys gravieri* **— setal formulae of setigers 1, 10, 21, 40 and 80, left side, expressed as in Table 1.**

Setiger	Setal Type: Barred	Spinose	Spinulose	Capillary
1	11 · — / —	— — / —	— — / —	6 — / 12
10	— — / 1 —	— 12 / — 9	6 6 / 7 8	2 8 / 2 2
21	— — / — —	— 11 / — 11	7 13 / 9 10	— 1 / — 2
40	— — / — —	— 6 / — 9	4 6 / 5 7	1 8 / 1 2
80	— — / — —	— 13 / — 10	5 3 / 8 7	1 — / 1 1

Setae of four types: barred, spinose, spinulose and capillary (Table 4). Spines of spinulose and spinose setae arranged in rows, with the size of spines varying in both setal types. Spinose setae generally longer, stouter, with a basal region of 15-20 rows of larger apically-directed spines grading distally into spinules similar to those on spinulose setae; both types have fine, unornamented tips. Setae arranged in pre- and postacicular rows, with postacicular setae extending into subacicular and supra-acicular position in notopodia and neuropodia respectively. First setiger contains barred and capillary setae only. Minutely-spinulose setae occur from 2nd setiger and spinose setae from 4th setiger. From 8th setiger, barred setae reduced to one in each neuropodium, and are absent from 12th setiger and thereafter. Capillary setae become smaller after first 2-3 setigers, and may well be the tips of developing spinose and spinulose setae.

REMARKS: Fauchald (1965) described *N. mirocirris* as having barred setae, but did not give details of their distribution. Paxton (1974) stated that barred setae were absent, presumably from an examination of middle and posterior setigers only. Some variation in the position of the last barred setae is present in the material examined, extending as far as the 17th neuropodium in a small specimen and only as far as the 8th neuropodium in a large specimen. The acicula have strongly curved tips in some specimens, with apices red or almost colourless, and with or without apical caps.

An important characteristic of *N. gravieri* has been considered to be the incised notopodial acicular lobes. A supra-acicular lobe is present in most Australian species of *Nephtys;* in *N. australiensis* it can be almost as large as the preacicular lamella. A corresponding subacicular lobe is usually present in the neuropodium, although usually less well-developed than the supra-acicular lobe. The dorsal and ventral portions, respectively, of the incised noto- and neuropodial lobes of *N. gravieri* are in the same position as the supra- and subacicular lobes of other species, and it is here preferred to regard them as well-developed supra- and subacicular lobes; as such, they do not uniquely distinguish *N. gravieri* from other species of *Nephtys*.

DISTRIBUTION: Australia (fig. 42); India.

ECOLOGY: Shallow estuarine and coastal areas, in sand or muddy sand.

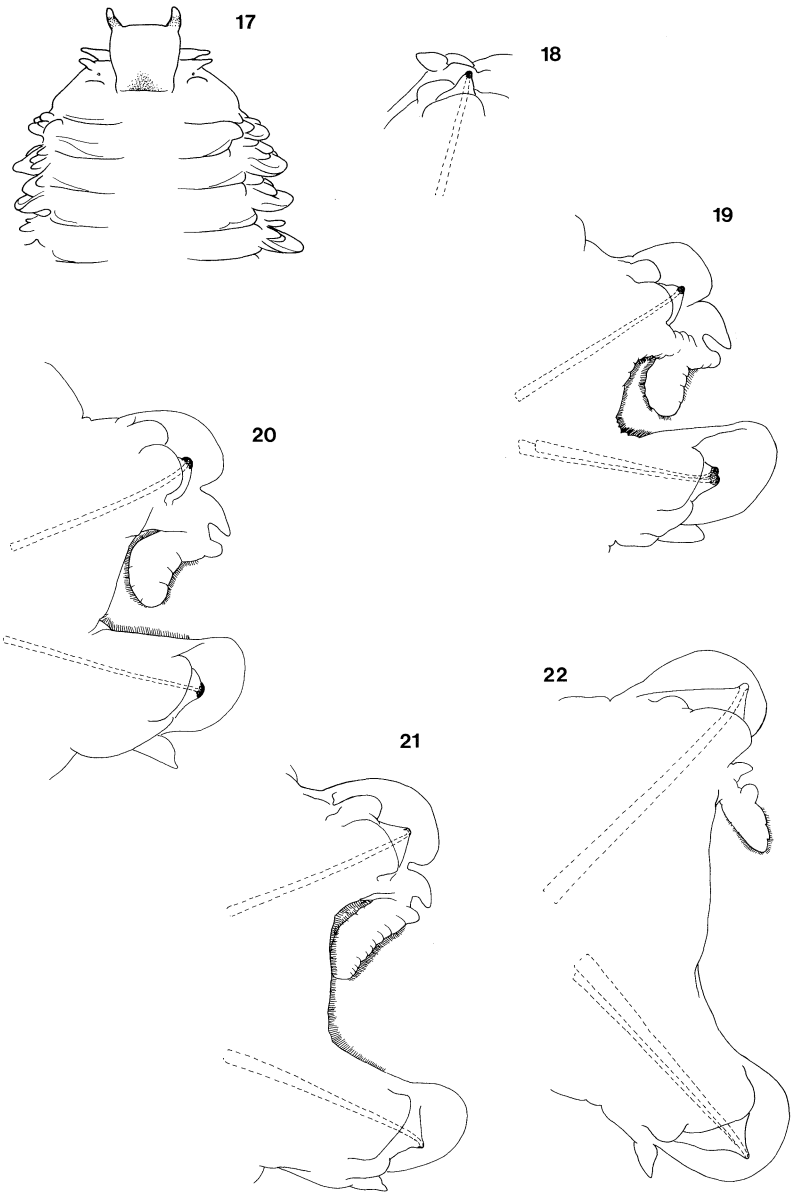
Nephtys inornata n.sp. (Figs 23-28, 43; Table 5)

Nephtys australiensis. — Fauchald, 1965: 334-335 (in part).

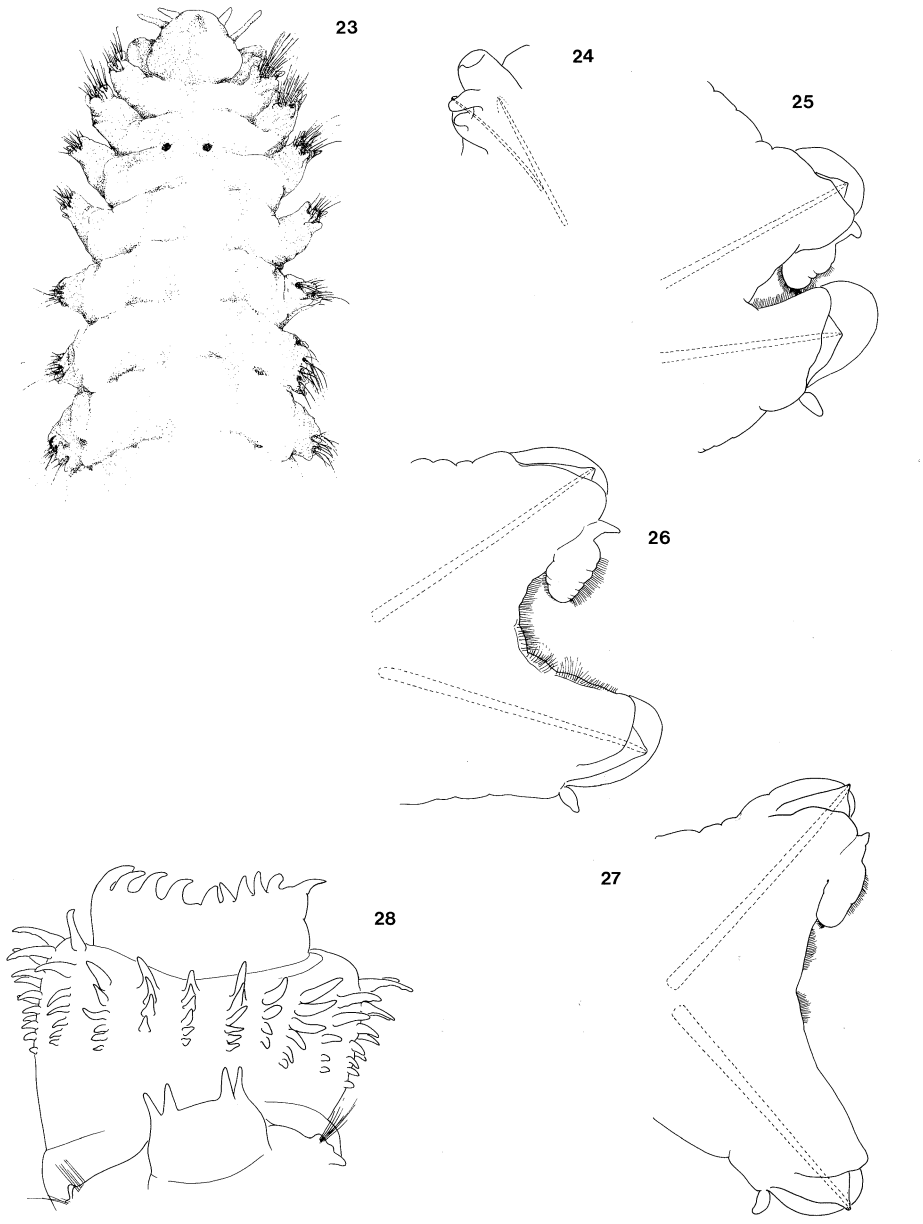
Nephtys sp. 1. — MMBW *et al.*, 1973: 370.

MATERIAL EXAMINED: New South Wales: — Woollahra Pt, Port Jackson (2.10), 1 spec. (AM W8182), 4-6 m. — 2 km E of Long Bay, 33°58'S 151°17'E (2.10a) (AM W8713), stn 4, 66 m, coll. Aust. Mus. Shelf Benthic Survey, July 1973. — Towra Bch, Botany Bay (2.11), 1 spec. (PARATYPE — USNM 53288), ant. fragment of 51 setigers, stn 220, coll. L. Collett, May 1975; 1 spec. (PARATYPE-BM ZB 1976:1), entire, 58 setigers, stn 242, coll. L. Collett, May 1975. — Gunnamatta Bay, Port Hacking (2.14), 1 spec. (AM W3580), entire, 74 setigers; 15 specs, coll. S. Rainer and A. Bothwell, including 1 spec. (HOLOTYPE-AM W8706), entire, 51 setigers, stn G2/9B, coll. 18 February 1975, 4.5 m; 3 specs (PARATYPES-AM W8708), ant. fragments of 25, 31; 39 setigers, stn G1/9B, coll. 8 January 1975; 1 spec. (PARATYPE-AM W8710), entire, 50 setigers, stn G1/10B, coll. 8 January 1975; 1 spec. (PARATYPE-AHF-Poly 1140), ant. fragment of 19 setigers, stn G2/1C, coll. 18 February 1975; 3 specs (PARATYPES-AM W8707), ant. fragment of 36 setigers and 2 entire, 46, 50 setigers, stn G2/3C, coll. 18 February 1975; 1 spec. (PARATYPE-AM W8709), entire, 50 setigers, stn G2/5C, coll. 18 February 1975. — Murrays Basin, Jervis Bay (2.16) (AM W8627), sand banks, stn 157, coll. NSW State Fisheries, 19 October 1972.

Victoria: — Western Port (3.7), 1 spec., WPES stn 1728, 10 m, coll. November 1973. — Port Phillip Bay (3.8), 668 specs from 64 stations, coll. 1969-1971, including PPBES stns 902/2, 932/2, 959/1, 916/1, 946/4, 982/4, 959/2, 970/1, 944/2, 913/1 (AM W8617-8627).



Figs 17-22. *Nephtys gravieri* (AM W3782): 17, anterior end (dorsal view, x 28); 18, first setiger (L, dorsal view, x 160); 19, tenth setiger (L, ant. view, x 67); 20, twenty-first setiger (L, ant. view, x 67); 21, fortieth setiger (L, ant. view, x 67); 22, eightieth setiger (L, ant. view, x 67).



Figs 23-28. *Nephtys inornata* n.sp.: 23, anterior end (dorsal view, x 33); 24, first setiger (R, dorsal view, x 80); 25, tenth setiger (L, ant. view, x 80); 26, twentieth setiger (L, ant. view, x 80); 27, fortieth setiger (L, ant. view, x 80); 28, prostomium and pharynx, everted (AHF Poly 1140, dorsal view, x 53).

DESCRIPTION: Holotype 13 mm long, 0.9 mm wide, for 51 setigers, entire; colourless except for eyespots, gravid. Prostomium flattened, rounded, about as long as wide; antennae and palps short, tapering, arising from anteroectal margin of prostomium, antennae about ½ length of prostomium, palps about ⅓ longer than antennae (fig. 23). A pair of small, brown eyespots visible near dorsal midline in posterior half of 2nd setiger. Pharynx of holotype not everted, not dissected. Body tapers gradually from 10th setiger to short, collar-like pygidium; anal cirrus slender, very short, about length of last 2 setigers.

Pharynx (described from paratypes AHF-Poly 1140 and AM W8707) divided into short muscular distal region with 18 bifid distal papillae and larger inflated proximal region with 20 subdistal rows of 4-7 conical papillae decreasing in size towards base of pharynx; no verrucae on proximal surface of pharynx, and no dorsal median subdistal papilla (fig. 28). Jaws paired, brown, horny, with heavy base and a pair of lateral extensions; a secondary tooth below the main tooth.

Parapodia of 1st setiger (fig. 24) reduced, directed forward to reach level of prostomium, with neuropodium just below and slightly anterior to notopodium; dorsal cirrus present as a short, digitate papilla about ½ length of antennae, arising from ventral surface of notopodium, ventral cirrus similar, about 1½ times size of notocirrus; neuropodium cylindroconical, with cirrus arising midway along ventral surface. Second setiger similar to remaining setigers, with entire pre- and postacicular lamellae and acicular lobes in both rami, dorsal and ventral cirri; preacicular and postacicular lamellae rounded, about size of conical acicular lobes; dorsal cirrus prominent, pearshaped, ventral cirrus as in 1st setiger. Postacicular lamellae larger in posterior parapodia, fully-developed by 5th setiger; interramal cirrus present from 5th setiger as a short, stout lobe with ciliated, convoluted surface, weakly outwardly curved. At 10th setiger (fig. 25), preacicular lamellae extend as far as acicular lobes, smaller than postacicular lamellae; dorsal cirrus a small conical papilla arising from dorsal border of interramal cirrus, reduced compared with anterior setigers; ventral cirrus arising at ventral junction of pre- and postacicular lamellae; interramal cirrus short, stout, ciliated, occupying most of interramal region; neuropodium ciliated on dorsal surface. Parapodium of 20th setiger (fig. 26) similar except that interramal region larger, with a number of strongly ciliated areas, and postacicular lamellae somewhat reduced although still larger than acicular lobes and preacicular lamellae. Near tail, parapodial rami become widely divergent, so that each setiger approximately quadrate in section. By 40th setiger (fig. 27), postacicular lamellae reduced to size of acicular lobes or slightly smaller, preacicular lamellae also somewhat reduced; interramal cirrus smaller than in anterior setigers, some ciliated patches still evident in interramal region.

A single aciculum present in all noto- and neuropodia, reaching surface of or barely projecting from acicular lobe, bluntly pointed in anterior and middle setigers and with curved tips in setigers near tail. Aciculum of 1st neuropodium reduced, not reaching surface. All acicula with fine lateral striations near apex.

Setae of three types: barred, spinulose and capillary. Setae generally arranged in pre- and postacicular rows, with barred setae preacicular only (Table 5). Notopodium of 1st setiger with barred preacicular setae and capillary postacicular setae, neuropodium with capillaries emerging in a single group from apex of neuropodium. In later setigers, barred setae replaced gradually by spinulose setae, dorsally between setigers 9-15, ventrally by setigers 10-15; barred setae absent by setiger 16.

REMARKS: Paratypes exhibit some variation from the holotype. The size of most of the specimens examined is 10-15 mm in length and 0.6-0.9 mm in width, for 46-51 setigers. The position of the eyes varies from the 1st setiger to the 4th. The position of the

Table 5. *Nephtys inornata* **n.sp. — setal formulae of setigers 1, 2, 10, 20 and 40, expressed as in Table 1.**

Setiger	Setal Type: Barred	Spinulose	Capillary
1 (L,R)	5-6 | — / —	— | — / —	— | 2-4 / 6-7
2 (L,R)	11-13 | — / 9-11 | —	— | — / — | —	2 | 3-5 / 1-2 | 7
10 (L)	7 | — / 6 | —	4 | 17 / 3 | 15	— | — / — | —
20 (L)	— | — / — | —	10 | 19 / 5 | 25	— | — / — | —
40 (L)	— | — / — | —	7 | 15 / 9 | 11	— | — / — | —

last barred setae is relatively constant, usually setiger 14-15 (8 specimens) but sometimes later.

The species is distinguished from most other species by the absence of spinose setae, the possession of barred setae in anterior setigers only, and the number of apical and subapical papillae on the pharynx (18 and 20 rather than 22 or 14 in most species). Four species have been described previously with a number of features similar to *Nephtys inornata* n.sp.: proximal region of the pharynx without verrucae, no unusually-modified setae, postacicular lamellae entire and not greatly prolonged, no erect lobe on the superior border of the neuropodium, and interramal cirri not foliaceous. These are *N. cornuta* Berkeley from the northwestern Pacific, *N. hystricis* McIntosh from the eastern Atlantic and Mediterranean, *N. panamensis* Monro from the central west Pacific, and *N. phyllocirra* Ehlers from the West Atlantic. None of these has eyespots. Three of the species have 22 rows of subdistal papillae on the pharynx (not known for *N. cornuta). Nephtys cornuta* has bifurcated ventral prostomial antennae, smooth postacicular setae and lacks preacicular setae in posterior setigers (Hartman, 1950). *Nephtys hystricis* has a pharynx with 22 rows of 35 small papillae and with a median dorsal papilla; interramal cirri commence on setiger 9, and are large and curved outwardly (Fauvel, 1923). *Nephtys panamensis* has outwardly curved interramal cirri present from the 3rd setiger, has well-developed parapodial lobes, and the postacicular setae include serrated (= spinose) setae (Hartman, 1940). *Nephtys phyllocirra* has barred setae in posterior setigers, although in reduced numbers, and the interramal cirri commence on the 6th setiger (Hartman, 1950).

Nephtys inornata n.sp. is distinguished from the closely-related *N. mesobranchia* n.sp. by the earlier commencement of interramal cirri, differences in parapodial shape, and the absence of a median dorsal subdistal papilla on the pharynx. The name *inornata* is derived from the absence of verrucae on the pharynx.

DISTRIBUTION: Australia (fig. 43).

ECOLOGY: Shallow, sheltered coastal areas, intertidal to 25 m, in sand, muddy sand, or firm mud.

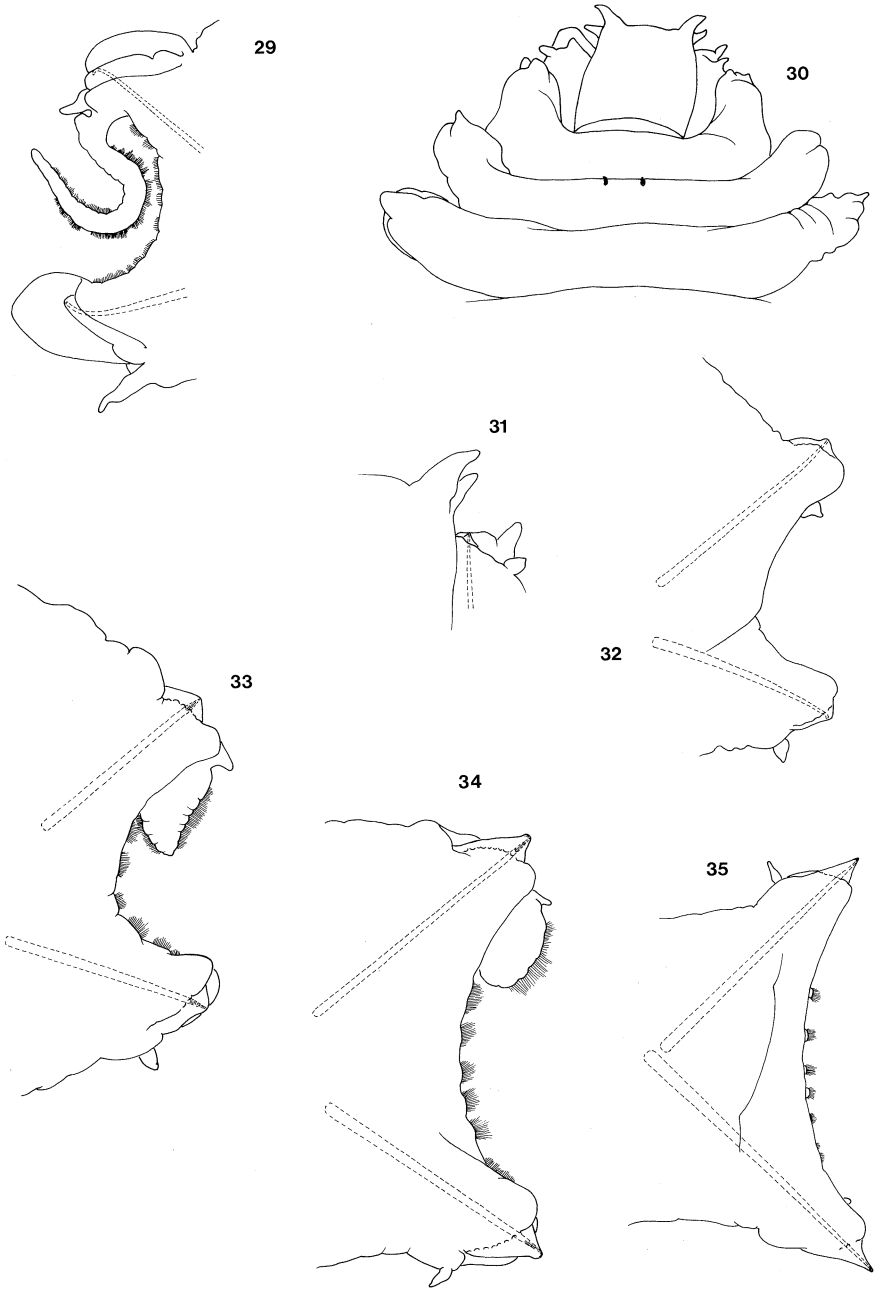
Nephtys longipes Stimpson, 1856 (Figs 29, 43)

Nephtys longipes Stimpson, 1856, 392.
Nephtys vikingensis Paxton, 1974: 204-207, figs 8-13.
Nephtys picta. — Knox and Cameron, 1971: 28, figs 15-16 (*non* Ehlers, 1868).
Nephtys sp. — Hutchings, 1974: 181.

MATERIAL EXAMINED: The holotype and paratypes of *N. vikingensis* are here designated the neotype and paraneotypes, respectively, of *N. longipes*. Queensland: — Moreton Bay (1.7) (AM W5401), coll. J. D. Ogilby. — Middle Banks off Tangalooma, Moreton Bay (1.7) (AM W8420, QM G9548), coll. W. Stephenson and others.

New South Wales: — Wallis L. (2.2) (PARANEOTYPE-AM W5252, AM W5392-5395, 5397-5400). — Burwood Bch, Newcastle (2.7) (AM W7391, 7394-7396), 16-20 m. — Belmont Bch, Newcastle (2.8) (AM W7388-7390, 7392, 7393, 7396), 12-22 m. — Seven Mile Beach, Gerroa (2.15) (AM W5255). — Batemans Bay (2.18) (NEOTYPE-AM W5251, PARANEOTYPES-AM W5253-5254, AM W5392-5395, 5397-5400).

Victoria: — Mallacoota Inlet and Bekta R. (3.1, 3.2) (AM W8434-8438). — Wilsons Promontory (3.6). — Port Phillip Bay (3.8) (NMV G1789).



Figs 29-35. *Nephtys longipes* (AM W5251): twenty-seventh setiger (L, ant. view x 53). Figs 30-35. — *Nephtys mesobranchia* n.sp.: ant. end (dorsal view, x 32); 31, first setiger (L, ant. view, x 85); 32, fifth setiger (L, ant. view, x 53); 33, tenth setiger (L, ant. view, x 53); 34, twentieth setiger (L, ant. view, x 53); 35, fortieth setiger (L, ant. view x 53).

DESCRIPTION: Preserved body pale often with slightly bluish iridescence, long flowing golden setae. Size range 55-100 mm. Pigmentation absent. Prostomium oval, with triangular translucent preantennal lobe. Antennae arise at base of preantennal lobe, palps arise further down the prostomium. Pharynx with 10 pairs bifid distal papillae separated by single middorsal and midventral papillae. Twenty-two rows of subdistal papillae, each row of 5-7 papillae. Proximal surface covered with verrucae. Outwardly curved interramal cirrus present from 3rd setiger almost to pygidium. Notopodia with rounded, equal acicular lobe and postacicular lamella, preacicular lamella short and rounded, supra-acicular lobe rounded, slightly elongated, dorsal cirrus digitate. Neuropodia with rounded acicular lobe, pre- and postacicular lamellae, preacicular smallest and postacicular largest. Ventral cirrus subconical, with distal notch (fig. 29). Setae long and flowing, barred, spinose and spinulose.

REMARKS: Stimpson (1856) described *N. longipes* from the sandy intertidal areas of Botany Bay, and the type was probably destroyed in the Chicago Fire (Pettibone, pers. comm.). Although the description is very brief, Stimpson does indicate that it is a very large species (3 inches), bluish white in colour, with very long setae, and with antennae 'placed rather near the base of the head'. The only species of *Nephtys* recorded from Australia which coincides with this is *N. vikingensis* Paxton, 1974. Paxton agrees with Augener (1922) that *N. longipes* is indeterminable, but sufficient information is given in Stimpson's description for *N. vikingensis* to be synonymised with *N. longipes*. The other species of *Nephtys* occurring intertidally around Sydney are *N. australiensis* and *N. inornata*. These are smaller species than *N. longipes* and have shorter setae. *N. australiensis* has a very characteristic pigmentation pattern, and the prostomium does not project beyond the antennae in either species.

The description given by Paxton (1974) for *N. vikingensis* has been emended to note the presence of a supra-acicular notopodial lobe, and the distal notch in the ventral cirrus. The holotype of *N. vikingensis* was selected as the neotype of *N. longipes* and several paratypes were selected for a paraneotype series.

DISTRIBUTION: Australia (fig. 43).

ECOLOGY: Intertidal to shallow subtidal, in clean sand in sheltered coastal areas.

Nephtys mesobranchia n.sp. (Figs 30-35, 43; Table 6)

MATERIAL EXAMINED: Queensland: — Calliope R., Gladstone (1.3), 7 specimens, coll. P. Saenger, 26-28 November 1975, comprising: 1 spec. (HOLOTYPE-AM W8653), entire gravid female, 49 setigers, stn 1/8/3, 8.5 km from mouth, 5 m; 1 spec. (PARATYPE-AM W8654), ant. fragment of 32 setigers, stn 1/4/2, 2 km from mouth, 5 m; 1 spec. (PARATYPE-AM W8657), ant. fragment of 39 setigers, stn 1/8/5, 8.5 km from mouth, 3 m; 4 specs, 1 ant. fragment of 28 setigers (PARATYPE-AM W8656), three entire, of 48 setigers (PARATYPE-BM ZB 1976:2), 43 setigers (PARATYPE-USNM 53289), 49 setigers (PARATYPE-AHF-Poly 1139), stn 1/7/75, 10 km from mouth, 3 m.

DESCRIPTION: Holotype entire, 49 setigers, proboscis not everted (examined by dissection); length 23 mm, maximum width 2.2 mm, excluding setae. Body without pigmentation, setae straw-coloured; 1 pair black eyespots visible dorsally at anterior border of 3rd setiger, about 0.15 mm apart (fig. 30).

Prostomium approximately square, 0.35 mm long and 0.4 mm wide, slightly convex anteriorly, with one pair antennae and one pair palps, subequal, short, tapering, on

anteroectal margins, about 0.1 mm long. Body widest at about 10-15th setiger, narrowing slowly to about 40th setiger and tapering rapidly thereafter. Anal cirrus short, slender, about length of last 3 setigers (PARATYPE AHF-Poly 1139). First setiger reduced dorsally, almost obscure by 2nd setiger; width of 2nd setiger 1.0 mm, 10th setiger 1.8 mm, 20th setiger 1.6 mm, 40th setiger 1.5 mm, with setae extending 0.15-0.2 mm on each side; segments compressed, wider than long, especially near prostomium, length of 2nd setiger 0.15 mm, 10th setiger 0.4 mm, 20th setiger 0.6 mm, 40th setiger 0.6 mm; intersegmental region of 1st-12th setiger not markedly constricted, obviously so thereafter; intersegmental region around 40th setiger 0.6 mm wide.

Pharynx with extrovert divided into usual muscular distal region and inflated proximal region; distal region with 20 bifid papillae surrounding a dorsoventral slit, 10 on each side, each papilla with cirriform outer portion and shorter radially-flattened inner portion, papillae smaller towards middorsal and midventral position; proximal region with prominent median dorsal subdistal papilla and with 18 longitudinal rows of 10-12 subdistal papillae extending half way to base of pharynx, papillae largest distally, almost microscopic proximally. Median subdistal papilla slender, 0.4 mm long, 2-3 times length of other subdistal papillae. Verrucae absent. Jaws paired, brown with broadly-conical apex and with triangular base embedded in pharyngeal muscle. In midventral position, distal to jaws and close to terminal papillae, a radially-arranged line of 4 or so pairs narrow brown cuticular ridges.

Parapodia biramous, not strongly projecting. Parapodia of 1st and 2nd setiger directed anteriorly, with 1st parapodium lying adjacent to prostomium just behind and below antennae, 2nd parapodium lying above and behind 1st; parapodia of 3rd setiger directed anterolaterally (fig. 30). Parapodium of 1st setiger (fig. 31) reduced, notopodium with low broadly-conical acicular lobe and digitate dorsal cirrus (0.04 mm long, 0.03 mm wide), neuropodium projecting slightly, with no distinct lobes, ventral cirrus digitate (0.06 mm long, 0.04 mm wide). Second parapodium basically similar to remaining parapodia, with acicular lobes and pre- and postacicular lamellae in both rami and with dorsal and ventral cirri. At 5th setiger (fig. 32), acicular lobe of notopodium low, mammilliform, not obscured by pre- or postacicular lamellae, preacicular lamella present as rounded lobe below level of acicular lobe, obscure above, postacicular lamella a short rounded lobe not visible from anterior view; dorsal cirrus short, bulbous (0.06 mm long, 0.06 mm diameter) with low conical tip; neuropodium with conical broadly-depressed acicular lobe, preacicular lamella developed only as a rounded lamella above level of acicular lobe, obscure below, postacicular lamella better developed than in notopodium, broadly rounded, best developed above level of acicular lobe but not visible from anterior view, ventral cirrus short, digitiform (0.08 mm long, 0.04 mm wide); interramal region about half height of parapodium, with some ciliation on dorsal surface of neuropodium. Interramal cirrus first present on 7th setiger, rapidly reaching full size. Parapodium of 10th setiger (fig. 33) with lobes and lamellae better developed than 5th parapodium; notopodium with low conical acicular lobe, preacicular lamella only developed above and below level of acicular lobe, postacicular lamella obscured, dorsal cirrus a short tapering lobe 0.05 mm long on dorsoectal margin of interramal cirrus, projecting beyond and below preacicular lamella; neuropodium with mammilliform acicular lobe, preacicular lamella developed above level of acicular lobe, obliquely rounded, reaching just beyond acicular lobe, postacicular lamella rounded, extending beyond and above acicular lobe, ventral cirrus short, digitate (0.08 mm long, 0.04 mm wide); interramal region 1/3 parapodial height, irregularly ciliated, with interramal cirrus extending about ½ height of interramal space; interramal cirrus short, barely curved outwardly, strongly ciliated. By 20th setiger (fig. 34), parapodial rami widely divergent, acicular lobes projecting beyond pre- and postacicular lamellae, dorsal cirrus expanded proximally and narrowly-tapering distally, ventral cirrus narrower, tapering (0.08 mm

Table 6. *Nephtys mesobranchia* **n.sp. — setal formulae of setigers 1, 5, 10, 20 and 40, left side, expressed as in Table 1.**

Setiger	Setal Type: Barred	Spinulose	Capillary
1	8 | — / —	— | — / —	— | 1 / c.6
5	12 | — / 12 | —	— | 13 / — | 16	— | 2 / — | 1
10	11 | — / 12 | —	2 | 22 / 3 | 26	— | — / 1 | 3
20	— | — / 2 | —	16 | 32 / 13 | 32	— | — / — | —
40	— | — / — | —	5 | 9 / 5 | 17	— | — / — | —

long, 0.03 mm wide), interramal region 2/3 parapodial height with ciliation restricted to raised pads and with interramal cirrus ciliated, stout, occupying 1/3 of interramal space. Interramal cirrus absent from 24th setiger and thereafter, disappearing abruptly. By 40th setiger (fig. 35), pre- and postacicular lamellae reduced, acicular lobes conical, strongly projecting, dorsal cirrus much reduced, interramal region about 4/5 parapodial height, with scattered raised ciliated pads.

Acicula usually prominent, extending to apex of acicular lobes, occasionally with minute slender curved tip projecting beyond acicular lobe, recurved dorsad in notopodia, ventrad in neuropodia. A single aciculum in all parapodial rami except perhaps neuropodium of 1st setiger, where not seen (not dissected). Acicula clear, colourless, generally with fine lateral striations near tips.

Setae of three types: barred, spinulose and capillary. Barred setae restricted to preacicular position, while spinulose setae predominantly postacicular in anterior setigers (Table 6). First setiger with barred and capillary setae in notopodium, capillary setae in neuropodium; spinulose setae appear in 2nd setiger and then predominate among postacicular setae; barred setae gradually replaced by spinulose setae, with barred setae present to 21st setiger, absent thereafter. Barred setae longest in anterior setigers, up to 0.35 mm, reducing to 0.15-0.2 mm by 20th setiger; spinulose setae shorter anteriorly, 0.35-0.4 mm, increasing to maximum of 0.65 mm on 20th setiger.

REMARKS: The four entire specimens examined ranged from 43-49 setigers, with the smaller specimens having several achaetous segments before the pygidium; one 49-setiger specimen was ovigerous. Eyespots were visible in the 2nd or 3rd setiger in all specimens. In all entire specimens the interramal cirri were restricted to the anterior half of the body; the range of setigers bearing interramal cirri was 7-21 (1 spec.), 7-22 (3 specs), 7-23 (1 spec.), 8-22 (1 spec.).

In general appearance, *N. mesobranchia* n.sp. is close to *N. oligobranchia* Southern and *N. polybranchia* Rullier, euryhaline species recorded from Indo-Pacific areas, including India, Gulf of Siam, China and Vietnam (Fauchald, 1968). *Nephtys mesobranchia* n.sp. differs from these in having 18 rows of subdistal papillae on the pharynx, rather than 22, and in possessing eyes; it differs further from *N. oligobranchia* in lacking lyrate setae and from *N. polybranchia* in the later commencement of interramal cirri (7-8th setiger, rather than 4th), the presence of a median subdistal papilla on the pharynx and the absence of verrucae. In possessing eyespots, only 18 rows of subdistal papillae and lacking verrucae, *N. mesobranchia* n.sp. is close to *N. inornata* n.sp., but the two can be easily differentiated by the different position of the interramal cirri and the presence of a single dorsal subdistal papilla in *N. mesobranchia* n.sp. The specific name *mesobranchia* indicates the intermediate position of the species between *N. oligobranchia* and *N. polybranchia*.

DISTRIBUTION: Australia (fig. 43).

ECOLOGY: *Nephtys mesobranchia* n.sp. was collected from a wide variety of sediment types, from mud and sandy mud to coarse river gravel with coarse sand, and the species appears to tolerate some degree of salinity reduction, with recorded salinities averaging 24.5-30.4‰ .

Nephtys paradoxa Malm, 1874 (Fig. 43)

Nephtys paradoxa. – Fauchald, 1963: 13-15, figs 1A, 2B, 3C. — Paxton, 1974: 204.

MATERIAL EXAMINED: New South Wales: — 53 km from Green Cape, approx. 37°16'S 15°10'E (2.24), 1 spec. (AM W5247), 860 m, coll. F.I.S. *Endeavour,* 2 October 1912.

DESCRIPTION: Incomplete specimen, 35 mm long and 7 mm wide for 37 segments, body uniform pale brown. Prostomium pentagonal, anterior margin slightly concave. Antennae long and pointed, palps similar length to antennae but thicker. Pharynx with 18 pairs bifid distal papillae. Twenty-two rows papillae present. Proximal surface of pharynx without verrucae. Interramal cirrus present from 9th setiger as small outgrowth ventral to dorsal cirrus; fully developed by 25th-27th setiger, bearing two lateral foliaceous lamellae, subsequently interramal cirrus becomes smaller. Notopodia with obliquely-rounded acicular lobe, rudimentary preacicular lamella and small postacicular lamella, triangular dorsal cirrus. Neuropodia with rudimentary preacicular lamella, postacicular lamella longer than acicular lobe, ventral cirrus triangular with constricted base. Setae relatively short and stout, comprise spinose and barred setae.

DISTRIBUTION: Australia (fig. 43); northern Atlantic, Sea of Japan, Sea of Okhotsk, subantarctic areas off Chile.

ECOLOGY: Deep-water species, 50-860 m.

Nephtys semiverrucosa n.sp. (Figs 36-40, 43; Table 7)

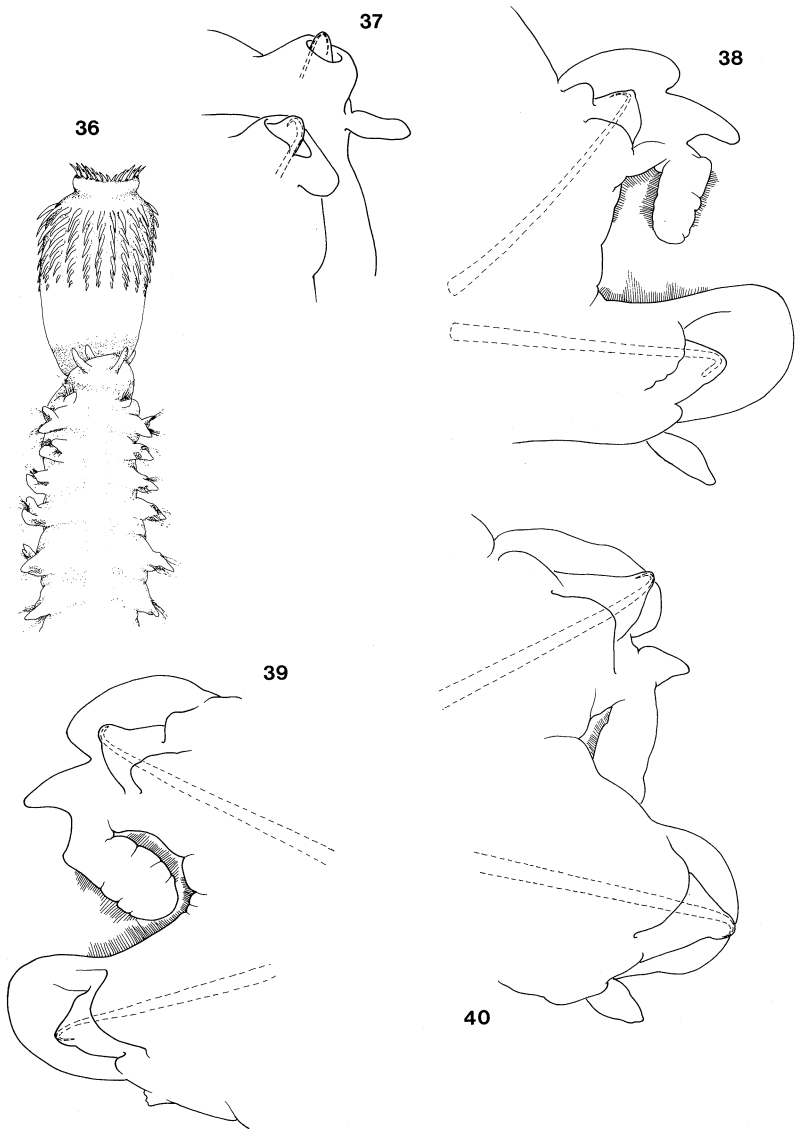
MATERIAL EXAMINED: Northern Territory: — Fannie Bay, Darwin (7.1), 1 spec. (HOLOTYPE-AM W5865), entire, 63 setigers, coll. E. Pope and R. Williams, 23 October 1965.

DESCRIPTION: Complete individual, pharynx everted; length 18 mm for 63 setigers (excluding proboscis), maximum width at 5-15th setiger 0.8 mm, excluding setae; segments 0.8 mm wide and 0.2 mm long at 15th setiger, 0.7 mm wide and 0.35 mm long at 40th setiger. Caudal cirrus present, length of last 7 setigers. Gametes absent.

Prostomium pentagonal, slightly extended anteriorly (fig. 36), with one pair antennae and one pair palps, antennae at base of anterior extension of prostomium, palps at base of prostomium. Eyespots not apparent.

Pharynx divided into muscular terminal region with 10 pairs bifid distal papillae having outer portion 1½ times length of inner, situated around elongated dorsoventral aperture of pharynx, and inflated basal region with 22 longitudinal rows of subdistal papillae, 4-7 papillae in each row, becoming smaller towards base of pharynx; no median dorsal subdistal papilla; basal region of pharynx with a proximal ring of patches of verrucae, distal portion of basal region without verrucae.

First setiger (fig. 37) displaced forwards but not adjacent to prostomium, with small acicular lobe and postacicular lamella. Acicula with red square tips curved away from interramal space. Interramal cirri from 4th setiger almost to pygidium, short, not markedly curved outwardly, occupying about ½ interramal space in anterior setigers, smaller in posterior setigers. Parapodia of 10th and 22nd setigers (figs 38, 39) with small rounded preacicular notopodial lamella and supra-acicular lobe, postacicular lamella divided into two unequal lamellae, dorsal lamella the larger; neuropodium with divided preacicular lamella, consisting of small rounded median lamella and inferior digitate lobe, acicular lobe extending beyond preacicular lamella and with slight posterior



Figs 36-40. *Nephtys semiverrucosa* n.sp.: 36, ant. end, pharynx everted (dorsal view, x 70); 37, first setiger, (R, dorsal view, x 160); 38, tenth setiger (L, ant. view, x 160); 39, twenty-second setiger (R, ant. view, x 160); 40, forty-fifth setiger (L, ant. view, x 160).

expansion, postacicular lamella and ventral cirrus large, lamellate; interramal cirrus well-developed, partially ciliated together with parts of the epithelium of the interramal region. Parapodia of 45th setiger (fig. 40) with considerably reduced postacicular lamellae, acicular lobes extending beyond postsetal lobes, small globular dorsal and ventral cirri.

Setae of four kinds: narrow-winged, smooth-tipped capillaries, barred, spinose and spinulose (Table 7). Preacicular notosetae of setigers 1-9 dominated by barred setae, 6-10 per setiger, gradually replaced by straight spinulose setae. Postacicular notosetae capillary in setigers 1-2, subsequently spinulose and spinose, with spinose setae rapidly predominating. Preacicular neurosetae capillary in setiger 1, subsequently barred, spinose and spinulose, with barred setae disappearing by 28th neuropodium. Postacicular neurosetae spinulose and spinose, with spinose setae dominating.

REMARKS: *Nephtys semiverrucosa* n.sp. closely resembles the widely-distributed *N. australiensis* in possessing a supra-acicular lobe, parapodial lobes of similar proportions, and branchiae starting on the fourth setiger. The main difference lies in the ornamentation of the pharynx. *N. semiverrucosa* n.sp. lacks a median dorsal subdistal papilla, has a smooth mid-proximal ring and a proximal ring with verrucae, whereas *N. australiensis* has a median dorsal subdistal papilla and has the proximal surface completely covered in verrucae even in very small individuals (less than 15mm in length). Using these features, *N. semiverrucosa* n.sp. can be separated from *N. gravieri,* which also lacks a median dorsal subdistal papilla on the pharynx, but has the proximal surface completely covered with verrucae. *N. longipes,* a species commonly found in sandy areas, can be distinguished by the shape of the prostomium. Other species of *Nephtys* have interramal cirri commencing on setigers other than the fourth, and differ in the shape of their parapodia. The specific name refers to the position of the verrucae on the pharynx which are restricted to the basal region.

DISTRIBUTION: Australia (fig. 43).

ECOLOGY: Intertidal, in sand.

DISCUSSION

The four known genera of nephtyids are represented in Australian waters by 13 species, seven of which belong to the genus *Nephtys*. Additional records are likely, particularly in N.W. Australia and offshore around the coast of Australia, where almost no collecting has been done. The majority of Australian records of nephtyids are from intertidal or shallow subtidal areas; there are three deep water species, *Aglaophamus gippslandicus* n.sp. (fig. 41), *A. profundus* n.sp. (fig. 41), and *Nephtys paradoxa* (fig. 43), but they are numerically poorly represented in museum collections. The nephtyid fauna has a strong degree of endemicity, with only four species recorded from outside Australia; *N. paradoxa,* which appears cosmopolitan in its distribution, *A. dibranchis* and *A. verrilli,* which are recorded elsewhere in the Indo-Pacific, and *Micronephthys sphaerocirrata,* which has been recorded from the Gulf of Iran and S. Africa. *Nephtys australiensis* (fig. 42) is the dominant species along the east coast of Australia and occurs from intertidal to subtidal areas, in bays, estuarine areas and shallow coastal lagoons which are subjected to fluctuating salinities. This species is found in seagrass beds of *Zostera* and *Posidonia* and in sandy, muddy flats. In Western and South Australia, *N. australiensis* appears to be replaced by *N. gravieri* (fig. 43), which is also tolerant of fluctuating salinities. Two other species have similar distributions to *N. australiensis,*

Table 7. *Nephtys semiverrucosa* **n.sp. — setal formulae of setigers 1, 10, 20 and 40, expressed as in Table 1.**

Setiger	Setal Type			
	Barred	Spinulose	Spinose	Capillary
1	9 | — —	— | — —	— | — —	— | 6 8
10	4 | — 2 | —	1 | 5 1 | 5	— | 7 — | 8	— | 1 — | —
20	1 | — 2 | —	4 | 5 5 | 7	— | 8 — | 6	— | — — | —
40	— | — 1 | —	7 | 6 7 | 9	— | 7 — | 9	— | — — | —

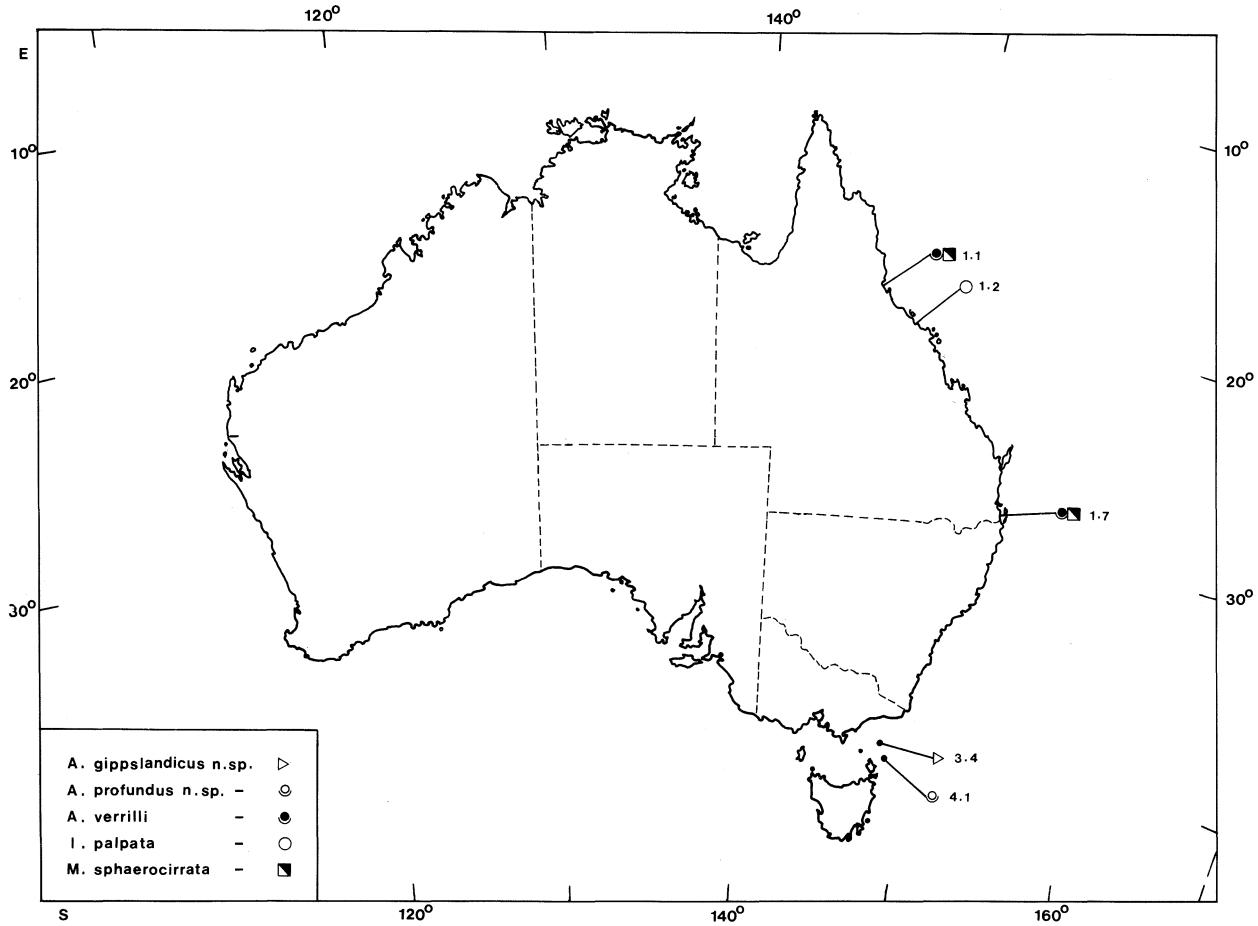


Fig. 41. Australian records for *Aglaophamus gippslandicus* n.sp., *A. profundus* n.sp., *A. verrilli, Inermonephtys palpata* and *Micronephthys sphaerocirrata*.

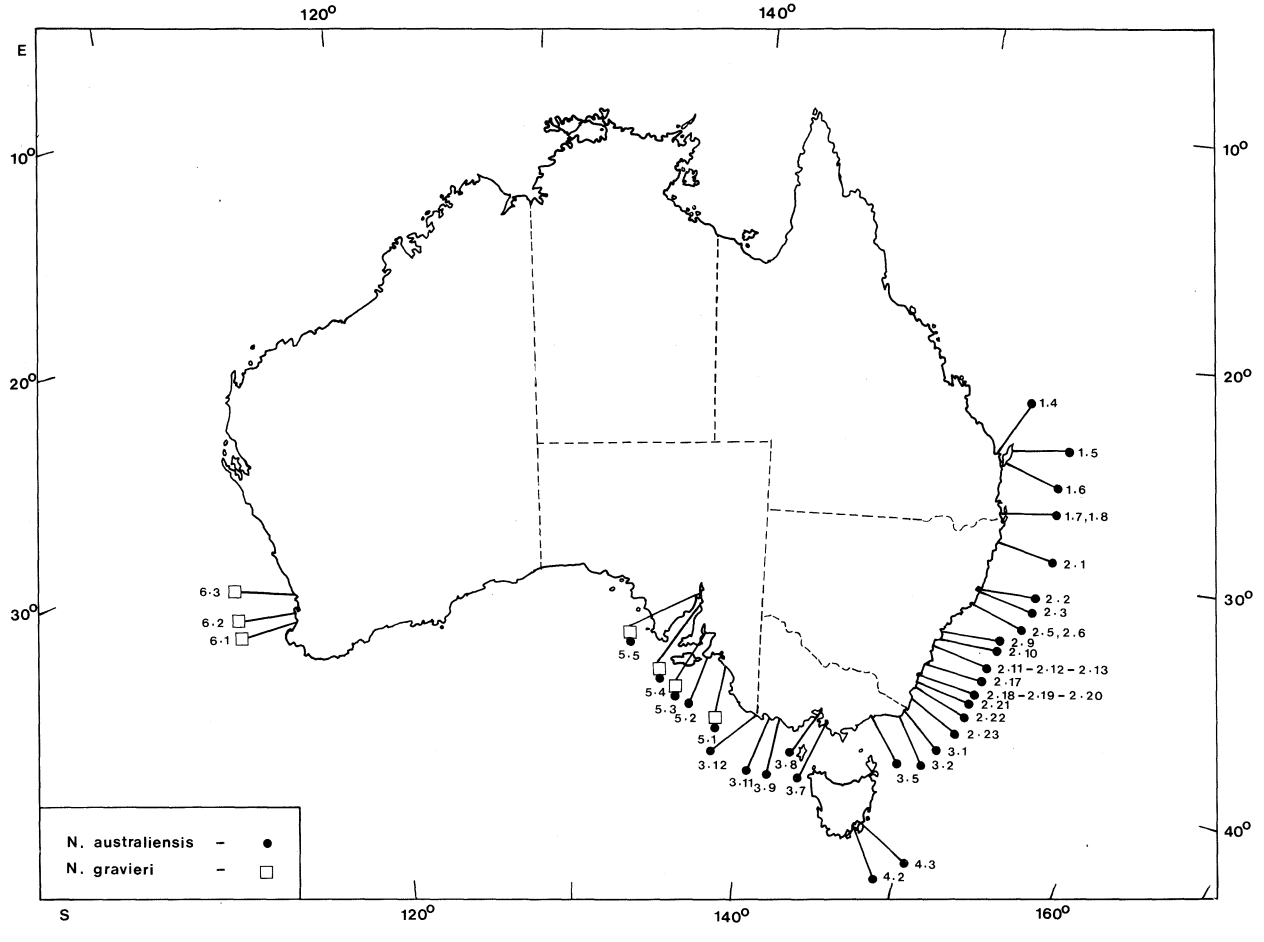


Fig. 42. Australian records for *Nephtys australiensis* and *N. gravieri*.

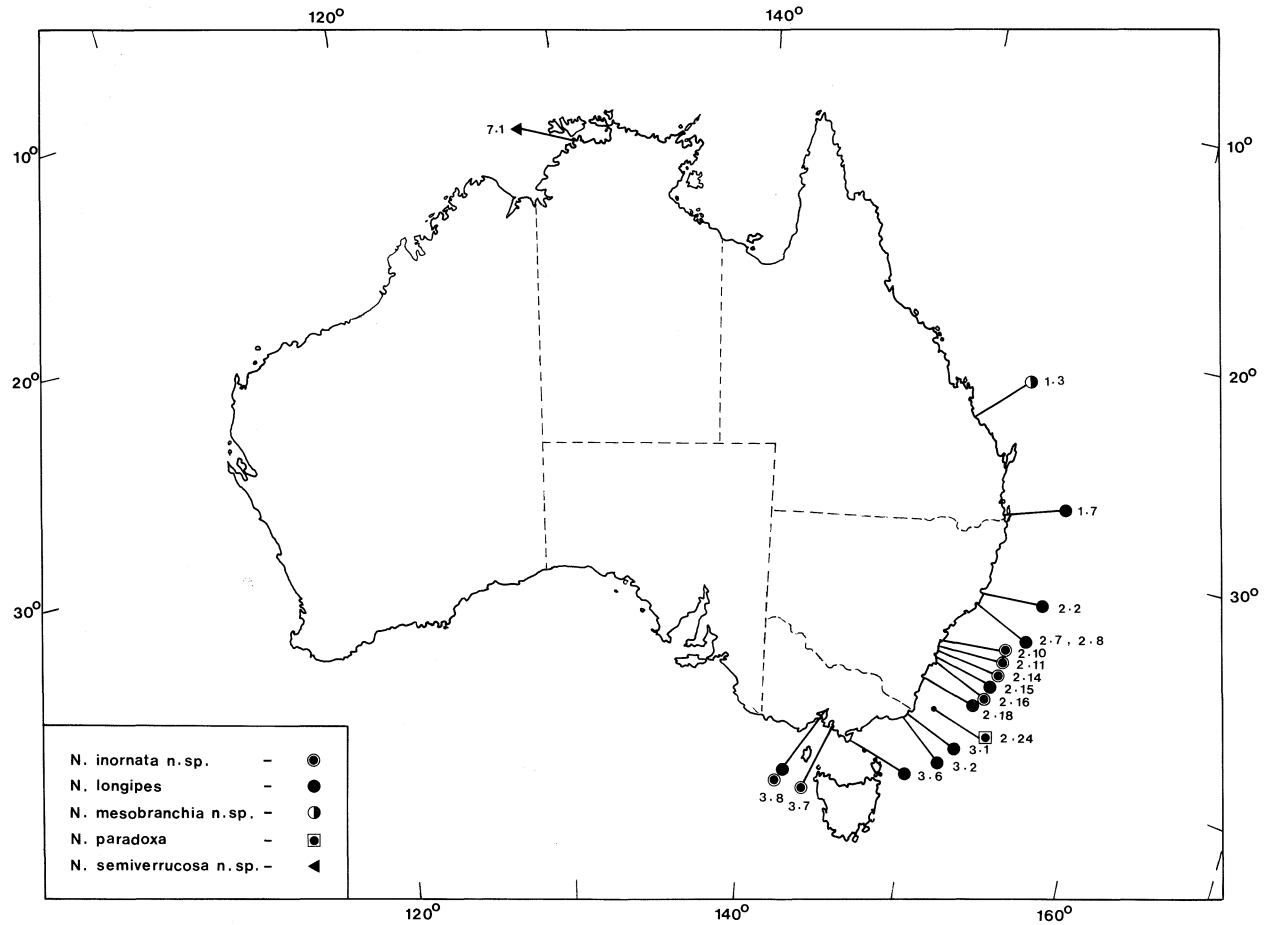


Fig. 43. Australian records for *Nephtys inornata* n.sp., *N. longipes, N. mesobranchia* n.sp., *N. paradoxa* and *N. semiverrucosa* n.sp.

although occurring in slightly different habitats; *N. longipes* (fig. 43) and *N. inornata* n.sp. (fig. 42) live in sheltered but fully marine situations, *N. longipes* in clean sand and *N. inornata* in sandy mud; both species occur in intertidal and shallow subtidal areas. *Nephtys longipes* and *N. australiensis* extend into southern Queensland, but have not been found north of Hervey Bay. *Nephtys mesobranchia* n.sp. (fig. 43) may replace *N. australiensis* above this latitude but so far it has only been recorded from the Calliope R., Gladstone, in an estuarine situation with fluctuating salinities. Unfortunately, very little intertidal or estuarine collecting has been done north of Gladstone. *Aglaophamus verrilli* (fig. 41) and *N. sphaerocirrata* (fig. 41) have been found in subtidal areas in Moreton Bay and off Townsville, in somewhat sheltered muddy situations, during extensive environmental surveys carried out in these areas. No other offshore surveys have been carried out between these two localities, and these species probably have a more continuous distribution.

In differentiating closely-related species, we found useful several characters to which insufficient attention has often been paid in earlier descriptions. These are the distribution of verrucae on the pharynx, the distribution and abundance of the various kinds of setae, and the shape and size of parapodial lamellae along the entire length of the body. We have also noticed that within a species there can exist some variation in the size and shape of parapodial lamellae and interramal cirri, in the distribution of setae and in pigmentation patterns, but there is little variation in the qualitative ornamentation of the pharynx. The variation found may be a function of size or related to the environment. In *Nephtys australiensis,* with abundant material available for study, variation in the number of barred setae was mainly size-related, while the size of interramal cirri appeared to be environmentally-related.

The use of the terms spinose and spinulose is not intended to imply a qualitative difference in spination, but rather to indicate consistent differences in the size and strength of setal spines that are useful in identification. We have looked at the setal spines of *N. australiensis* with a scanning electron microscope and have confirmed the light microscope picture that spines near the base of a seta tend to be arranged in closely set transverse rows. With the light microscope, spines towards the tip of a seta appear randomly organised; SEM examination showed no difference in the arrangement of spines along the length of a seta, the number and size of spines in each transverse row being gradually reduced towards the setal tip.

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