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New Polygordiidae (Polychaeta) from the Australian region

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Abstract

The interstitial polychaete family Polygordiidae is recorded from Australia for the first time, based on two new species: *Polygordius arafura* **sp. nov.** from continental shelf depths in the Arafura Sea, northern Australia, and *Polygordius kiarama* **sp. nov.** from the continental shelf and slope off southeastern Australia. *Polygordius kiarama* **sp. nov.**, found at slope depths up to 1650 m, is the deepest record to date for the family, which has previously been recorded from intertidal habitats, shallow coastal waters and continental shelf depths.

Keywords: *Polygordius arafura* **sp. nov.**, *Polygordius kiarama* **sp. nov.**, Australia, continental shelf, continental slope

Introduction

Polygordiidae are interstitial polychaetes best known from continental shelf depths in the northeast Atlantic Ocean but are also recorded from shallow seas in many regions world wide (Rota & Carchini, 1999). Polygordiidae, however, have not previously been recorded from Australian waters (Paxton, 2000), although they are known from elsewhere in the Pacific region: New Caledonia (Jouin, 1970), Japan (Izuka, 1903; Uchida, 1935) and the Galapagos (Schmidt & Westheide, 1977). The Polygordiidae comprises a single genus, *Polygordius*, with 16 species (Ramey *et al.*, 2006). A second genus, *Chaetogordius*, for *Chaetogordius canaliculatus* Moore, 1904 is based on fragments and is regarded as an invalid taxon (Rota & Carchini, 1999; Westheide, 1990).

Polygordiidae are distinguished from other interstitial Polychaeta by the following combination of characters: buccal organ absent; paired prostomial antennae present; indistinct external segmentation; ventral groove present; chaetae absent; pygidium cylindrical or inflated (not bilobed), pygidial cirri if present may be terminal or subterminal and number from 2 or 3 to 15. If inflated, the pygidium often has adhesive glands. The nuchal organs are conspicuous. More complete descriptions of the family are Rouse & Pleijel (2001) and Glasby & Fauchald, 2002). The most current taxonomic reviews of species of Polygordiidae are Rota and Carchini (1999) and Ramey *et al.* (2006).

Materials and methods

The first Australian Polygordiidae were initially discovered and identified by the senior author from material collected from central New South Wales, Australia as a part of environmental surveys. Subsequently, additional Polygordiidae specimens were located among collections from shelf depths in southeastern

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Australia (Gray *et al.*, 1997) and in collections from the Arafura Sea in northern Australia through a biological survey led by Dr G.D.F.Wilson from the Australian Museum, Sydney (AM), as well as other collections in Australian museums from locations in northern Queensland. Material from the Ross Sea, Antarctica (in collections of the AM) was also considered for comparison. Museum Victoria Polygordiidae holdings are summarised in material examined sections below; full details can be found by performing searches at http://collections.museumvictoria.com.au/search.php?type=NS

Museum Abbreviations

Australian Museum, Sydney (AM); Museum and Art Gallery of the Northern Territory, Darwin (NTM); Museum Victoria, Melbourne (MV); National Museum and Gallery of Wales, Cardiff (NMW); Swedish Museum of Natural History, Stockholm (SMNH); National Museum of Natural History, Smithsonian Institution, Washington DC (USNM); Yale Peabody Museum of Natural History, Yale University, Connecticut (YPM); Zoological Museum Hamburg (ZMH).

Light and Scanning Electron microscopy (SEM)

Specimens were examined under Olympus and Zeiss stereo microscopes and measured using calibrated graticules and images from a microscope-mounted, Canon G6 digital camera. Temporary mounts in glycerol and permanent mounts in Aqua-Mount™ with rose bengal stain were viewed using a Leitz compound microscope to examine specimens for reproductive condition and size measurements. Dimensions were measured following the methods of Ramey *et al.* (2006). Specimens were prepared for examination by SEM by transfer through increasing concentrations of ethanol to 95% followed by 3 changes of 100% ethanol every 10 min, with the last change being dry ethanol. Hexamethyldisilazane (HMDS) chemical drying was used: 10 min in solution comprised of absolute ethanol and HMDS in volumetric ratio 2:1 followed by 10 min in a solution of the same in the ratio 1:2; followed by 2 five minute periods in HMDS alone, adapted from Nation (1983). Specimens were then allowed to air dry before mounting on carbon tabs, sputter-coated with gold, and examined in a Philips 505 SEM. All specimens had been formalin-fixed so DNA extraction was not attempted. Ramey et al. (2006) found that for those *Polygordius* species where the circulatory system has been examined, different levels of detail, inconsistent terminology, and difficulty of re-evaluation of specimens that had been preserved for long periods of time meant that little useful comparative data were obtainable. Although redescription of the circulatory system of all Polygordiidae would likely be informative for a review of relationships within the family, this is beyond the scope of the present study. Material listed below are spirit specimens in ethanol unless otherwise designated.

Comparative material examined

Type material. *Polygordius antarcticus* Rota & Carchini, 1999: paratype (SMNH 5043), Antarctic Ocean, Ross Sea, Terra Nova Bay, sea between Tethys Bay, 74˚40'S, and Adélie Cove,74˚46'S, between longitudes 164˚01' E and 164˚08' E, 50 m, collected: G. Carchini, 24 January 1988.

Polygordius jouinae Ramey, Fiege and Leander, 2006: holotype (YPM 38050), north-western Atlantic Ocean, United States, New Jersey, Tuckerton, Beach Haven Ridge, LEO-15 Station 9, (39˚ 28'N 74˚ 15'W, ~12 m, coarse sand, collected: P.A. Ramey, 19 May 2005.

Polygordius pacificus floreanensis Schmidt & Westheide, 1977: holotype (ZMH P-13668), South Pacific Ocean, Galapagos Islands, Floreana, black beach, eulittoral, coarse black lava sand, collected: June 1972.

Non-type material. *Polygordius antarcticus* Rota & Carchini, 1999. Previously unidentified material determined during this study: Antarctica: Off tip of northern rookery, McMurdo Sound, Cape Bird, Ross Island, 77° 13.083’ S 166° 26.4’ E, 4 Jan 1971, many specimens (AM W32497-32499); North of Priapulus Point, McMurdo Sound, Cape Bird, Ross Island, 77° 14.53’ S 166° 22.8’ E, 11 Jan 1971, many specimens, (AM W32500-32504; AM W32550 includes wholemount microslide of 3 specimens; Moubray Bay, Cape Hallett, 72° 18.1’ S 170° 13.6’ E, 18 Jan 1972, many specimens (AM W32547, W32549,W32505); Moubray

Bay, Cape Hallett, 72° 17.8’ S 170° 14’ E, 17 Jan 1972, 6 specimens (AM W32548); McMurdo Sound, Cape Bird, Ross Island, 77° 13’ S 166° 23’ E, 11 Jan 1971, many specimens (AM W32550); McMurdo Sound, Cape Bird, Ross Island, 77° 13’ S 166° 23’ E, 11 Jan 1974, many specimens including 2 specimens on wholemount microslide (AM W32551); Just off the hut, McMurdo Sound, Cape Bird, Ross Island, 77° 13.5’ S 166° 16.7’ E, 25 Dec 1970, many specimens (AM W32496).

Polygordius appendiculatus Fraipont, 1887: 15 specimens (NMW 1989.104.1867), north-eastern Atlantic Ocean, Irish Sea, St George’s Channel, 52805.7’N 05833.7’W, 112 m, sandy gravel, collected: 12 July 1989.

Where type material was unavailable (several type specimens for this family have been lost or were never deposited) comparisons are based on original species descriptions. Character data obtained was collated to generate Tables 1–3. Descriptions of species do not repeat characters from the family description.

Systematics

Polygordiidae Czerniavsky, 1881

Polygordius arafura sp. nov.

Figure 1 A–F

Material examined. Holotype: Australia: Northern Territory. Arafura Sea: Stn SS05/2005 007GR011, 9°50.126' S 135°17.766' E, 4 May 2005, 83 m, calcareous poorly-sorted muddy fine sand, (NTM W22253). Paratypes: same data as for holotype, spirit specimens, 1 paratype NTM W22254, 1 complete paratype and 3 fragments NTM W20934. Paratypes: Australia, Northern Territory, Arafura Sea: Stn SS05/2005 002GR002 9°47.986' S 135°22.007' E, 91.2 m, 1 May 2005, 4 paratypes: NTM W22248, NTM W22249, NTM W22250, NTM W22251, and one SEM stub paratype NTM W22252; 2 paratypes, MV F165642, F165643; 1 paratype, USNM 1121878. One paratype: Australia: Northern Territory. Arafura Sea: Stn SS05/2005 012GR019, 9° 47.593’ S 135° 16.636’ E, 5 May 2005, 85 m, muddy sand, USNM 1121879.

Non-type material: Australia: Northern Territory. Arafura Sea: Stn SS05/2005 012GR019, 9° 47.593’ S 135° 16.636’ E, 5 May 2005, 85 m, muddy sand, 2 spirit specimens (NTM W20939); Stn SS05/2005 005GR007, 9° 50.47’ S 135° 16.099’ E, 4 May 2005, 80 m, muddy sand, 1 spirit specimen and 2 specimens on one SEM stub (NTM W20941); Stn SS05/2005 002BS002, 9° 47.947’ S 135° 22.024’ E, 1 May 2005, 92 m, moderately sorted calcareous medium sand, 1 specimen (NTM W20936); Stn SS05/2005 006GR009, 9° 50.356’ S 135° 20.888’ E, 4 May 2005, 87 m, poorly-sorted muddy fine calcareous sand, 1 specimen (NTM W20937); Stn SS05/2005 011GR018, 9° 47.768’ S 135° 16.935’ E, 5 May 2005, 84 m, muddy sand, 1 specimen (NTM W20942); Stn SS05/2005 009GR015, 9° 49.294’ S 135° 19.599’ E, 4 May 2005, 83 m, 5Y 4/2, poorly-sorted calcareous, muddy medium sand, 1 specimen (NTM W20940); Stn SS05/2005 003GR005, 9° 52.788’ S 135° 21.891’ E, 4 May 2005, 69 m, Sandy Mud, 1 specimen and wholemount microslide (NTM W20938); Stn SS05/2005 010GR017, 9° 48.774’ S 135° 15.412’ E, 5 May 2005, 82 m, sandy mud GLEY 1 4/10Y, 1 specimen and wholemount microslide (NTM W20935).

Distribution. Australia. Northern Australia, Arafura Sea, Gulf of Carpentaria (Fig. 1F). Habitat marine, shelf 69–92 m, mostly from poorly-sorted sediments.

Description. Size range of material examined 2.4–11.6 mm long, 0.08–0.18 mm wide (*n*=15), inflated pygidial region about 1.2 times maximum body width.

Prostomium conical (0.06–0.12 mm long), pointed at tip (Fig. l A). Eyes absent. Paired antennae 0.04–0.06 mm long, almost attached to each other at the base, and remain parallel for some distance (Fig. l B). Ratio of antenna to prostomium length 0.5–0.86. Head fold deep (Figure l A). Dimensions of holotype given in Table 2.

Pygidium cylindrical, minimally inflated (about 1.2 times body width), pygidial glandular pads absent (Fig. l C, confirmed by examination of whole mounts using compound microscope). Pygidial appendages

absent. Anal opening central; anal lobes present; 7–8 approximately equal-sized lobes (Fig. l D). Epidermis of pygidium lacking cilia (Fig. 1E). Neither eggs nor sperm could be seen in any specimen examined in temporary or permanent whole body mounts.

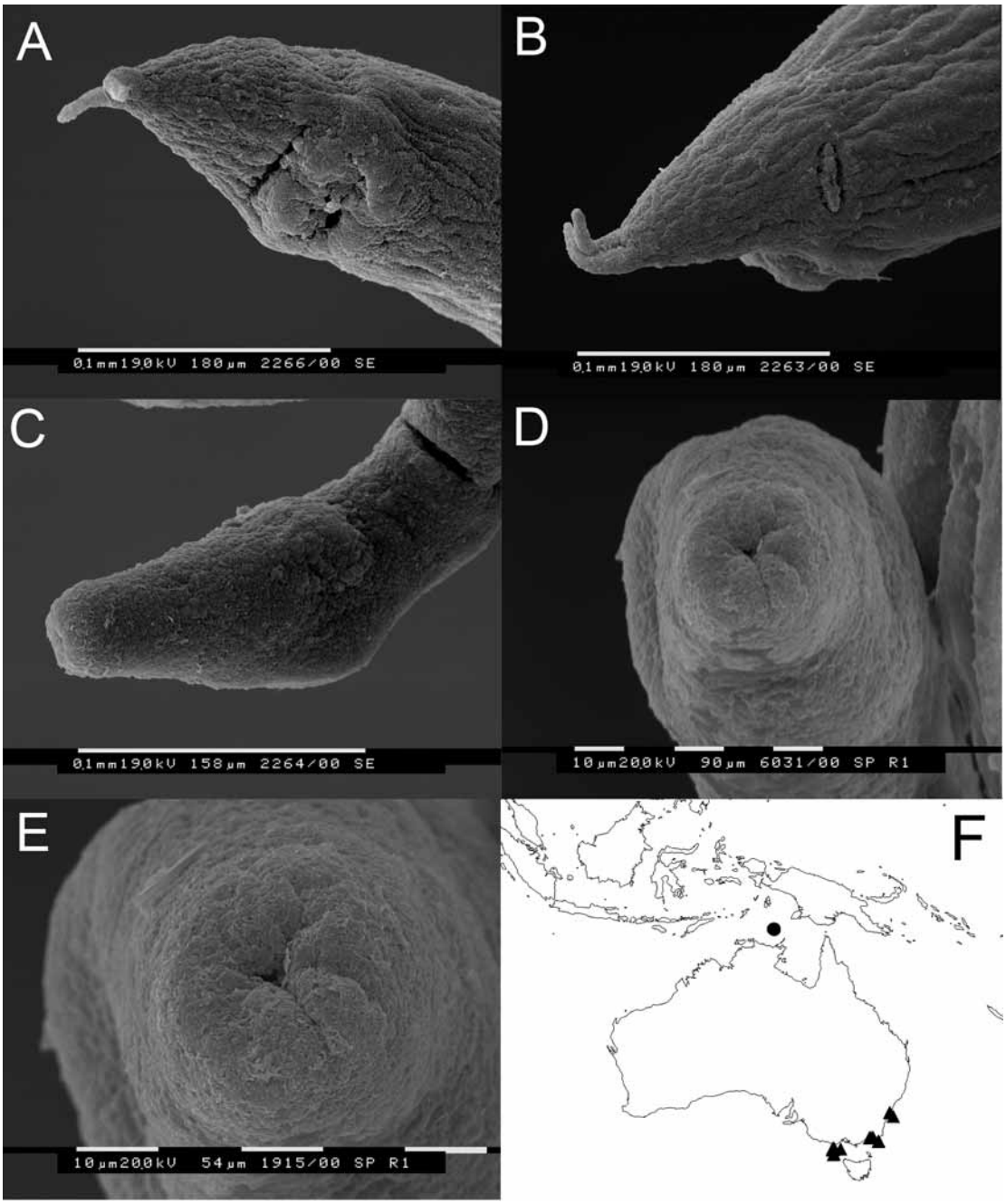

FIGURE 1. *Polygordius arafura* **sp. nov.**: A, antero-ventral view prostomium, paratype NTM W20941 (1 of 2 on stub); B, lateral view prostomium, paratype NTM W20941 (2 of 2 on stub); C, lateral view pygidium, paratype NTM W20941 (1 of 2 on stub); D–E, posterior views pygidium, paratype NTM W20941 (1 of 2 on stub). For all SEM images white bars equate to scale measurement (*e.g.* "180 µm"). F, *Polygordius arafura* **sp. nov.** distribution – circles (multiple records overplot); *Polygordius kiarama* **sp. nov.** distribution – triangles.

Discussion. Table 1 groups all known *Polygordius* species based on presence or absence of pygidial glands, and subterminal or terminal pygidial appendages. *Polygordius arafura* **sp. nov.** is similar to three other species that also lack pygidial glands and pygidial appendages. Of these *Polygordius uroviridis* is easily distinguished from *Polygordius arafura* **sp. nov.** by its inflated or bulb-like pygidium, the presence of eyes,

and a dark band of pigment encircling the middle region of the pygidium. *Polygordius arafura* **sp. nov.** is most similar to *Polygordius jouinae* and *Polygordius triestinus* Hempelmann, 1906 . *Polygordius arafura* **sp. nov.**, has shorter antennae (0.04–0.06 mm) than *P. jouinae* (0.10–0.15 mm), and the length ratio of antennae to prostomium is ~0.5 for *P. arafura* **sp. nov.** and ~1 for *P. jouinae* (see also Table 2). Moreover, *Polygordius arafura* **sp. nov.** has a deep head fold while *P. jouinae* and *P. triestinus* have a shallow head fold. Although no head fold has been described for *P. jouinae*, examination indicated that the head fold is shallow. Finally, *P. jouinae* has a distinctly ciliated pygidial region (Ramey *et al.* 2006: 1029 figure 2F) whereas *P.arafura* **sp. nov.** has the pygidial region bare of cilia (Fig. 1E). The species description for *P. triestinus* is incomplete for many characters (Table 2) and Ramey *et al.* (2006) were unsuccessful in locating type material. Moreover, *P. triestinus* has not been reported since the original description and is not present in benthic samples taken from the Gulf of Trieste from 1966–2003 (Ramey *et al*. 2006).

Etymology. The specific name *arafura* is derived from the name of the indigenous inhabitants of the Molluccas, "the people of mountains", a name subsequently also given to the Arafura Sea, the type locality of *P.arafura* **sp. nov.**

TABLE 1. Grouping of all known *Polygordius* species based on pygidial morphology. Undetermined = description is incomplete or can not be interpreted with confidence for this character; superscripts j and h respectively for *P. triestinus sensu* Jouin (1970) from South Pacific Ocean, New Caledonia and for *P. triestinus sensu* Hempelmann (1906) from northern Adriatic Sea, Trieste.

	Pygidial appendages absent	Pygidial appendages subterminal	Pygidial appendages terminal
Pygidial glands / glandular pads present	*P. antarcticus* *P. erythrophthalmus* *P. lacteus* *P. neapolitanus* *P. pacificus* *P. pacificus floreanensis* *P. triestinus*[j]	*P. appendiculatus* *P. kiarama* **sp. nov.** *P. leo*	*P. eschaturus* *P. eschaturus brevipapillosus* *P. madrasensis*
Pygidial glands / glandular pads absent	*P. arafura* **sp. nov.** *P. jouinae* *P. triestinus*[h] *P. uroviridis*		
Undetermined	*P. villoti*	*P. ijimai*	

***Polygordius kiarama* sp. nov.**
Figures 1F, 2A–D

Material examined. Holotype: Australia: New South Wales. Coniston, S of Port Kembla, 34° 28’ S 150° 53’ E, 3 Aug 2006, (MV F165641).

Paratypes: 6 paratypes, same data as holotype, MV F165640, SEM stub MV F162527, AM W35243, AM W35244; USNM 1121880, USNM 1121881. 2 paratypes: Australia: Victoria: Eastern Bass Strait, 15.3 km ESE of eastern edge of Lake Tyers, Stn MSL-EG 97, 37° 53.383’ S 148° 15.4’ E, Feb 1991, 43 m, coarse sand, (MV F165630, MV F165631; 5 paratypes: Eastern Bass Strait, 2.9 km SE of Cape Conran, Stn MSL-EG 113, 37° 50’ S 148° 38.9’ E, Feb 1991, 29 m, coarse sand, (MV F 165632, MV F 165633, wholemount microslide of 3 paratype specimens MV F 165634 ; 2 paratypes: Eastern Bass Strait, 13.1 km E of eastern edge of Lake Tyers, Stn MSL-EG 93, 37° 49.9’ S 148° 14’ E, Feb 1991, 21 m, coarse sand, (MV F165635, MV F165636, MV F165637; 2 paratypes: Eastern Bass Strait, 10.8 km E of eastern edge of Lake Tyers, Stn

MSL-EG 118, 37° 50.9167’ S 148° 12.83’ E, 25 Sep 1990, sand (MV F165638, MV F165639).

Non-type material: Australia: New South Wales. Off Nowra, Stn SLOPE 15, 34° 58.4’ S 151° 23.2’ E, 16 Jul 1986, 1650–1750 m, 10 specimens (MV F134238); Port Kembla, 34° 29’ S 150° 55’ E, Oct 1995, 2 specimens (MV F151917); Port Kembla, 34° 29’ S 150° 55’ E, Oct 1995, 50 specimens (MV F151902).

TABLE 2. Characters of *P. arafura* **sp. nov.** with morphologically most similar species of the genus. Morphological information for *P. triestinus* was taken from original species descriptions (type material was either lost or never deposited); n.a. = not applicable, n.d.= no data available, *n* = number of specimens measured.

Character/Species	*P. arafura* **sp. nov.**	*P. jouinae* Ramey, Fiege and Leander, 2006	*P.triestinus* Hempelmann, 1906
Prostomium shape	conical (pointed)	conical (pointed)	conical (pointed)
Antenna length (mm)	Holotype (0.05) range (0.04–0.06; *n*=15)	Holotype (0.13) range (0.11–0.15; *n*=43)	n.d.
Prostomium length (mm)	Holotype: (0.10) range(0.06–0.12; *n*=15)	Holotype (0.14) range (0.11–0.15; *n*=43)	n.d.
Ratio (antenna:prostomium)	Holotype 0.5:1 range (0.5–0.86; *n*=15)	1:1	n.d.
Antennae (close or spaced)	close	close	close
Eyes	absent	absent	absent
Head fold	deep	shallow	shallow
Pygidium shape	not inflated to minimally inflation	not inflated to minimally inflation	not inflated
Pygidial glands	absent	absent	absent
Pygidial gland shape	n.a.	n.a.	n.a.
Pygidial cirri (no.)	absent	absent	absent
Anal lobes (no.)	7–8	7	n.d.
Body length (mm)	Holotype: (8.1) range(2.4–11.6; *n*=15)	Holotype (19.4) Females (13.0–42.7; *n*=20) Males (13.8–43.1; *n*=23) population (3.0–23.5; *n*=318)	max 30
Body width (mm)	Holotype: (0.14) range(0.08–0.18; *n*=15)	Holotype (0.23) Female (0.24–0.38; *n*=20) Males (0.23–0.34; *n*=23) population (0.06–0.32; *n*=318)	n.d.
Segment (no.)	Holotype: (46) range(27–74; *n*=15)	Holotype (>65) Females (82–91; *n*=10) Males (86–93; *n*=10)	n.d.
Type locality	Northern Australia, Gulf of Carpentaria	NW Atlantic Ocean, United States, New Jersey, Tuckerton, Beach Haven Ridge	Northern Adriatic Sea, Italy, near Trieste
Sediment type	poorly sorted sediments	medium to very coarse sand	muddy, oxygen poor, in relatively quiescent environments
Depth range (m)	69–92	5–152	n.d.

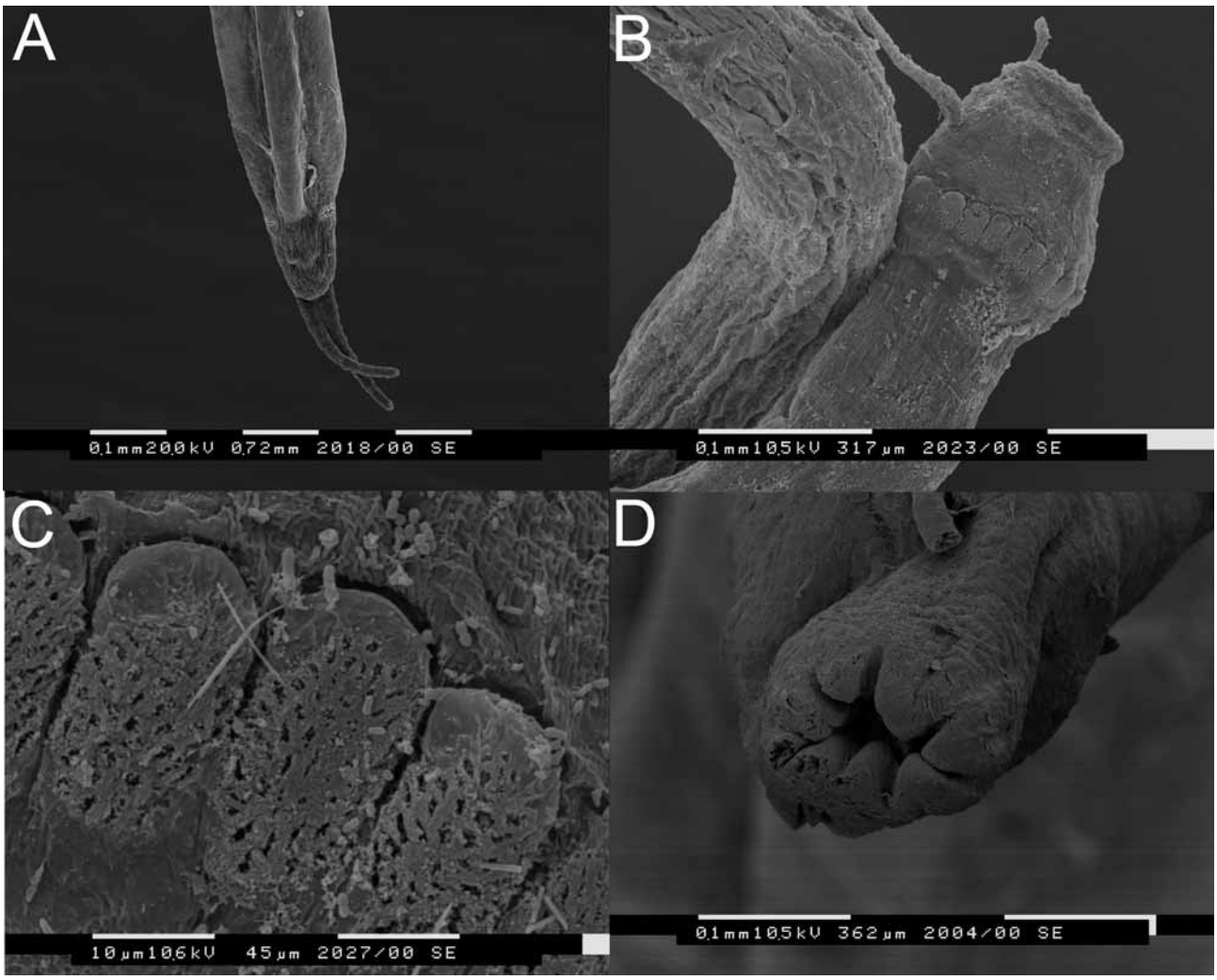

FIGURE 2. *Polygordius kiarama* **sp. nov.**: A, dorsal view prostomium, paratype MV F162527 (1 of 5 paratypes on stub); B, lateral view pygidium, paratype MV F163291 (1 of 5 paratypes on stub) ; C, pygidial glandular pad, paratype MV F163291; D, posterior view pygidium, MV F162526. For all SEM images white bars equate to scale measurement (*e.g.* "317 µm").

Australia: Bass Strait. Western Bass Strait (15 MV registered lots) including: 59 km WNW of Cape Farewell, King Island, Stn BSS 81 DP, 39° 28' S 143° 17' E, 10 Oct 1980, 103 m, coarse sand, 2 specimens (MV F134280); 52 km WNW of Cape Farewell, King Island, Stn BSS 80 DP, 39° 25' S 143° 23' E, 10 Oct 1980, 103 m, medium sand, 1 specimen (MV F134276); 64 km WNW of Cape Farewell, King Island, Stn BSS 83 G, 39° 31' S 143° 12' E, 11 Oct 1980, 122 m, medium sand, 2 specimens (MV F134319); 48 km WNW of Stokes Point, King Island, Stn BSS 85 G, 40° 3' S 143° 24' E, 11 Oct 1980, 122 m, coarse sand, 1 specimen (MV F134269)

Central Bass Strait, 44 km NE of Cape Wickham, King Island, Stn BSS 203, 39° 22' S 144° 18.3' E, 23 Nov 1981: 60 m, coarse sand, 3 specimens (MV F145912; SEM stub: MV F 162528)

Eastern Bass Strait (26 MV registered lots) including: South of Point Hicks, Stn SLOPE 33, 38° 19.6' S 149° 24.3' E, 23 Jul 1986, 930 m, 5 specimens (MV F134251); South of Point Hicks, Stn SLOPE 32, 38° 21.9' S 149° 20' E, 23 Jul 1986, 1000 m, 5 specimens (MV F134249); 11.2 km E of eastern edge of Lake Tyers, Stn MSL-EG 27, 37° 51.4167' S 148° 13.167' E, 25 Sep 1990, 32 m, sand-shell, 10 specimens (MV F134259; SEM stubs: MV F162524, MV F162525, MV F162526); 13.1 km E of eastern edge of Lake Tyers, Stn MSL-EG 24, 37° 50.03' S 148° 14.183' E, 25 Sep 1990, 21 m, sand-shell, 5 specimens (MV F134262); 2.9 km SE of Cape Conran, Stn MSL-EG 114, 37° 50' S 148° 38.9' E, Feb 1991, 29 m, coarse sand, 20

TABLE 3. Characters of *P. kiarama* **sp. nov.** with morphologically most similar species of the genus. Morphological information for *P. ijimai*, *P. leo, and P. appendiculatus* was taken from original species descriptions unless otherwise specified. n.a. = not applicable, n.d. = no data available, undetermined = description is incomplete or can not be interpreted with confidence, *n* = number of specimens measured, and superscripts: f, rc for observations taken from a figure in the original species description rather than being explicitly stated in the text, and data taken from Rota and Carchini (1999), respectively.

Character/Species	*P. kiarama* sp. nov.	*P. ijimai* Izuka, 1903	*P. leo* Du Bois-Reymond Marcus, 1955	*P. appendiculatus* Fraipont 1887
Prostomium shape	conical (blunt)	n.d.	rounded[f]	rounded [f,rc]
Antenna length (mm)	Holotype (0.22) range (0.10–0.22; *n*=13)	1.00	0.30	0.24–0.41 [rc]
Prostomium length (mm)	Holotype: (0.12) range(0.08–0.14; *n*=13)	n.d.	n.d.	n.d.
Ratio (antenna:prostomium)	Holotype (1.8:1) range (1.2–2.0, *n*=13)	n.d.	1.5:1[f]	2:1 [f]; <2:1 [rc]
Antennae (close or spaced)	close	n.d.	spaced [f]	spaced
Eyes	absent	absent	absent	2; 1or 2 [rc]
Pygidium shape / width (mm)	inflated / 0.12–0.40	inflated / n.d.	inflated / 0.46	inflated / n.d.
Pygidial glands (no.)	20	undetermined	40	30 [rc]
Pygidial gland shape	oval	undetermined	elongate [f]	round [f, rc]
Gland ratio length: width	1:0.5	n.a. or n.d.	3: [f]	n.a.
Glandular pores (no. per gland)	35–36	n.a. or n.d.	n.d.	25–35 [rc]
Pygidial cirri (no.) / location	2/ventro-lateral	3/subterminal :2 (ventro-lateral, 1-dorsal median)	8–15/subterminal (radial)	2/subterminal (lateral)
Anal lobe (no.)	7–8	8	>10 [f]	5; 5 [rc]
Body length (mm)	Holotype: (9.8) range(3.8–11.6; *n*=13)	range (70–77)	40 ; *n*=1	max 20; 20–45 [rc]
Body width (mm)	Holotype: (0.12) range(0.3–0.28; *n*=13)	range (0.6–0.8)	0.5 ; *n*=1	0.25; 0.12–0.31 [rc]
Reproduction	n.d.	gonochoristic	n.d. (1 ind. with sperm)	gonochoristic
Segment (no.)	Holotype (71) Range (30–74, *n*=8)	n.d.	200	95–125
Type locality	Australia, South-eastern Australia	North Pacific Ocean, Japan, Misaki	South Atlantic Ocean, Brazil, Island of São Sebastião	Mediterranean Sea, Gulf of Naples
Sediment type	sandy, well-sorted calcareous sediments	sand, pebbles, shell fragments	coarse sand	coarse sand
Depth range (m)	21–1650	low tide mark	n.d.	3–4

specimens (MV F134315); 7.8 km ESE of eastern edge of Lake Tyers, Stn MSL-EG 26, 37° 51.65' S 148° 10.6' E, 25 Sep 1990, 38 m, sand-shell, 1 specimen (MV F134271) and wholemount microslide MV F 163290); 5.7 km W of Cape Conran, Stn MSL-EG 110, 37° 48.85' S 148° 39.8' E, Feb 1991, 22 m, coarse sand, 5 specimens (MV F145909).

Distribution. Australia. South eastern Australia (Fig. 1F). Habitat marine, inshore (including sandy inshore bays), shelf and slope, 21–1650 m, mostly from well-sorted, calcareous sediments.

Description. Size range of material examined 3.8–11.6 mm long, 0.10–0.0.28 mm wide (*n*=19), pygidial region about equal to body width but preceded by slightly narrower region thus appearing inflated.

Prostomium conical (0.08–0.14 mm long; *n*=15), with blunt tip (Fig. 2 A). Eyes absent. Paired antennae (0.08–0.22 mm long; *n*=15) almost attached to each other at the base, apparently very stiff and remain parallel for some distance (Fig. 2 A). Ratio of antenna to prostomium length 1.8 for holotype, (range 1.2–2.0, *n*=13). Head fold deep. Dimensions of holotype given in Table 3.

Pygidium inflated, bulb-like (Fig. 2 B). Pygidial glands present, ~20 oval glandular pads (length= 0.10–0.12, width= 0.056–0.064 mm, *n*=3) with 35–36 pores per pad (Fig. 2 C). Pygidial appendages present; 2 pygidial cirri attached subterminally between glandular belt and anus, cirri inserted ventro-laterally (length= 0.1–0.4 mm, *n*=9) (Figure 2 B). Anal opening central; anal lobes present; 7–8 lobes (Fig. 2 D). Neither eggs nor sperm could be seen in any specimen examined in temporary or permanent whole body mounts.

Discussion. *Polygordius kiarama* **sp. nov.** is most similar to the three species that have pygidial glands and subterminal pygidial cirri including *Polygordius leo, Polygordius ijimai* and *Polygordius appendiculatus* (Table 1). However, *P. kiarama* **sp. nov.** can be clearly distinguished from these three species by the following characters (see also Table 3). *Polygordius kiarama* **sp. nov.** has ~20 oval pygidial glands and 2 pygidial cirri inserted ventro-laterally, whereas *P. leo* has 40 elongate glands and 8–15 pygidial cirri arranged radially around the glandular region. Izuka (1903) described *P. ijimai* as having numerous papillae arranged in a number of longitudinal rows or zones on the pygidium, however, it is undetermined whether these represent pygidial glands. Rota and Carchini (1999) interpreted these "papillae" as elongate glands but here, since no figures are provided with the original species description and efforts to locate type material have not been successful, we conclude that the presence or absence of pygidial glands remains undetermined for this species (Table 3). However, *Polygordius ijimai* differs from *P. kiarama* **sp. nov.** in that it has 3 pygidial cirri including 2 positioned laterally and the other mid-dorsally. *Polygordius appendiculatus* has 30 round glands, 2 pygidial cirri positioned laterally, and eyes.

Variability in antenna length and hence in the ratio of antenna to prostomium length is more extreme than reported for other *Polygordius* spp. (although range of variation is not often available in published descriptions). The range of values reported here for antenna:prostomium is 1.2–2.0 (*n*=13) and values at the lower end of this range may be due to damage, although none was evident (several even shorter antennal length values were discarded due to obvious damage). Only one specimen had antenna:prostomium greater than 1.8 and this was from a number of more typical individuals from one station (MV F148025). We judge that the variability for antenna to prostomium length observed for *P. kiarama* **sp. nov.** is not taxonomically significant.

Etymology. The specific name "kiarama" is derived from an Australian Aboriginal name meaning "Place where the sea makes a noise" and is also the name given to the Aboriginal people of the region surrounding modern Kiama.

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