Journal of the Marine Biological Association of the United Kingdom, 2009, 89(4), 697–710.
doi:10.1017/S0025315408002427 Printed in the United Kingdom

Nephtyidae (Polychaeta) from the Gulf of California (Mexican Pacific) with the description of two new species of *Aglaophamus*

J. PÉREZ-TORRIJOS, P. HERNÁNDEZ-ALCÁNTARA AND V. SOLÍS-WEISS

Laboratorio de Ecología y Biodiversidad de Invertebrados Marinos, Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México (UNAM), Apartado Postal 70-305, México, D.F. 04510, México

The aim of this study is to analyse the Nephtyidae from the Gulf of California. Previous studies about the family Nephtyidae from the continental shelf of the Gulf include 21 species of which seven have been synonymized by several authors, so that at present only 14 species are recognized. In this study, 1763 specimens of Nephtyidae from the continental shelf of the Gulf of California were examined. Eight species were identified, from which Aglaophamus longicirrata *sp. nov. and* Aglaophamus foliosa *sp. nov. are newly described.* Aglaophamus longicirrata *sp. nov. is characterized by the presence of very long dorsal cirri in median parapodia and by having 16 rows of subterminal papillae with 3–7 papillae per row, and a pair of middorsal papillae on the proboscis.* Aglaophamus foliosa *sp. nov. is characterized by foliaceous long dorsal cirri; the proboscis bears 16 rows of subterminal papillae and an irregular number of papillae per row, from 5 to 15. A taxonomic key is presented for the species of Nephtyidae recorded from the continental shelf of the Gulf of California, including the two new species of* Aglaophamus.

Keywords: Nephtyidae, new species, key to species, Gulf of California, Mexican Pacific

Submitted 14 February 2008; accepted 6 June 2008; first published online 25 September 2008

INTRODUCTION

The Nephtyidae constitute one of the most conspicuous families of polychaetes found in marine soft bottoms. These worms are long, strongly muscular, with a cylindrical anterior region which includes the proboscis, and a median region rectangular in cross-section (Hilbig, 1994). Although the family Nephtyidae is easily recognized and probably monophyletic, the only evidence put forward for this assertion is the characteristic interramal cirrus (also called interramal branchia) (Fauchald & Rouse, 1997). The parapodia along the body gradually change in size and development of lobes and cirri. They have well separated rami bearing dense chaetal fascicles diagonally pointed outwards. All chaetae are simple and include capillary and spinulose forms. The Nephtyidae are unique within Phyllodocida in possessing a single median pygidial cirrus/papilla (Pleijel, 2001).

Nephtyids are distributed worldwide and typically live in sediments ranging from sand to muddy sands (Pettibone, 1982). Their bathymetric distribution is wide, but they are most frequent in shallow bottoms (less than 100 m), although abyssal species are also known. They are active burrowers and good excavators, helped by their strong eversible proboscis; they do not live permanently in the galleries they build. They are considered active subsurface carnivores, although some species such as *Nephtys incisa* might be non-selective surface deposit-feeders (Fauchald & Jumars, 1979).

The family includes five genera (*Aglaophamus, Dentinephtys, Inermonephtys, Micronephtys* and *Nephtys*) and over 110 nominal species (Pleijel, 2001). In the Gulf of California, Mexican Pacific, the nephtyids constitute one of the most abundant and widely distributed groups of polychaetes. They can be found almost everywhere on the continental shelf (Hernández-Alcántara & Solís-Weiss, 1999; Hernández-Alcántara, 2002). In this region, 21 species belonging to the genera *Aglaophamus, Inermonephtys* and *Nephtys* have been recorded; seven species have been synonymized by several authors and at present 14 are recognized as valid.

Recent comprehensive studies of Nephtyidae taxonomy of the north-eastern Pacific Ocean are scarce and only Hilbig (1994) reviewed this family from California. Therefore, the aim of this study is to analyse the Nephtyidae from the Gulf of California, to increase the taxonomic knowledge of this family and to describe two new species from the genus *Aglaophamus*.

MATERIALS AND METHODS

The polychaete fauna examined in this study was collected on board the RV 'El Puma' (UNAM, México) during the oceanographic expeditions 'CORTES 2' (March 1985) and 'CORTES 3' (July–August 1985). Forty-one stations were sampled on the continental shelf of the Gulf of California from which nephtyids were found in 39, in 17 to 120 m depth (Figure 1; Tables 1 & 2).

Corresponding author:
V. Solís-Weiss
Email: solisw@mar.icmyl.unam.mx

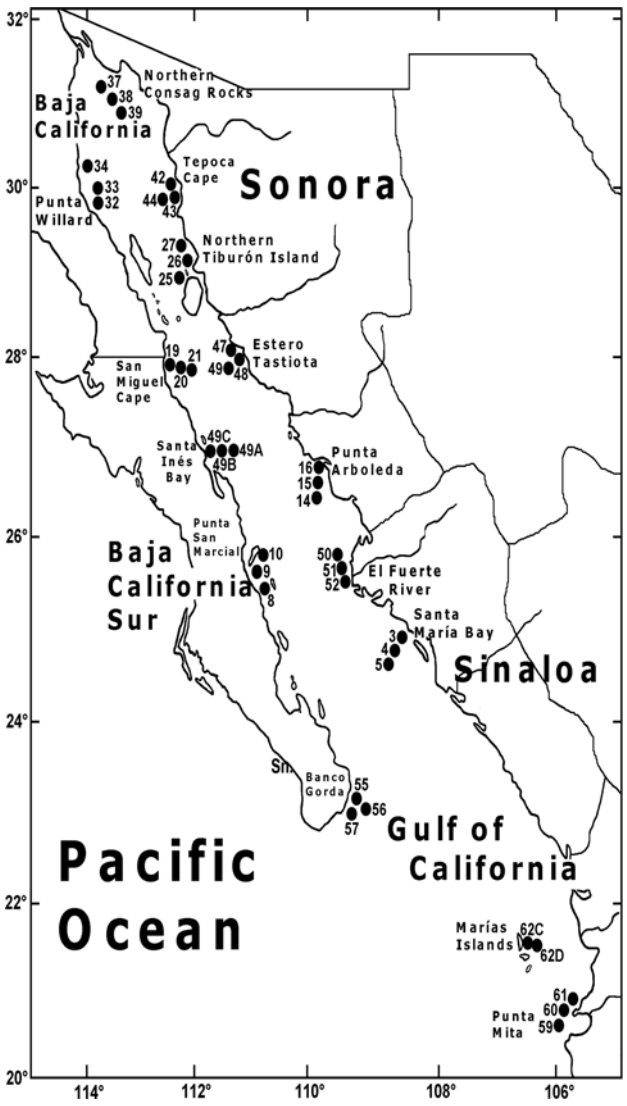

Fig. 1. Study area showing the sampling stations.

Samples were collected with a Smith–McIntyre grab (0.1 m²) and sieved through a 0.5 mm sieve. The biological material was fixed in 4% formaldehyde and preserved in 70% ethanol.

For each species, the number of specimens is given under 'Material Examined' in parentheses following the number of the sampling station. Information about the habitat data for each species is abbreviated as follows: D, depth in metres; S, salinity in psu (practical salinity units); T, temperature in °C; DO, dissolved oxygen in ml/l (determined by the Winkler method (Strickland & Parsons, 1977)); OM, organic matter content in the sediments in %C (determined by the Walkley & Black (1934) method modified by Jackson (1958)). The distribution along the continental shelf of the Gulf of California, in addition to the worldwide distribution recorded in the literature is given for each species.

The holotypes and paratypes of *Aglaophamus longicirrata* sp. nov. and *Aglaophamus foliosa*, and all nephtyids examined from the Gulf of California are deposited in the National Polychaete Collection at the Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México (CP-ICMyL). Additional paratypes are deposited in the Los Angeles County Natural History Museum (LACM), the Australian Museum (AM), and The Natural History Museum, London (BNHM).

RESULTS

For this study, 1763 specimens of the family Nephtyidae belonging to eight species from the genera *Aglaophamus* and *Nephtys* were examined. *Aglaophamus longicirrata* sp. nov. and *Aglaophamus foliosa* sp. nov. are newly described.

SYSTEMATICS

Genus *Aglaophamus* Kinberg, 1866
Aglaophamus erectans Hartman, 1950
Aglaophamus erectans Hartman, 1950: 125–127, plate 19, figures 1–10; Hilbig, 1994: 334–336, figure 13.1. A–G.

MATERIAL EXAMINED

A total of 120 specimens (CP-ICML and UNAM PO-45-002): CORTES 2: Station 39 (2), Station 33 (1), Station 14 (3), Station 51 (33), Station 50 (5), Station 4 (2), Station 10 (5), Station 49B (13), Station 49A (1); CORTES 3: Station 39 (8), Station 14 (11), Station 50 (28), Station 5 (7), Station 49B (2).

DIAGNOSIS

All examined specimens incomplete with 15–40 segments, 3–19 mm long, 0.5–2.0 mm wide. Prostomium slightly longer than wide, subrectangular, eyes absent. Proboscis with a circlet of 14 terminal bifid papillae, and 14 rows of subterminal papillae with 10 to 13 papillae per row. Interramal cirri starting on segments 8 or 9, shorter than dorsal cirri until segment 14; in the following segments fully developed and curved around segment 17.

HABITAT

In muddy and silty sediments, 37 to 440 m (Hilbig, 1994). In this study in fine and medium sand and silty sand sediments: D = 39.0–106.4; S = 34.98–35.54; T = 12.9–21.4; DO = 0.54–4.93; and OM = 3.0–7.2.

DISTRIBUTION

Central California to western México (Hartman, 1968; Hilbig, 1994). In the Mexican Pacific it has been recorded off the Pacific coast of Baja California (Hartman, 1950, 1968) and in the Gulf of California (Hernández-Alcántara & Solís-Weiss, 1999; Hernández-Alcántara, 2002). In this study, the species was collected on the eastern coasts of the central region and northern Gulf of California.

Aglaophamus longicirrata sp. nov.
(Figures 2A–J & 3A–I)
Aglaophamus lyrochaeta—Hernández-Alcántara & Solís-Weiss, 1999: 28 (not Fauvel, 1902).

https://doi.org/10.1017/S0025315408002427 Published online by Cambridge University Press

Table 1. Sampling stations from the CORTES 2 oceanographic expedition.

Sampling station	Sampling date	Latitude (N)	Longitude (W)	Depth (m)	Sediment type	Salinity (psu)	Temperature (°C)	Dissolved oxygen (ml/l)	Organic matter (%C)
37	16/03/85	31 16.1	114 21.7	30.3	FS	35.51	16.0	5.40	2.4
38	16/03/85	31 08.3	114 13.3	71.9		34.45	14.5	3.17	
39	16/03/85	30 59.4	114 04.1	106.4		36.16	13.2	1.73	3.0
42	17/03/85	30 12.1	112 46.9	29.9	FS	35.54	16.4	5.11	3.6
43	17/03/85	30 08.6	112 08.6	68.8		35.45	15.2	3.03	8.9
44	17/03/85	30 02.4	112 55.4	104.1		35.26	14.2	2.40	7.2
27	14/03/85	29 26.1	112 27.9	34.9	FS	35.46	15.1	3.09	6.9
26	14/03/85	29 23.3	112 30.7	71.9	FS	35.35	14.4	2.55	1.5
25	14/03/85	29 12.4	112 31.4	102.1	FS	35.22	12.7	1.90	3.0
32	15/03/85	29 48.2	114 19.8	37.2		35.48	15.1	4.21	7.2
34	15/03/85	30 11.5	114 31.7	32.9		35.38	15.1	4.30	6.9
33	15/03/85	29 55.4	114 19.3	81.8		35.33	13.8	1.93	
47	18/03/85	28 17.8	111 37.1	36.9		35.06	13.8	1.54	
48	18/03/85	28 16.4	111 36.6	60.2	FS	35.09	13.2	0.63	5.7
46	18/03/85	28 09.3	111 41.2	105.0	FS	35.00	12.9	0.91	2.9
16	12/03/85	26 53.2	110 04.1	22.2	FS	35.46			3.9
15	12/03/85	26 51.1	110 06.5	49.8		35.22	14.1	1.04	
14	12/03/85	26 46.6	110 06.7	92.0	MS	35.09	13.6	0.92	5.3
52	20/03/85	25 39.9	109 28.6	28.6		35.19	16.8	5.40	3.6
51	20/03/85	25 42.1	109 30.6	49.5		35.15	14.8	1.80	7.2
50	20/03/85	25 46.8	109 35.4	97.0		34.99	13.2	1.47	5.7
3	10/03/85	25 02.4	108 31.7	32.0	FS	35.04	14.0	1.02	5.7
4	10/03/85	24 56.9	108 41.8	79.0		35.00	13.2	0.80	3.0
5	10/03/85	24 54.6	108 45.3	120.0		34.98	12.9	0.54	6.4
19	13/03/85	28 10.4	112 48.1	30.4	CS	35.30		4.00	1.8
20	13-03-85	28 08.0	112 45.8	54.1	FS	35.28	13.6	3.25	4.5
21	13/03/85	28 07.7	112 42.1	104.1		35.24		2.97	
49C	19/03/85	26 59.2	111 58.3	28.9	VFS	35.40	17.2	4.70	3.6
49B	19/03/85	26 59.4	111 53.5	68.8		35.11	13.7	1.33	
49A	19/03/85	26 59.6	111 50.4	100.0	FS	35.10	13.2	1.34	3.6
10	11/03/85	25 58.6	111 06.9	39.0	VFS	35.52	17.5	4.93	4.1
8	11/03/85	25 33.4	110 59.8	52.0	FS	35.50	18.7	3.62	4.2
9	11/03/85	25 47.8	111 03.8	77.5	FS	35.44	16.7	3.60	5.3
61	23/03/85	20 53.9	105 27.5	50.4	FS	34.92	16.8	1.03	5.5
60	23/03/85	20 51.6	105 33.5	76.0	FS	34.99	15.3	0.76	4.8
59	23/03/85	20 49.4	105 41.9	100.0	FS	35.01	14.0	0.83	3.0
55	21/03/85	23 08.7	109 28.3	32.5	FS	34.70	21.3	5.20	3.8
57	21/03/85	23 07.3	109 27.3	64.0	CS	34.64	18.9	5.00	2.1
56	21/03/85	23 06.6	109 24.3	101.0	FS	34.80	13.9	1.10	5.7
62?	22/03/85	21 38.2	106 31.9	29.7	FS	35.10	22.1	5.29	4.2
62D	22/03/85	21 38.4	106 31.9	132.0		35.02	13.8	0.20	1.8

VFS, very fine sand; FS, fine sand; MS, medium sand; CS, coarse sand.

Table 2. Sampling stations from the CORTES 3 oceanographic expedition.

Sampling station	Sampling date	Latitude (N)	Longitude (W)	Depth (m)	Sediment type	Salinity (psu)	Temperature (°C)	Dissolved oxygen (ml/l)	Organic matter (%C)
37	04/08/85	31 19.8	114 23.2	21.5	VFS	36.06	29.6	4.26	5.00
38	04/08/85	31 04.90	114 16.4	64.0	VFS	35.71	26.5	3.51	3.00
39	04/08/85	31 01.83	114 05.3	93.0	VFS	35.54	20.8	2.25	5.00
42	05/08/85	30 12.4	112 47.2	23.5	VFS	35.63	28.1	4.03	4.80
43	05/08/85	30 11.6	112 52.0	66.3	VFS	35.60	22.5	2.75	8.40
44	05/08/85	30 00.5	112 59.5	106.0	VFS	35.63	19.4	2.56	8.40
27	02/08/85	29 28.6	112 26.4	34.4	VFS	35.59	26.6	4.28	5.30
26	02/08/85	29 23.0	112 30.3	65.8	VFS	35.58	26.8	4.64	4.80
25	02/08/85	29 11.3	112 31.5	83.0	FS	35.52	17.2	2.54	6.50
32	03/08/85	29 46.7	114 20.0	21.6	FS	35.90	28.2	4.10	5.10
34	03/08/85	30 10.6	114 32.9	26.3	FS	35.93	28.9	3.88	2.90
33	03/08/85	29 55.1	114 19.6	72.8	FS	35.58	22.7	3.18	5.10
47	06/08/85	28 20.8	111 41.1	21.4	FS	35.56	29.8	4.53	1.50
48	06/08/85	28 15.7	111 35.6	54.6	FS	35.44	22.5	3.01	1.90
46	06/08/85	28 09.1	111 39.6	96.0	FS	35.31	16.0	1.62	3.00
16	31/07/85	26 52.7	110 00.8	18.0	VFS	35.95		4.82	3.80
15	31/07/85	26 53.2	110 05.9	39.0	FS	34.80	28.1	3.83	6.10
14	31/07/85	26 46.9	110 06.9	80.7	FS		15.5	1.23	7.20
52	08/08/85	25 43.6	109 29.3	22.1	VFS	34.20	30.0	4.34	5.30
51	08/08/85	25 44.3	109 29.4	42.0	VFS	35.12	32.0	4.58	4.80
50	08/08/85	25 49.5	109 37.9	80.0	VFS	35.22	17.6	2.22	3.80
3	09/08/85	25 02.4	108 30.5	23.5	FS	35.00	30.2	4.76	2.90
4	09/08/85	24 00.0	108 41.5	54.9	FS	35.23	25.3	3.58	5.00
5	09/08/85	24 56.7	108 43.9	97.0	FS	35.07	16.3	2.12	5.10
19	01/08/85	28 07.8	112 42.0	19.5	FS	31.64	23.6	3.59	5.00
20	01/08/85	28 10.5	112 46.9	43.9	VFS	31.76	24.4	3.80	4.00
21	01/08/85	28 08.9	112 41.6	112.0	FS	35.48	16.3	2.22	6.90
49C	07/08/85	26 59.2	111 58.3	17.0	VFS	35.44	24.5	3.87	3.80
49B	07/08/85	26 59.4	111 53.5	63.3	FS	35.46	21.4	3.09	4.40
49A	07/08/85	27 00.9	111 49.9	94.0	FS	35.41	18.9	2.77	5.70
10	30/07/85	25 57.7	111 06.8	28.4	FS	34.45	24.7	5.06	5.00
8	30/07/85	25 33.1	110 59.7	48.0	FS	34.30	19.8	3.21	5.10
61	28/07/85	20 54.4	105 27.4	42.2	VFS	33.34	28.3	3.67	8.40
60	28/07/85	20 50.6	105 33.5	67.7	FS	33.50	21.7	1.47	7.40
59	28/07/85	20 47.8	105 41.8	91.0	MS	33.51	18.0	0.72	5.90
55	29/07/85	23 08.0	109 28.7	33.5	FS	33.46	23.5	4.47	5.50
57	29/07/85	23 06.4	109 27.8	55.2	MS	33.48	17.2	1.63	6.10
56	29/07/85	23 05.3	109 25.5	104.0	FS	33.53	16.3	1.60	4.00

VFS, very fine sand; FS, fine sand; MS, medium sand.

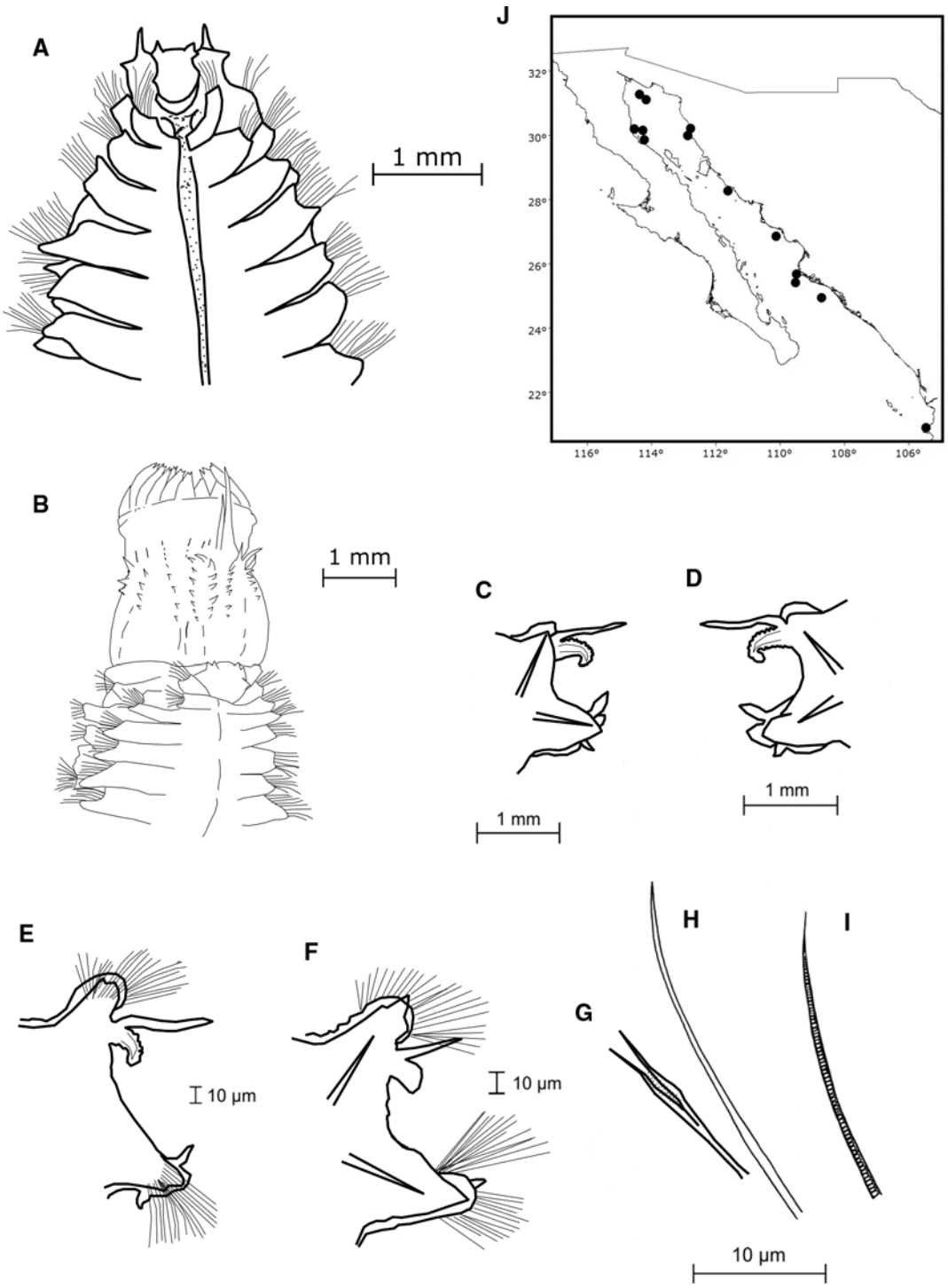

Fig. 2. *Aglaophamus longicirrata* sp. nov.: (A) anterior region, dorsal view; (B) anterior region with proboscis; (C) parapodium 23, anterior view; (D) parapodium 23, posterior view; (E) parapodium 25, anterior view; (F) parapodium 35 posterior view; (G) lyrate chaetae; (H) smooth capillary chaetae; (I) cross-barred capillary chaetae; (J) distribution in the Gulf of California.

MATERIAL EXAMINED

Holotype: El Fuerte River 25° 42.1′N 109° 30.6′W, CORTES 2, Station 51, 20 March 1985, 49.5 m (CP-ICMyL; POH-45-002).

Paratypes: 25 specimens: El Fuerte River 25° 42.1′N 109° 30.6′W, CORTES 2: Station 51, 20 March 1985, 49.5 m: 10 specimens (CP-ICMyL; POP-45-002); 5 specimens (LACM-AHF; POLY 2197); CORTÉS 2: Station 52, 25° 39.9′N 109° 28.9′W, 20 March 1985, 28.6 m: 5 specimens (BNHM 2008.964.968); Tepoca Cape 30° 12.1′N, 112° 46.9′W CORTÉS 2: Station 42, 17 March 1985, 29.9 m: 5 specimens (AM W.33715).

ADDITIONAL MATERIAL EXAMINED

A total of 68 incomplete specimens (CP-ICML; PO-45-0024): CORTES 2: Station 37 (2), Station 38 (3), Station 42 (3);

https://doi.org/10.1017/S0025315408002427 Published online by Cambridge University Press

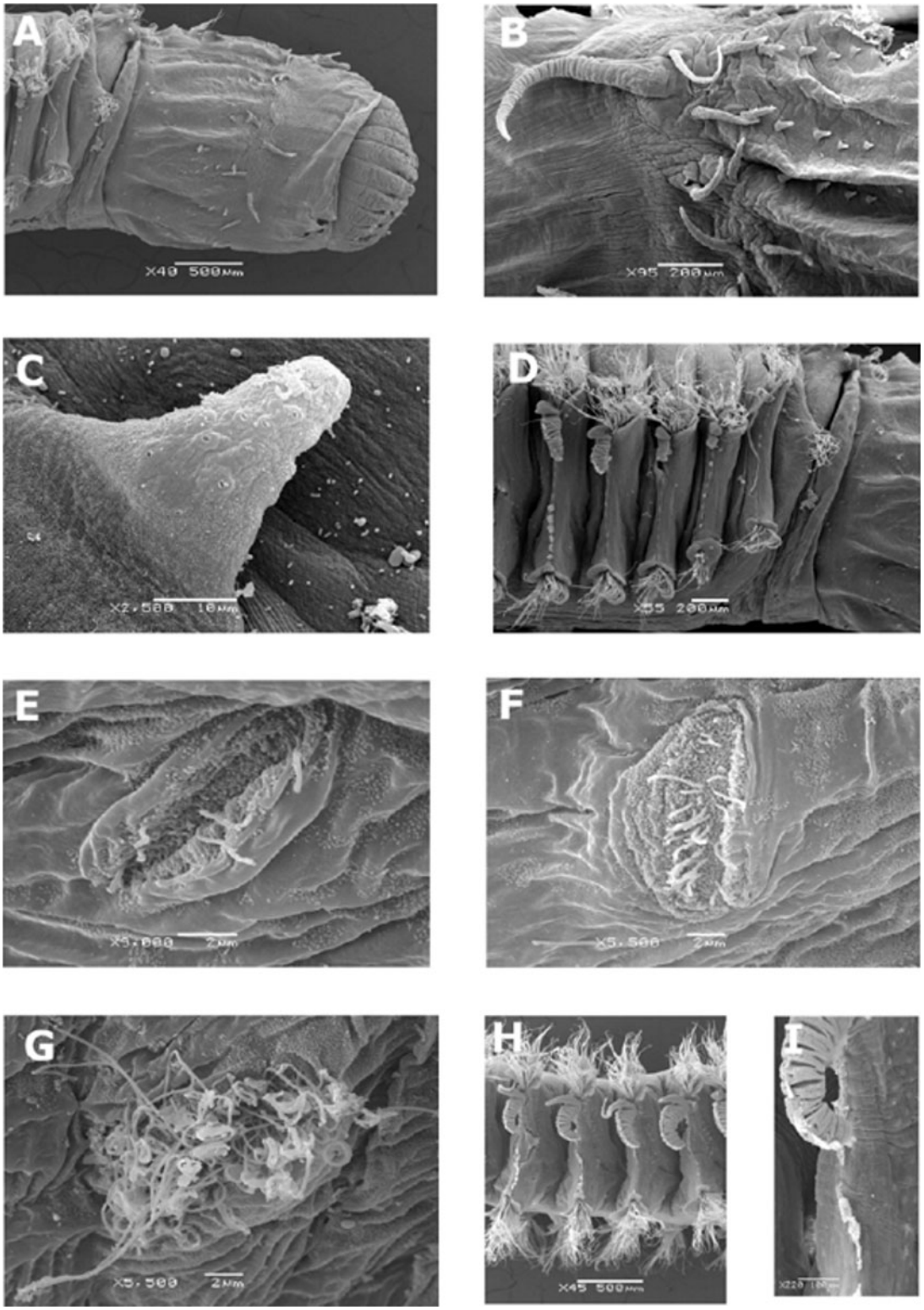

Fig. 3. *Aglaophamus longicirrata* sp. nov., electronic microscopy photographs: (A) anterior end with everted proboscis; (B) middorsal and companion papillae; (C) papilla of the proboscis showing the pores; (D) anterior end and first parapodia; (E–G) ciliated organs with different lengths of the cilia; (H) median parapodia; (I) interramal cirri with band of ciliated organs.

Station 43 (1), Station 32 (2), Station 33 (1), Station 48 (1), Station 15 (2), Station 52 (14), Station 51 (3), Station 4 (2), Station 61 (3); CORTES 3: Station 37 (1), Station 43 (3), Station 32 (3), Station 15 (3), Station 52 (12), Station 51 (7), Station 61 (2).

DESCRIPTION

Description based on holotype unless specified otherwise. The specimen is 20.4 mm long and 2.1 mm wide. Prostomium rectangular, slightly longer than wide, with two pairs of cirriform

https://doi.org/10.1017/S0025315408002427 Published online by Cambridge University Press

antennae similar in length; a pair of nuchal organs at posterior margin of prostomium (Figure 2A). Proboscis bearing 16 rows of subterminal papillae with 3–7 papillae per row (Figure 2B), very short in proximal region of proboscis and increasing gradually in length towards distal region (Figure 3A, B); pore-like grooves on surface of the proboscideal papillae (Figure 3C). Three rows of papillae with seven papillae each in regular arrangement on dorsal side of the proboscis; in median and ventral rows, distribution and number of papillae not homogeneous varying in number from three to five papillae per row (Figure 3A, B). Middorsal papillae very long and conical without grooves, with one companion papilla in basal position, somewhat shorter, thin and cirriform (Figures 2B & 3A, B). Twenty-two bifid terminal papillae (Figures 2B & 3A); midventral papilla absent. First parapodium short, directed forward; subsequent parapodia directed laterally (Figure 2B). Dorsum with dark medial line widening around segments 6–14 (Figure 2A). Involute interramal cirri thick, starting on fourth segment. Median and posterior parapodia with well separated rami (Figures 2E & 3D). Notopodium with rounded prechaetal lobe and orbicular longer postchaetal lobe (Figure 2C, D); lobes decreasing in size towards posterior end of body (Figure 2E, F). Notopodial lamella short, foliaceous, extending along notopodium. Neuropodial lamella shorter than notopodial, extending beyond postchaetal lobe. Dorsal cirri short in first parapodia, digitiform, inserted on superior base of interramal cirri, increasing in length to medial region of body, well developed around segment 25, reaching approximately twice length of gill (Figures 2E, F & 3D, H). Ventral cirri digitiform, similar in length to gill (Figure 2C–F). Ciliary bands distributed in oval groups present on dorsal side of each interramal cirrus (Figure 3H, I) and extending on the body wall to the base of the neuropodia; cilia without heads (sensory hairs). Bands showing sensorial organs difficult to observe with light microscopy, possibly contractile, cilia showing different lengths along body (Figure 3E–G). Chaetae including smooth capillaries (Figure 2H), cross-barred capillaries (Figure 2I) and lyrate chaetae (Figure 2G) in noto- and neuropodia.

REMARKS

Aglaophamus longicirrata sp. nov. is a species included within a group characterized by the interramal cirrus starting on the third or fourth segment. In the Tropical East Pacific region this group is only represented by *Aglaophamus peruana* (Hartman, 1940) from Perú coasts and by the two species described in this study: *A. longicirrata* sp. nov. and *A. foliosa* sp. nov. The species included in this group can be basically separated by the shape of the dorsal cirri: *A. longicirrata* sp. nov. has very long and cirriform dorsal cirri, while both *A. foliosa* sp. nov. (see below) and *A. peruana* bear foliaceous dorsal cirri. Taking into account the very long dorsal cirri, a characteristic morphological structure of this new species, *A. longicirrata* sp. nov. is only similar to *Aglaophamus lyrochaeta* (Fauvel, 1902) distributed in Morocco, Congo, Gulf Beach and South Africa (Hartman, 1950). Both species have lyrate chaetae and very long dorsal cirri. However, *A. lyrochaeta* bears 14 rows of subterminal papillae and only one middorsal papilla on the proboscis, while *A. longicirrata* sp. nov. bears 16 rows of subterminal papillae and one very long middorsal papilla with one companion papilla in basal position. In addition, the pore on the surface of the proboscideal papillae detected in *A. longicirrata* is a morphological characteristic that has not been observed in other nephtyids yet.

The scanning electron microscopy (SEM) observations of the parapodia of *A. longicirrata* sp. nov. clearly show ciliary structures (Figure 3D–I). Those structures constitute a morphological feature which has seldom been observed in the Nephtyidae family. They were studied in some detail by Coonfield (1931, 1934) on *Nephtys bucera* Ehlers, 1868. Physiological tests performed by this author indicate that the cilia are grouped into small tufts and each ciliated cell is independent of the nervous system, regulating its own activity. 'The beating of the cilia causes a current of water to flow on each side of the worm posteriorly in the groove formed by the division of each parapodium into a neuropodium and a notopodium' (Coonfield, 1931). In this study, we cannot give a definite status of taxonomic value to the ciliary structures since it is possible that it has been overlooked in other species. Ciliary bands have also been described in organisms from other polychaete families such as the terebellid *Lanice conchilega* (Pallas, 1766) (Heimler, 1983), syllids of the genus *Paraehlersia* and *Autolytus* (San Martín, 2003), and *Syllis* or spionids as *Pygospio elegans* Claparède, 1863 (Schlötzer-Schrehardt, 1991). It has been observed that the ciliated organs may be of different kinds, but not all of them are sensory: for example, in some spionids the organs probably play a role in sperm transfer (Schlötzer-Schrehardt, 1991).

ETYMOLOGY

The name of the species indicates the presence of very long dorsal cirri, here found mainly on the midbody region.

HABITAT

In fine sands, silty sands, silts, muds and sands: D = 28.6–79.0; S = 34.92–45.54; T = 13.2–16.8; DO = 0.63–5.40; OM = 2.4–8.9.

DISTRIBUTION

Widely distributed on the continental shelf of the Gulf of California: in the central region, mainly on the eastern coasts; in the northern region, on both sides of the coast (Figure 2J).

Aglaophamus foliosa sp. nov.
(Figure 4A–H)

MATERIAL EXAMINED

Holotype: Northern Tiburón Island 29° 11.3′N 112° 31.5′W, CORTES 3 Station 25 2 August 1985, 83 m (CP-ICMyL; POH-45-001).

Paratypes: (CP-ICMyL; POP-45-001) 1 specimen from CORTÉS 3: Station 52, 25° 43.6′N 109° 29.3′W, 8 August 1985, 22.1 m; (BNHM 2008.964.969) 1 specimen from CORTÉS 3: Station 44, 30° 00.5′N 112° 59.5′W 5 August 1985, 106.0 m.

https://doi.org/10.1017/S0025315408002427 Published online by Cambridge University Press

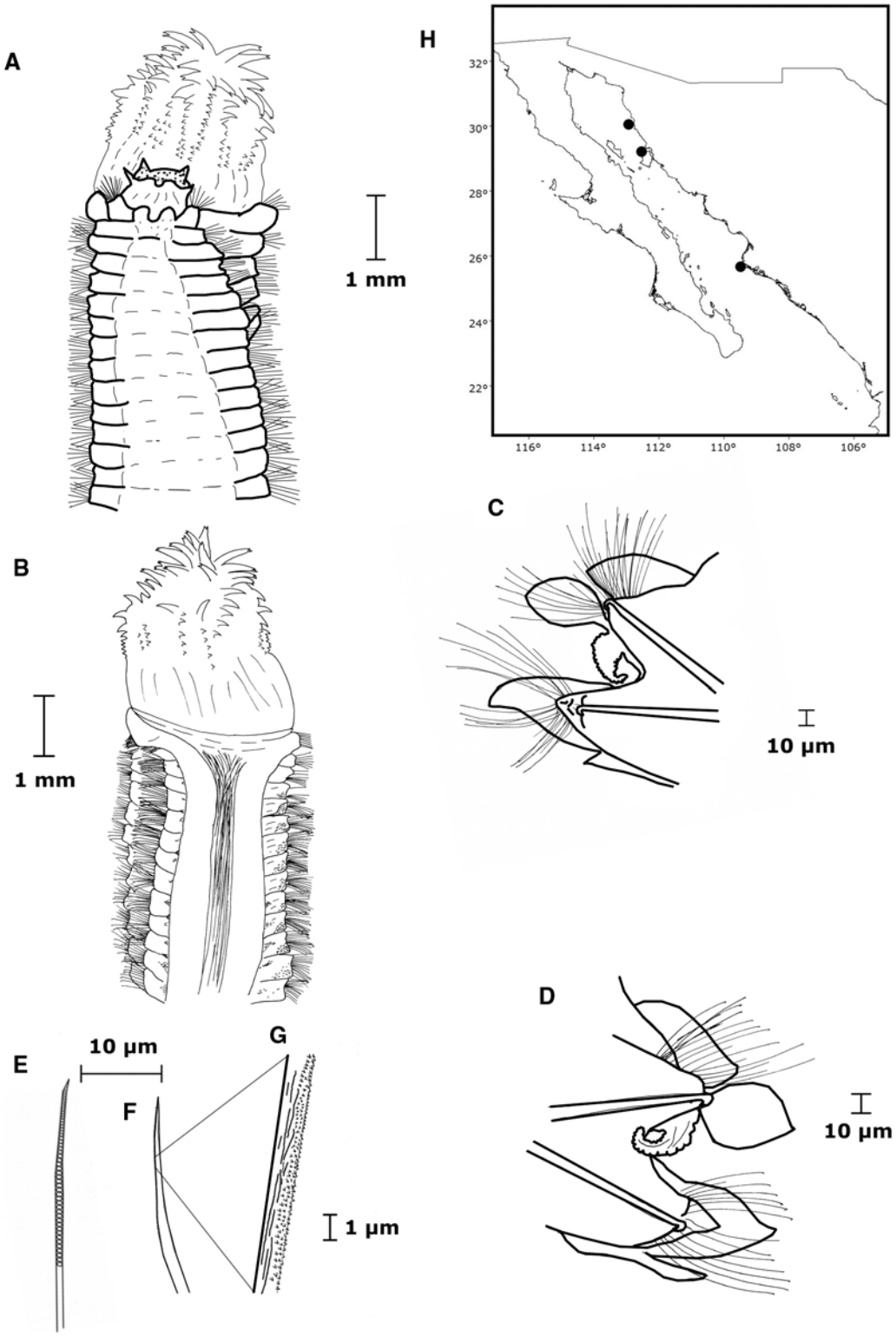

Fig. 4. *Aglaophamus foliosa* sp. nov.: (A) anterior region, dorsal view; (B) anterior region, ventral view; (C) parapodium 20, anterior view; (D) parapodium 30, posterior view; (E) cross-barred chaetae; (F) serrated chaetae; (G) margin of the serrate chaetae (1000x); (H) distribution in the Gulf of California.

DESCRIPTION

Description based on holotype unless specified otherwise. Complete specimen 31.0 mm long, 4.0 mm wide, 61 segments. Prostomium rounded, brownish, iridescent after fixation, darker on anterior margin. Two pairs of cirriform antennae similar in length; a pair of rounded nuchal organs at posterior margin of prostomium. Proboscis with 22 bifid terminal papillae, proximal region with smooth surface; 16 rows of subterminal papillae with numerous papillae per row (Figure 4A, B): 5 papillae on lateral and ventral rows, and 15 small papillae on dorsal rows. Dorsal rows with 7–10 small digitiform

https://doi.org/10.1017/S0025315408002427 Published online by Cambridge University Press

papillae at the proximal end of the row and thick, long curved papillae on the distal region of the proboscis (Figure 4A). First parapodium directed forward with thick and long ventral cirrus; subsequent parapodia directed laterally. Involute interramal cirri starting at segment 4, almost straight; fully developed around segment 10, strongly curved; decreasing gradually in size around segment 60 until end of body to papilliform appendix. Dorsum with thick median iridescent line, extending to end of body (Figure 4A). Ventral region showing dark brownish spot on ventral median line of body (Figure 4B). Parapodia similar in shape from segment 4. Notopodia with conical acicular lobes, rounded pre-acicular lamellae and foliaceous post-acicular lamellae extending around notopodial margin. Dorsal cirri foliaceous, long, almost length of gill, inserted at base of gill. Neuropodia with conical acicular lobes with small incision, rounded pre-acicular lamellae short; post-acicular lamellae foliaceous, very long, approximately 1.5 times length of gill; without an erected lobe on the upper edge. Ventral cirri digitiform, slightly shorter than dorsal, elongated at base and with wide median region, directed downwards; aciculae in both rami yellow, emerging out of acicular lobe and curving backwards (Figure 4C, D). Noto- and neurochaetae similar in shape: pre-acicular capillaries cross-barred and short, widely serrated chaetae; post-acicular chaetae serrated, wide and short, and thin and long (Figure 4E–G). Lyrate chaetae absent.

REMARKS

The presence of foliaceous dorsal cirri in *A. foliosa* sp. nov. allow us to include it in a group which presently includes seven species, all collected in the Pacific Ocean. Within this group, we can separate the species based on the neuropodia with an erected lobe on the upper edge, the number of rows of subterminal papillae on the proboscis and the first segment with interramal cirri, so that two subgroups can be formed: the first, characterized by the presence of neuropodia with an erected lobe on the upper edge, which includes four species: *A. sinensis* (Fauvel, 1932), distributed in China, Vietnam and Japan, which bears 22 rows of subterminal papillae and interramal cirri from the segment 2 (Fauchald, 1968); *A. dicirroides* Fauchald, 1968, from Vietnam, also with 22 rows of subterminal papillae, but with interramal cirri starting at segment 3; *A. lutreus* (Baird, 1873), distributed in Patagonia, South America, bears 14 rows of subterminal papillae and interramal cirri starting at segment 5; the fourth species, *A. mirasetis* (Hoagland, 1920) recorded from the Philippines, bears neuropodia with an erected lobe on the upper edge, but was described from a single individual, and according to Hartman (1950) presumably has many subterminal rows with 8 in a row at the sides and only 5 medially, and the origin of interramal cirri is not known.

The second subgroup is formed by three species, which bear neuropodia without an erected lobe on the upper edge: *A. peruana* (Hartman, 1940) registered in Perú and *A. macroura* (Schmarda, 1861) distributed in all Antarctic regions, but also in southern South America to the La Plata River, and in deep waters off Maine (Hartman, 1950), have 22 rows of subterminal papillae and the interramal cirri are first present from the third, or not until the fourth segment; the third species, *A. orientalis* Fauchald, 1968, recorded from China, bears 14 rows of subterminal papillae and interramal cirri from segment 3. *Aglaophamus foliosa* sp. nov. is included in this latter subgroup, but it differs from the above mentioned species in having 16 rows of subterminal papillae and in having interramal cirri from segment 4.

The emergent aciculae observed in the types of *A. foliosa* could be a result of the constriction of the musculature in the parapodia at the time of fixation. For this reason, we cannot at this point decide on its status as a valid taxonomic character. However, we observed that in the specimens examined, this character is consistent along the body, while in the specimens from other species of Nephtyidae found in the same sampling stations, and thus treated similarly, we did not observe this character. That is why, pending confirmation, we believe that the emergent aciculae could be typical of this species.

ETYMOLOGY

The name is derived from the shape of the dorsal cirri, the morphological structure characteristic of this species.

HABITAT

In very fine and fine sands: D = 22.1–106.0; S = 34.20–35.63; T = 17.2–30.0; DO = 2.54–4-34; and OM = 5.30–8.40.

DISTRIBUTION

Northern Tiburón Island, Tepoca Cape and El Fuerte River (Sonora, México) on the north-eastern coast of the Gulf (Figure 4H).

Aglaophamus verrilli (McIntosh, 1885)
Nephtys verrilli McIntosh, 1885: 163–164, plate 26, figures 6–7, plate 32A, figure 8.
Nephtys dibranchis—Hartman, 1938: 146 (in part); 1940: 237 (in part) (not Augener, 1922).
Aglaophamus dicirris Hartman, 1950: 122–124, plate 18, figures 1–8; Kudenov, 1975: 79; 1980: 100.
Aglaophamus verrilli Hilbig, 1994: 337–338, figure 13.3. A–H.

MATERIAL EXAMINED

A total of 1001 specimens (CP-ICML; UNAM PO-45-012): CORTES 2: Station 37 (40), Station 38 (4), Station 39 (5), Station 42 (14), Station 43 (1), Station 44 (1), Station 27 (30), Station 26 (17), Station 32 (7), Station 34 (1), Station 47 (14), Station 48 (14), Station 16 (78), Station 15 (13), Station 14 (5), Station 52 (40), Station 51 (25), Station 3 (16), Station 10 (5), Station 20 (6), Station 49C (9), Station 49B (14), Station 49A (9), Station 61 (1); CORTES 3: Station 37 (42), Station 38 (9), Station 39 (6), Station 42 (72), Station 43 (1), Station 44 (7), Station 27 (64), Station 26 (15), Station 32 (106), Station 34 (6), Station 47 (48), Station 48 (11), Station 16 (64), Station 15 (19), Station 14 (3), Station 52 (23), Station 51 (8), Station 3 (21), Station 4 (5), Station 5 (1), Station 10 (13), Station 49C (73), Station 49B (10), Station 49A (5).

https://doi.org/10.1017/S0025315408002427 Published online by Cambridge University Press

DIAGNOSIS

One hundred and fifty-five complete specimens with 27–94 segments, 6.0–41.0 mm long, 0.25–3.0 mm wide; the rest are anterior segments with 16–83 segments, 3.0–39.0 mm long, 0.25–2.5 mm wide. Prostomium slightly longer than wide, rectangular, with a pair of small eyes in posterior middle of prostomium. Proboscis cylindrical, strongly muscular in distal region, with 22 papillae and 22 rows of subterminal papillae with 3–9 papillae per row. Middorsal papillae usually absent. Interramal cirri involute, first present on segments 5–9. Accessory cirri short, rounded, located just below the dorsal ones and separated from them by a deep incision.

HABITAT

Intertidal to 200 m; sandy, muddy sands, sands mixed with shell fragments and silty clays; estuarine (Taylor, 1984; Hilbig, 1994). In depths of 20–72 m, in sand and muddy sands, 26–30°C and sediments with 0.17–0.28% organic carbon (González-Ortiz, 1994). In this study in fine to medium sands, silty sands and sandy silts: D = 17.0–120.0 m; S = 34.20–36.06; T = 12.9–32.2; DO = 0.54–6.45; and OM = 1.5–8.9.

DISTRIBUTION

Temperate and subtropical waters from the western Atlantic Ocean and northern Gulf of México (Taylor, 1984). California to Panamá, Maryland to Georgia, New Zealand, Australia, Japan and India (Hilbig, 1994). In the Mexican Pacific, it has been recorded on the eastern coasts from Baja California peninsula (De León-González, 1994), Gulf of California (Hernández-Alcántara & Solís-Weiss, 1999; Hernández-Alcántara, 2002) and Gulf of Tehuantepec (González-Ortiz, 1994). In this study, this species was collected practically on the whole continental shelf of the Gulf of California where it is very abundant.

Genus *Nephtys* Cuvier, 1817 in Audouin & Milne-Edwards, 1833

Nephtys caecoides Hartman, 1938

Nephtys caecoides Hartman, 1938: 148–149, figure 63; 1950: 101–102; 1968: 577; Hilbig, 1994: 344–346, figure 13.6. A–H.

MATERIAL EXAMINED

A total of 42 specimens (CP-ICML; UNAM PO-45-021): CORTES 2: Station 27(9), Station 25 (2); CORTES 3: Station 3 (19), Station 5 (9), Station 8 (2), Station 57 (1).

DIAGNOSIS

Specimens incomplete with 20–48 segments; 3.5–14.0 mm long, 0.75–1.0 mm wide. Prostomium rounded to trapezoidal, depending whether proboscis is retracted or everted. Proboscis with 22 long bifid terminal papillae and 22 rows of subterminal papillae with three to five papillae per row; proximal surface smooth, with one middorsal long papilla and one short midventral papilla. Prostomium and first few parapodia with a brownish pigmentation pattern. Interramal cirri recurved, starting on segment 4 and continuing nearly to the end of the body. Noto- and neuropodium with a short pre-acicular lamella.

HABITAT

Common in muddy sands and eelgrass flats (Hartman, 1938). Typical intertidal species found in sheltered beaches; in 50–110 m depth in sands, sands mixed with silt and silts (Hilbig, 1994). At 30 m depth, muddy sand, 30°C, sediments with 0.20% organic carbon (González-Ortiz, 1994). In this study, in fine sands: D = 32.0–120.0; S = 34.48–35.50; T = 12.7–19.9; DO = 0.54–16.30; and OM = 2.1–6.9.

DISTRIBUTION

California, Washington (Hartman, 1938). Western México to British Columbia (Hilbig, 1994), Gulf of California (Hernández-Alcántara & Solís-Weiss, 1999; Hernández-Alcántara, 2002) and Gulf of Tehuantepec (González-Ortiz, 1994). In this study, it was collected in front of the north-eastern coasts of the Gulf of California and at the southern end of the Baja California peninsula.

Nephtys californiensis Hartman, 1938

Nephtys californiensis Hartman, 1938: 150–151, figure 64; Hilbig, 1994: 346–348, figure 13.7. A–G.

MATERIAL EXAMINED

A total of 135 specimens (CP-ICML; UNAM PO-45-004): CORTES 2: Station 27 (2), Station 26 (1), Station 25 (3), Station 32 (4), Station 33 (1), Station 46 (1), Station 52 (4), Station 3 (14), Station 10 (1), Station 8 (1), Station 19 (7), Station 20 (19), Station 49A (2), Station 62C (2); CORTES 3: Station 37 (3), Station 39 (2), Station 42 (2), Station 27 (1), Station 47 (21), Station 46 (1), Station 16 (13), Station 52 (3), Station 3 (4), Station 5 (9), Station 10 (1), Station 8 (1), Station 19 (8), Station 20 (2), Station 21 (2).

DIAGNOSIS

Specimens incomplete with 16–145 segments, 5.0–67.0 mm long, 1.0–3.0 mm wide. Prostomium rounded anteriorly, trapezoidal, with a dark coloured 'spreadeagle' pattern at the posterior half. Proboscis with 22 bifid terminal papillae and 22 rows of subterminal papillae with 6–8 papillae per row; no papilla in clear middorsal position. Interramal cirri recurved, starting on segment 3 and continuing until end of body.

HABITAT

Intertidal to 330 m; on exposed sandy beaches (Hartman, 1968; Hilbig, 1994). In this study in fine to coarse sands and silty sands: D = 18.0–120.0; S = 31.64–36.06; T = 12.7–30.2; DO = 0.54–5.29; and OM = 1.5–7.2.

https://doi.org/10.1017/S0025315408002427 Published online by Cambridge University Press

DISTRIBUTION

Central and southern California (Hartman, 1968). Western México to California, Gulf of México, Yellow Sea, Japan (Hilbig, 1994). Widely distributed in the Gulf of California (Hartman, 1940; Hernández-Alcántara & Solís-Weiss, 1999; Hernández-Alcántara, 2002). In this study, it was recorded from the whole continental shelf of the Gulf of California, although it is more abundant in the central region.

Nephtys panamensis Monro, 1928
Nephtys panamensis Hartman, 1940: 239, plate 41, figure 105, plate 42, figures 106–109; 1950: 101; Kudenov, 1980: 100.

MATERIAL EXAMINED

A total of 350 specimens (CP-ICML; UNAM PO-45-013): CORTES 2: Station 37 (17), Station 38 (7), Station 27 (3), Station 48 (1), Station 16 (139), Station 52 (27), Station 3 (6), Station 9 (2), Station 19 (6), Station 49C (4), Station 61 (8), Station 60 (2); CORTES 3: Station 39 (1), Station 27 (7), Station 26 (10), Station 32 (4), Station 47 (1), Station 48 (4), Station 16 (47), Station 14 (1), Station 52 (3), Station 3 (4), Station 4 (4), Station 10 (4), Station 8 (3), Station 19 (1), Station 20 (1), Station 49C (5), Station 49B (20), Station 49A (2), Station 61 (4), Station 60 (2).

DIAGNOSIS

All specimens incomplete with 3–88 segments, 3.0–53.0 mm long, 0.25–2.5 mm wide. Prostomium rectangular with two pairs of antennae. Proboscis with 22 rows of subterminal papillae and one middorsal papilla; proximal surface smooth. Interramal cirri recurved starting on segment 3 and continuing to end of body. Prechaetal lobes wide, oval, and comparatively shorter than postchaetal.

HABITAT

Intertidal to 60 m (Hartman, 1968). In this study on fine to coarse sands and silty sands: D = 31.64–35.95; S = 31.64–35.95; T = 13.2–30.2; DO = 0.63–5.40; and OM = 1.5–8.4.

DISTRIBUTION

Panamá (Hartman, 1940), Gulf of California (Hartman, 1940, 1950; Kudenov, 1980; Hernández-Alcántara & Solís-Weiss, 1999; Hernández-Alcántara, 2002). In this study, it was recorded on the whole continental shelf of the Gulf of California; it is more abundant in the central eastern region.

Nephtys simoni Perkins, 1980
Nephtys simoni Perkins, 1980: 37–42, figures 15 & 16; Hilbig, 1994: 358–359, figure 13.13. A–H.
Nephtys magellanica Hartman, 1950: 100–101 (not Hartman, 1938).

MATERIAL EXAMINED

A total of 18 specimens (CP-ICML; UNAM PO-45-015): CORTES 3 Station 39 (3), Station 47 (15).

DIAGNOSIS

Specimens incomplete with 13–42 segments, 12.0–32.0 mm long, 0.75–2.25 mm wide. Prostomium with anterior margin convex, thin, spatulate; lateral margins irregularly rounded; single red eyespot in central dorsal region; posterior margin with long, narrow, V-shaped, middorsal projection extending to near posterior end of segment 1. Proboscis with 22 rows of subterminal papillae, 4–8 papillae per row, very short proximally and gradually increasing in size through distal region; 22 bifid terminal papillae at distal region. Interramal cirri recurved, starting on segment 3.

REMARKS

Perkins (1980) showed that the *Nephtys simoni* specimens from the Pacific Ocean bear a pair of eyes located on segment 2 or segment 3 in juvenile individuals and on the first segment in most specimens when the proboscis is retracted. However, in all specimens found in the Gulf of California these eyes are absent.

HABITAT

Intertidal to 189 m depth; in coarse to very fine sands, silty clays, silts and sandy-clay sediments (Hartman, 1950; Taylor, 1984; Hilbig, 1994). In this study in fine sands: D = 21.4–93.0; S = 35.54–35.56; T = 20.8–29.8; DO = 2.25–4.53; and OM = 1.5–5.0.

DISTRIBUTION

Florida, North Carolina, California (Perkins, 1980). Southern California to the Strait of Magellan; Colombia and Venezuela (Hartman, 1950; Hilbig, 1994). In temperate and subtropical waters from the western Atlantic Ocean, Gulf of México (Taylor, 1984). In this study, it was recorded on the northeastern region of the Gulf of California.

KEY TO SPECIES OF NEPHTYIDAE FROM THE GULF OF CALIFORNIA

1. One pair of antennae (anterolateral absent) difficult to observe in dorsal view (Figure 5A); proboscis without papillae. . . . . *Inermonephtys inermis*
   _ Two pairs of antennae (Figure 5B); proboscis with terminal and subterminal papillae 2
2. Interramal cirri involute (curved inwards) (Figure 5C): genus *Aglaophamus* 3
   _ Interramal cirri recurved (curved outwards) (Figure 5F, G): genus *Nephtys* 7

https://doi.org/10.1017/S0025315408002427 Published online by Cambridge University Press

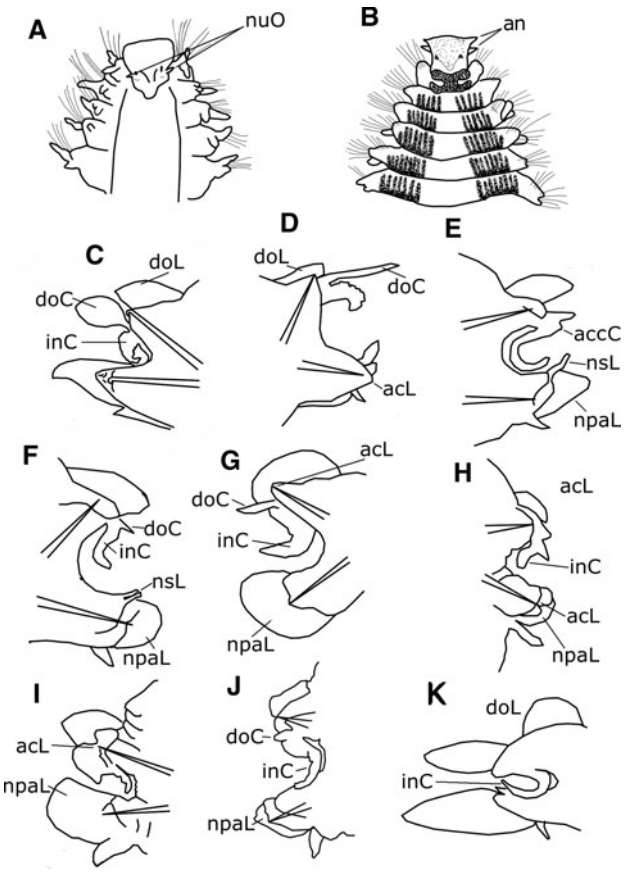

Fig. 5. Representative figures associated with the taxonomic key of Nephtyidae: (A, B) anterior end of polychaetes, dorsal view; (C–K) types of parapodia, anterior view. an, antennae; accC, accessory cirrus; acL, acicular lobe; doC, dorsal cirrus; doL, dorsal lamellae; inC, interramal cirrus; npaL, neuropodial acicular lamellae; nsL, neuropodial superior lobe; nuO, nuchal organs.

3. Interramal cirri on segment 4 4
_ Interramal cirri starting after segment 5 6
4. Notopodia with dorsal cirri foliaceous, long, similar in length to the interramal cirri (Figure 5C) . . . . . *Aglaophamus foliosa* sp. nov.
_Notopodia with dorsal cirri cirriform (Figure 5G) 5
5. Dorsal cirri very long, twice as long as interramal cirri (Figure 5D); 16 rows of subterminal papillae and two long middorsal papillae . . . . . *Aglaophamus longicirrata* sp. nov.
_Dorsal cirri shorter than long of interramal cirri (Figure 5F); 14 rows of subterminal papillae and one long middorsal papilla. . . . . .*Aglaophamus dibranchis*
6. Prostomium with two minute but conspicuous black eyes in posterior half; interramal cirri starting on segments 5–8; with lyrate chaetae . . . . . *Aglaophamus verrilli*
_ Prostomium without eyes; interramal cirri first present on segments 8–9; lyrate chaetae setae absent . . . . . *Aglaophamus erectans*
7. Notopodia with dorsal lamellae imbricated, broad and foliaceous, lying flat over the dorsum, scalelike expansions of the dorsal edge of the notopodia (Figure 5K) . . . . . .*Nephtys squamosa*
_Notopodia without dorsal lamellae without imbricated lappets 8
8. Interramal cirri short, wide, straight to weakly curved (Figure 5H); prostomium with a single red spot on its central region in juveniles . . . . . *Nephtys simoni*
_Interramal cirri clearly recurved (Figure 5G, K); prostomium without red spot 9
9. Neuropodia on anterior segments with one or two lobes at superior margin (Figure 5E, F). 10
_ Neuropodia without lobes at superior margin (Figure 5G, J) 11
10. Neuropodia with one single erected lobe at superior margin, well developed at segments 8–15 as digitiform projection (Figure 5E) . . . . . .*Nephtys singularis*
_Neuropodium with two lobes at superior margin, well developed at segment 20 as conical projections (Figure 5F) . . . . . *Nephtys bilobatus*
11. Acicular lobes conical (Figure 5G); the aciculum projects from the distalmost part of the lobe . . . . . .*Nephtys panamensis*
_Acicular lobes incised or bilobed (Figure 5I) at least in some region of the body; the tip of the aciculum projects from the lobe at its deepest part 12
12. Anterior end of body pigmented 13
_Anterior end of body unpigmented 15
13. Dorsal anterior region with transverse bar shaped pigmentation (Figure 5B); interramal cirri first present on segment 3; anterior region with acicular lobes bilobed (Figure 5I), posterior region with acicular lobes conical (Figure 5G); . . . . . .*Nephtys ferruginea*
_ With variable pigmentation on prostomium and first few segments (no bars); interramal cirri starting on segment 4 14
14. Acicular lobes broad and short (Figure 5H) with a slight incision where the aciculum emerge; interramal cirri with accessory cirri separated from dorsal cirri (Figure 5E) . . . . . *Nephtys picta*
_Acicular lobes in middle parapodia bilobed (Figure 5H, I); interramal cirri without accessory cirri . . . . . *Nephtys caecoides*
15. Middle segments with neuropodial post-acicular lamellae low and broadly rounded (Figure 5H). . . . . *Nephtys californiensis*
_Middle segments with neuropodial post-acicular lamellae long (Figure 5E) 16
16. Interramal cirri starting on segment 3; prostomium with a pair of deeply embedded black eyespots on the posterior half . . . . . *Nephtys magellanica*
_Interramal cirri starting on segment 6; eyespots absent . . . . . .*Nephtys assignis*

ACKNOWLEDGEMENTS

Thanks are due to the director of the ICML for the financial support for this study, to Yolanda Hornelas for the electronic microscope photographs and to Adriana Barbosa López for the review of some material. The two anonymous referees are also thanked for their comments.

REFERENCES

Audouin J.V. and Milne-Edwards H. (1833) Classification des Annélides, et description de celles qui habitent les côtes de la France. *Annales des Sciences Naturelles Paris*, série 1 29, 195–269.

Augener H. (1922) Australische Polychaeten des Hamburger Zoologischen Museums. *Archive für Naturgeschichte* 7, 1–37.

Baird W. (1873) Description of some new species of Annelida Gephyrea in the collection of the British Museum. *Journal of the Linnean Society of London, Zoology* 11, 341–361.

Claparède E. (1863) *Beobachtungen über Anatomie und Entwicklungsgeschichte wirbelloser Thiere an der Küste von Normandie angestellt*. Leipzig: Wilhelm Engelmann, 120 pp.

Coonfield B.R. (1931) The cilia of *Naphthys* (*sic*) *bucera*. *Proceedings of the National Academy of Sciences of Philadelphia* 17, 416.

Coonfield B.R. (1934) The movement and regulation of cilia on the parapodia of *Nephthys bucera*, Ehlers. *Biological Bulletin. Marine Biological Laboratory* 67, 399–409.

de León-González J.A. (1994) *Poliquetos (Annelida: Polychaeta) de la plataforma continental de la costa oeste de Baja California Sur, México: taxonomía, hábitos alimenticios y distribución*. Tesis Maestría, CICIMAR, Instituto Politécnico Nacional, México, 177 pp.

Ehlers E. (1868) *Die Borstenwürmer, nach systematischen und anatomischen Untersuchungen dargestellt*. Leipzig: Wilhelm Englemann, pp. 269–748.

Fauchald K. (1968) Nephtyidae (Polychaeta) from the Bay of Nha Trang, South Vietnam. *Naga Report* 4, 5–34.

Fauchald K. and Jumars P.A. (1979) The diet of worms: a study of polychaeta feeding guilds. *Oceanography and Marine Biology: an Annual Review* 17, 193–284.

Fauchald K. and Rouse G. (1997) Polychaete systematics: past and present. *Zoologica Scripta* 26, 71–138.

Fauvel P. (1902) Annélides polychaetes de la Casamance rapportées par M. Aug. Chevalier. *Bulletin de la Société Linnéenne de Normandie* 5, 59–105.

Fauvel P. (1932) Annelida Polychaeta of the Indian Museum, Calcutta. *Memorial Indian Museum, Calcutta* 12, 1–262.

González-Ortiz L. (1994) *Los poliquetos (Annelida: Polychaeta) de la plataforma continental del Golfo de Tehuantepec, México*. Tesis Profesional, Facultad de Ciencias, Universidad Nacional Autónoma de México, México, 191 pp.

Hartman O. (1938) Review of the annelid worms of the family Nephtyidae from the northeast Pacific, with descriptions of five new species. *Proceedings of the United States National Museum* 85, 134–158.

Hartman O. (1940) Polychaetous annelids. Part II. Chrysopetalidae to Goniadidae. *Allan Hancock Pacific Expeditions* 7, 173–287.

Hartman O. (1950) Goniadidae, Glyceridae and Nephtyidae. *Allan Hancock Pacific Expeditions* 15, 1–181.

Hartman O. (1968) *Atlas of the errantiate polychaetous annelids from California*. Los Angeles: Allan Hancock Foundation and University of Southern California Press, 822 pp.

Heimler W. (1983) Untersuchungen sur Larvalentwicklung von *Lanice conchilega* (Pallas 1766) (Polychaeta/Terebellomorpha). Part III, Bau und Struktur der Aulophora-Larve. *Zoologische Jahrbücher (Anatomie Ontogenie der Tiere)* 110, 411–478.

Hernández-Alcántara P. (2002) *Composición y estructura de las comunidades de poliquetos (Annelida: Polychaeta) bénticos de la plataforma continental del Golfo de California*. Tesis Doctorado. Facultad de Ciencias, Universidad Nacional Autónoma de México, México, 196 pp.

Hernández-Alcántara P. and Solís-Weiss V. (1999) Systematics and distribution of the polychaetes (Annelida: Polychaeta) from the sublittoral zone in the Gulf of California. *Oceánides* 13, 25–38.

Hilbig B. (1994) Family Nephtyidae Grube, 1850. In Blake J.A. and Hilbig B. (eds) *Taxonomic atlas of the benthic fauna of the Santa Maria Basin and western Santa Barbara Channel*, Volume 4. Santa Barbara, California: Santa Barbara Museum of Natural History, pp. 329–362.

Hoagland R.A. (1920) Polychaetous annelids collected by the United States Fisheries Steamer ALBATROSS during the Philippine expedition of 1907 to 1909. *US National Museum Bulletin* 100, 603–634.

Jackson M.L. (1958) *Soil chemical analysis*. Englewood Cliffs, New Jersey: Prentice-Hall Publications, 498 pp.

Kinberg J.G.H. (1866) Annulata nova. Fam. Nephthydea (Grube). *Öfversigt af Kungliga Vetenskaps-Akademiens Förhandlingar, Stockholm* 22, 239–258.

Kudenov J.D. (1975) Errant polychaetes from the Gulf of California, Mexico. *Journal of Natural History* 9, 65–91.

Kudenov J.D. (1980) Annelida: Polychaeta (Bristleworms). In Brusca R.C. (ed.) *Common intertidal invertebrates of the Gulf of California*. 2nd edition. Arizona: University of Arizona Press, pp. 77–123.

McIntosh W.C. (1885) Report on the Annelida Polychaeta collected by H.M.S. Challenger during the years 1873–76. *Challenger Reports* 12, 1–554.

Monro C.C.A. (1928) Papers from Dr. Th. Mortensen's Pacific Expedition 1914–16. XLV. On the Polychaeta collected by Dr. Th. Mortensen off the Coast of Panama. *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening* 85, 75–103.

Pallas P.S. (1766) *Miscellanea Zoologica, quibus novae imprimis atque obscurae Animalium species describunture et observationibus iconibusque illustrantur*. Hagae Comitum, 244 pp.

Perkins T.H. (1980) Review of species previously referred to *Ceratonereis mirabilis*, and descriptions of new species of *Ceratonereis*, *Nephtys*, and *Goniada* (Polychaeta). *Proceedings of the Biological Society of Washington* 93, 1–49.

Pettibone M.H. (1982) Annelida. In Parker S.P. (ed.) *Synopsis and classification of living organisms*, 2 volumes. New York: McGraw-Hill, pp. 1–43.

Pleijel F. (2001) Nephtyidae, Grube, 1850. In Rouse G.W. and Pleijel F. (eds) *Polychaetes*. Oxford: Oxford University Press, pp. 127–129.

San Martín G. (2003) Annelida, Polychaeta II: Syllidae. In Ramos M.A., Alba J., Bellés X., Gosálbez J., Guerra A., Mcpherson E., Martín F., Serrano J. and Templado J. (eds) *Fauna Ibérica*. Madrid: Museo Nacional de Ciencias Naturales, CSIC, 554 pp.

Schlötzer-Schrehardt U. (1991) Ultrastructural differentiation of nuchal and dorsal organs during postembryonic and sexual development of *Pygospio elegans* Claparède (Polychaeta: Spionidae). *Ophelia Supplement* 5, 633–640.

Schmarda L.K. (1861) *Neue wirbellose Thiere beobachtet und gesammelt auf einer Reise um die Erde 1853 bis 1857*. Volume 1. Leipzig: Turbellarian, Rotatorien un Anneliden, pp. 1–164.

Strickland J.D.H. and Parsons T.R. (1977) A practical handbook of seawater analysis. *Fisheries Research Board of Canada, Bulletin* 167, 1–310.

Taylor J.L. (1984) Family Nephtyidae Grube, 1850. In Uebelacker J.M. and Johnson P.G. (eds) *Taxonomic guide to the polychaetes of the northern Gulf of Mexico. Volume 5. Final report to the Minerals*

https://doi.org/10.1017/S0025315408002427 Published online by Cambridge University Press

Management Service, contract 14-12-001-29091. Mobile, Alabama: Barry A. Vittor and Associates, Inc., pp. 35.1–35.20.

and

Walkley A. and Black I.A. (1934) An examination of the Degthareff method for determining soil organic matter and a proposed modification of the chromic acid titration method. *Soil Science* 27, 29–38.

Correspondence should be addressed to:
V. Solís-Weiss
Laboratorio de Ecología y Biodiversidad de Invertebrados Marinos
Instituto de Ciencias del Mar y Limnología
Universidad Nacional Autónoma de México (UNAM)
Apartado Postal 70-305, México, D. F. 04510, México
email: solisw@mar.icmyl.unam.mx

https://doi.org/10.1017/S0025315408002427 Published online by Cambridge University Press