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Turbo-taxonomy: 21 new species of Myzostomida (Annelida)

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Abstract

An efficient protocol to identify and describe species of Myzostomida is outlined and demonstrated. This taxonomic approach relies on careful identification (facilitated by an included comprehensive table of available names with relevant geographical and host information) and concise descriptions combined with DNA sequencing, live photography, and accurate host identification. Twenty-one new species are described following these guidelines: *Asteromyzostomum grygieri* **n. sp.**, *Endomyzostoma scotia* **n. sp.**, *Endomyzostoma neridae* **n. sp.**, *Mesomyzostoma lanterbecqae* **n. sp.**, *Hypomyzostoma jasoni* **n. sp.**, *Hypomyzostoma jonathoni* **n. sp.**, *Myzostoma debiae* **n. sp.**, *Myzostoma eeckhauti* **n. sp.**, *Myzostoma hollandi* **n. sp.**, *Myzostoma indocuniculus* **n. sp.**, *Myzostoma josefinae* **n. sp.**, *Myzostoma kymae* **n. sp.**, *Myzostoma laurenae* **n. sp.**, *Myzostoma miki* **n. sp.**, *Myzostoma pipkini* **n. sp.**, *Myzostoma susanae* **n. sp.**, *Myzostoma tertiusi* **n. sp.**, *Protomyzostomum lingua* **n. sp.**, *Protomyzostomum roseus* **n. sp.**, *Pulvinomyzostomum inaki* **n. sp.**, and *Pulvinomyzostomum messingi* **n. sp.**

Key words: systematics, polychaete, marine, symbiosis, crinoid, asteroid, ophiuroid, parasite, taxonomic impediment

Background

Estimations of Earth's biodiversity vary by orders of magnitude (e.g. Mora *et al.* 2011; Costello *et al.* 2012; Costello *et al.* 2013) and a proposed limitation to accurate assessments is a 'taxonomic impediment' (see Wheeler *et al.* 2004; Ebach *et al.* 2011). This impediment encompasses a range of constraints (e.g. training, people power, publication impact) that prevent timely description of new species. One advocated aid is the use of online repositories for taxonomic work that can be regularly updated and peer reviewed (Wheeler *et al.* 2004; Godfray, 2007; La Salle *et al.* 2009; Maddison *et al.* 2012; Page, 2013; Parr *et al.* 2012). Such a movement is beginning with an assortment of online tools available for taxonomists (SpeciesID-Zookeys, WORMS, EOL, BioNames). Yet, a formal taxonomic name is required to effectively link molecular data, geographic distributions, and other publications (Patterson *et al.* 2010).

The valid establishment of a new animal species name requires publication of the description in a print or online journal and fulfilling a series of requirements (ICZN 1999, 2012). The time required from collection of the specimens to a formal description involves the time for establishing that the species is new, fulfilling the International Code of Zoological Nomenclature, and publishing the description. The former is slowed by a requirement to find and interpret previous descriptions and potentially the need to study type material that often may be in poor condition. Once identified as new, descriptions may require detailed morphological information for publication, which requires a significant investment of time and money. With the goal in mind to provide accurate, assessable descriptions along with the ability to unambiguously distinguish related taxa, the only aspect where time can be reduced is eliminating superfluous details in the description. Shortened descriptions, though linked with appropriate DNA sequence data, have been used in a process coined 'turbo-taxonomy,' first implemented to describe 179 species of wasps (Butcher *et al.* 2012). This approach has also been used to name 101 weevil species, all of which are now online in wiki-format through incorporation with Species-ID via ZooKeys (Riedel *et al.* 2013a,b).

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The annelid taxon Myzostomida Graff, 1877, is an excellent group to apply this 'turbo-taxonomic' approach. Myzostomids are obligate associates, mostly to echinoderms. Myzostomida currently includes around 150 nominal species, but this number likely represents a small fraction of the actual diversity based on recent reports of new, and potentially new, species (Eeckhaut *et al.* 1998; Summers & Rouse 2014). Myzostomids can generally be distinguished based on morphology and most are host-specific (Summers & Rouse 2014). However, the taxonomy of the group has been afflicted by descriptions that lack accurate host information, the loss of type material, and sampled, but unnamed, diversity. Here we establish a set of criteria for efficient identification within Myzostomida. This then allows the establishment of new taxa using genetic, host, and morphological differences along with photographs of live specimens and types accessioned into a museum collection. This method is applied here to name 21 new species of myzostomids. To assist future taxonomic work, we also provide a comprehensive list of all available names with host and locality information, a short morphological description, and relevant notes for each.

Methods

Myzostomids were collected with hosts on multiple field trips, as described in Summers & Rouse (2014). To separate external myzostomids from the host, crinoids were placed in a 50:50 mixture of seawater and 7% MgCl (in freshwater), and after five minutes shaken lightly. Internal myzostomids were dissected from the relaxed host. Samples for scanning electron microscopy (SEM) were fixed in either 1% osmium tetroxide in seawater or 4% formalin in seawater. They were then rinsed in freshwater, preserved in 70% alcohol, critical point-dried or air-dried using hexamethyldisilazane, iridium sputter-coated and examined using an EM S150TS scanning electron microscope (SEM). All specimens were deposited at: the Australian Museum, Sydney, Australia (AM); Muséum National d'Histoire Naturelle, Paris, France (MNHN); Museum Zoologi Bogor, Bogor, Indonesia (MZB); South Australian Museum, Adelaide, Australia (SAM); Benthic Invertebrate Collection, Scripps Institution of Oceanography, La Jolla, CA (SIO-BIC).

The new myzostomid species are described here if the following criteria were fulfilled. 1) All new species were supported by at least one COI DNA sequence (which differed markedly from all others available), a live photograph, and at least one specimen (= holotype) deposited in a museum collection thus fulfilling the requirements of the ICZN (1999). 2) The host was different from that of the most closely related and morphologically similar myzostomid taxa, and ideally the host was vouchered and a DNA sequence was also available. Compared to earlier descriptions, this approach adds the requirement of host identification and live photography, while eliminating the need for time-consuming and generally ambiguous chaetal preparations and histology (since multiple other lines of evidence are available for differentiation). Specimen terminology was from Pleijel *et al.* (2008); for myzostomids we use: 1) *hologenophore*—piece of animal was sequenced, remainder of animal is vouchered, ideally this includes the holotype; 2) *paragenophore*—a vouchered specimen that was or was not sequenced, but came from the exact same host as the sequenced specimen; 3) *syngenophore*—any other specimen assignable to this species unit.

Systematics

Asteromyzostomatidae Wagin, 1954

Asteromyzostomum Wagin, 1954

Asteromyzostomum grygieri n. sp. Summers & Rouse

Fig. 1

Asteromyzostomum sp.—Grygier (1988); Grygier (2000); Lanterbecq *et al.* (2006)

Holotype: SIO-BIC A3801 (S6950) **hologenophore** (1 spm: 95% ethanol). Elephant Island, Antarctica (Stn. E1-82) (61°09.0527'S, 54°11.8609'W), 222–247 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 22 October 2011 by Nerida Wilson, GWR, MMS, and science team. Genbank (COI—KM014170).

Host. *Labidiaster annulatus* Sladen (Heliasteridae, Forcipulatida. Asteroidea).

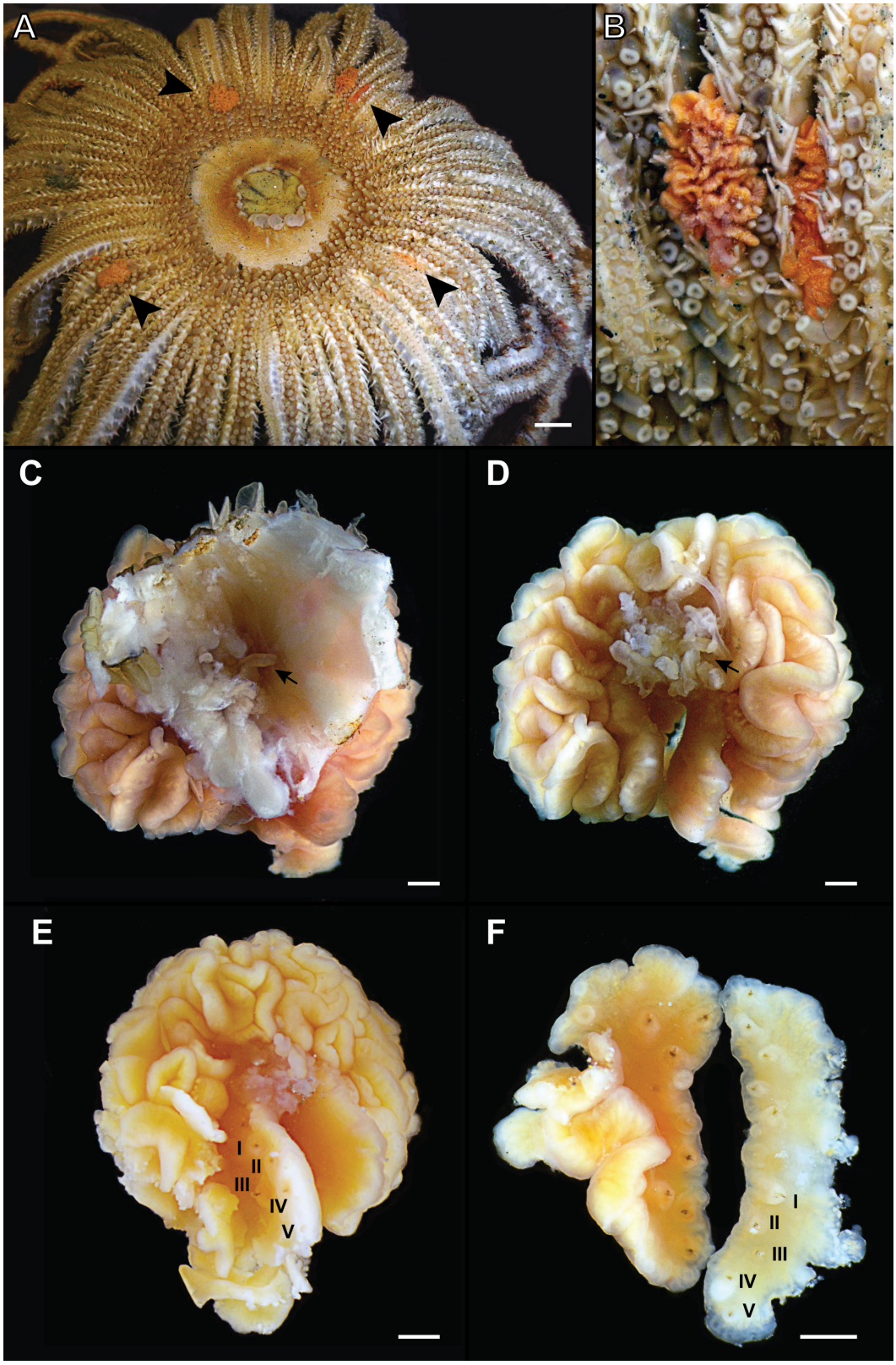

FIGURE 1. Live photographs of *Asteromyzostomum grygieri* **n. sp.** (A, B) Holotype (SIO-BIC A3801) and other non-types on host *Labidiaster annulatus,* arrowheads indicate myzostomids. (C, D) Paratype (SIO-BIC A3554) ventral, mouth pierced through body wall (C) and dissected (D), arrow shows mouth and ring of circumoral tentacles. (E) Paratype (SIO-BIC A3232) ventral, five parapodia visible to left of mouth, indicated with roman numerals. (F) Two juveniles (non-types), ventral, showing five pairs of parapodia to left and right of mouth; one side indicated with roman numerals, the third pair offset from the others. Scalebars 1 cm (A); 1 mm (C–F).

Paratypes: SIO-BIC A3232 (S4392) **syngenophores** (2 spms: in 70% ethanol after formalin fixation). Elephant Island, Antarctica (Stn. EI-79) (61°10.4189'S, 54°11.9508'W), 223–242 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 22 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Labidiaster annulatus.* SIO-BIC A3836 (S6947) **syngenophore** (1 spm: 95% ethanol). Elephant Island, Antarctica (Stn. EI-79) (61°10.4189'S, 54°11.9508'W), 223–242 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 22 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Labidiaster annulatus.* SIO-BIC A3554 (S20195) **syngenophores** (2 spm: 1—in 70% ethanol after formalin fixation; 1—95% ethanol). South Georgia, Antarctica (Stn. SG4-5) (53° 42' 54.4"S, 36° 50' 8.5"W), 190 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 16 April 2013 by Nerida Wilson, GWR, and science team. Host: *Labidiaster annulatus,* SIO-BIC E6160 (S20209).

Etymology. Named for Mark Grygier, who first discovered this species. We also name this species to acknowledge his significant contributions to myzostomid taxonomy.

Diagnosis and description. Specimens recovered on sides of arms and in ambulacral groove, mouth piercing through body wall of host (Fig. 1A–C). Holotype body wider than long, approximately 6 mm long and 8 mm wide following fixation. Posterior margin composed of convoluted, lobular folds. Body margin acirrate. Five pairs of parapodia on ventral side on either side of mouth, third pair farther from the edge (Fig. 1E–F). Mouth surrounded by ring of circumoral tentacles (Fig. 1D). Color peach in life, faded in preservative.

Remarks. *Asteromyzostomum* comprises three other species—*Asteromyzostomum arcticum* Wagin, 1954, *A. multiplicatum* Wagin, 1954, *A. witjasi* Wagin, 1954—all described from seastars in Arctic waters (Table 1). Specimens most likely to be *Asteromyzostomum grygieri* **n. sp.** were previously recorded, but not described, from *Labidiaster* sp. outside of McMurdo Sound, Antarctica (Grygier 2000). These specimens were catalogued at the Smithsonian (NMNH). One of these specimens (NMHN 98554 or 98555) was sequenced in Lanterbecq *et al.* (2006), but this sequence has been shown to be incorrect in Summers & Rouse (2014). *Asteromyzostomum grygieri* **n. sp.** is the first myzostomid described from a seastar in Antarctica. All *Asteromyzostomum* species insert their mouth through the integument of the host, and are found attached to the sides of the arms or in the ambulacral grooves of the host (Wagin 1954; Grygier 2000). An additional specimen has been reported from Atlantic waters, though it was found disassociated from its host and has not been described (Wagin 1954; Grygier 1988).

Endomyzostomatidae Perrier, 1897

Endomyzostoma Perrier, 1897

Endomyzostoma scotia n. sp. Summers & Rouse

Fig. 2 A–E

Endomyzostoma cysticolum—Grygier (2000); Lanterbecq *et al.* (2006)
Endomyzostoma sp. MZ-2009—Bleidorn *et al.* (2009)

Holotype: SIO-BIC A3865 (S6842) **hologenophore** (1 spm: 95% ethanol). Elephant Island, Antarctica (Stn. 2–83)(61°20.3263'S, 55°37.4961'W), 143–162 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 23 October 2011 by Nerida Wilson, GWR, MMS, and science team. Genbank (COI—KM491738).

Host. *Promachocrinus kerguelensis* Carpenter (Antedonidae, Comatulida, Crinoidea). Clade A from Wilson *et al.* (2007). SIO-BIC E4910 (S6807). Genbank (COI—KM491767).

Paratypes: SIO-BIC A3870 **syngenophore** (S6847) (1 spm: 95% ethanol). Elephant Island, Antarctica (Stn. 2–83)(61°20.3263'S, 55°37.4961'W), 143–162 m. Genbank (COI—KM491739). Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 23 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Promachocrinus kerguelensis* clade A, SIO-BIC E4909 (S6812); Genbank (COI—KM491768). SIO-BIC A3841 (S6205) **syngenophore** (1 spm: 95% ethanol). Bransfield Strait, Antarctica (St. 2–89)(63° 20.5962'S, 59° 54.6094'W), 198–213 m. Genbank (COI—KM491740). Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 25 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Promachocrinus kerguelensis* clade A, SIO-BIC E4882 (S6332); Genbank (COI—KM491769). SIO-BIC A3849 (S6403) **syngenophore** (1 spm: 95% ethanol). Bransfield Strait, Antarctica (St. 1–87)(62° 45.1707'S, 57° 19.3005'W), 272–292 m. Genbank

(COI—KM491741). Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 24 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Promachocrinus kerguelensis* clade A, SIO-BIC E4889 (S6489); Genbank (COI—KM491770). SIO-BIC A3875 (S6853) **syngenophore** (1 spm: 95% ethanol). Elephant Island, Antarctica (Stn. 2–83)(61°20.3263'S, 55°37.4961'W), 143–162 m. Genbank (COI—KM491742). Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 23 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Promachocrinus kerguelensis* clade A, SIO-BIC E4869 (S6816); Genbank (COI—KM491771).

Etymology. Named for its distribution throughout the Scotia Arc.

Diagnosis and description. Solitary, located in cysts along ambulacral grooves of host, near mouth or on arms (Fig. 2A–B). Holotype body folded along anterior-posterior axis, dorsal side inward (Fig. 2C–E). Length ~ 9 mm, width ~ 6 mm following fixation. Mouth and cloaca terminal. Five pairs of reduced parapodia with small chaetae, approximately midway between midline and body margin (Fig. 2C–E). Live color cream, faded in preservative.

Remarks. *Endomyzostoma* includes seven gall-forming taxa that reside in stalked crinoids—*E. cryptopodium* (Wheeler, 1896), *E. clarki* (McClendon, 1906), *E. belli* (Wheeler, 1896), *E. eremita* (Wheeler, 1896), *E. deformator* (Graff, 1884a), *E. pentacrini* (Graff, 1884a), and *E. robustum* (Hara & Okada, 1921) [transferred to *Endomyzostoma* here]—and seven (possibly eight) other cyst-forming taxa on feather star crinoids. Most cyst forms have been recorded from multiple hosts, these records likely representing different species. *Endomyzostoma inflator* (Graff, 1883) was described from *Adelometra angustiradia* (Carpenter) from southwest West Papua (Indonesia) and later recorded from *Neocomatella pulchella* (Pourtalès) from the Barbados in Graff (1884a). *Endomyzostoma tenuispinum* (Graff, 1884a) was described from four host species—*Glyptometra inequalis* (Carpenter), *Glyptometra angusticalyx* (Carpenter), *Charitometra basicurva* (Carpenter), and *Charitometra incisa* (Carpenter)—from three sites in the Pacific. *Endomyzostoma murrayi* (Graff, 1883) was described from *Horaeometra duplex* (Carpenter) from St. Vincent and the Grenadines (Caribbean) and subsequently recorded in the Pacific on *Adelometra angustiradia* by Graff (1884a). *Endomyzostoma beardi* (Graff, 1887) [here transferred to *Endomyzostoma*] was recorded from the Arafura Sea (Australia) on *Monachometra flexilis* (Carpenter). Another possible member of *Endomyzostoma* is *Myzostoma willemoesii* Graff, 1884a, which was described from the Kermedec Islands and southwest of Fiji on *Charitometra basicurva* (Carpenter) and *Glyptometra inaequalis* (Carpenter). The specimens were described from a cyst, but possessed 20 long cirri and lateral organs, the latter feature is absent in all other members of *Endomyzostoma.* This specimen was folded along an axis so that anterior and posterior ends meet, while *Endomyzostoma* are otherwise folded at 90° to this, along the anterior-posterior axis such that the lateral margins meet. *Myzostoma willemoesii* may therefore be a juvenile stage of a free-living *Myzostoma* and we leave it in that genus pending further collection and study.

Endomyzostoma cysticolum (Graff, 1883) was described from Cape Frio, Brazil, associated with *Comactinia meridionalis* (Agassiz). A variety and a sub-species of *E. cysticolum* have also been named, both of which we raise to species rank. *Endomyzostoma cysticolum cystihymenoides* (McClendon, 1907) (now *E. cystihymenoides*) was described from *Florometra asperrima* (AH Clark) in Arctic waters. *Endomyzostoma cysticolum orientale* (McClendon, 1906) (now *E. orientale*) was recorded from *Calometra discoidea* (Carpenter) in Japan. *Endomyzostoma cysticolum* has also been reported from many different crinoids species from the Caribbean Sea, Red Sea, Japanese and Indonesian waters, and from Antarctica (Grygier 2000). Many of these records are likely unrecognized *Endomyzostoma* species. Sequences available online for *E. cysticolum* (GenBank DQ238194, DQ238165, DQ238130) published in Lanterbecq *et al.* (2006) and the mitochondrial genome for *Endomyzostoma* sp. MZ-2009 (GenBank FJ975144) published in Bleidorn *et al.* (2009) are from specimens of *Endomyzostoma scotia* **n. sp.**

Among *Endomyzostoma* associated with feather stars, *E. tenuispinum* and *E. beardi* are distinguished by the presence of cirri (14 and 20 respectively). All other forms lack cirri, and are separated based on host, locality, and in some cases, size. *Endomyzostoma scotia* **n. sp.** is the first species of *Endomyzostoma* described from Antarctica, as well as in association with *Promachocrinus.*

Endomyzostoma neridae n. sp. Summers & Rouse

Fig. 2 F–G

Holotype: AM W.43447 **hologenophore** (1 spm: ½—in 70% ethanol after formalin fixation; ½—95% ethanol).

Dili, Banda Sea, Timor-Leste (8° 31'15"S, 125°36'46" E). Collected using scuba on 19 September 2012 by Nerida Wilson and GWR. Genbank (COI—KM014169).

Host. *Cenometra bella* (Hartlaub) (Colobometridae, Comatulida, Crinoidea). AM J.25425. Genbank (COI—KM491772).

Paratypes: AM P.90322 **paragenophore** (1 spm: in 70% ethanol after formalin fixation). Collected on same host as holotype.

Etymology. Named for Nerida Wilson, who collected this new species with GWR.

Diagnosis and description. Located in cysts along ambulacral grooves of the host's arms (Fig. 2G). Holotype body folded along anterior-posterior axis, dorsal side inward (Fig. 2F). Length ~5 mm, width ~ 3–3.5 mm (folded) following fixation. Mouth and cloaca terminal. Five pairs of very small parapodia with noticeable chaetae midway between midline and body margin (Fig. 2F). Live color orange, cream in preservative.

Remarks. *Endomyzostomum neridae* **n. sp.** is the first *Endomyzostoma* described from a crinoid host belonging to Mariametroidea. Remscheid (1918) recorded *Endomyzostoma cysticolum* (Graff, 1883) from a mariametroid, likely *Amphimetra tesselata* (AH Clark, 1911) in the Aru Islands (Indonesia). The drawing of the gall and specimen cannot be distinguished from *E. neridae* **n. sp.** and may represent an earlier record. *Endomyzostoma cysticolum* was originally described from Cape Frio, Brazil, associated with *Comactinia meridionalis,* a member of Comatulidae. See discussion above regarding other *Endomyzostoma.*

Myzostomatidae Beard, 1884

Mesomyzostoma Remscheid, 1918

Mesomyzostoma lanterbecqae n. sp. Summers & Rouse

Fig. 2 I–L

Holotype: SIO-BIC A3651 **hologenophore** (1 spm: ½—in 70% ethanol after formalin fixation; ½—95% ethanol). Padoz Reef, Madang Harbor, Papua New Guinea (5° 9' 34.8006"S, 145° 48' 46.2096"W), 5–20 m. Collected using scuba on 27 November 2012 by MMS and GWR. Genbank (COI—KM014176).

Host. *Clarkcomanthus alternans* (Carpenter) (Comatulidae, Comatulida, Crinoidea). MNHN-IE-2013-8114 (dried voucher); SIO-BIC E5879 (tissue subsample in 95% ethanol). Genbank (COI—KM491773).

Paratypes: SIO-BIC A3652 **syngenophores** (3 spms: 2—in 70% ethanol after formalin fixation; 2—95% ethanol). Same location as holotype. Genbank (COI—KM491743). Host: *Clarkcomanthus mirabilis* (Rowe et al.), MNHN-IE-2013-8174 (dried voucher) & SIO-BIC E5880 (tissue subsample in 95% ethanol); Genbank (COI—KM491774). SIO-BIC A3653 **syngenophores** (2 spms: 95% ethanol). South Padoz Reef, Madang Harbor, Papua New Guinea (5° 9' 43.1994"S, 145° 48' 59.3922"W), 5–20 m. Collected using scuba on 1 December 2012. Genbank (COI—KM491744). Host: *Comatella nigra* (Carpenter), MNHN-IE-2013-8064 (dried voucher) & SIO-BIC E5891 (tissue subsample in 95% ethanol); Genbank (COI—KM491775).

Etymology. Named for Deborah Lanterbecq, who first sequenced DNA from a *Mesomyzostoma* and led the work resulting in the first molecular phylogeny for myzostomids (Lanterbecq *et al.* 2006).

Diagnosis and description. Located within host's coelom. Holotype body thin and elongate. Length ~ 2.5 mm following fixation (specimen cut and curled) [paratypes 2–4 mm]. Body margin acirrate. Mouth and cloaca terminal. Five pairs of small parapodia, with large hooks (Fig. 2L). Color cream in life, white in preservative.

Remarks. There are nine other species of *Mesomyzostoma*—two described, *Mesomyzostoma katoi* Okada, 1933 and *Mesomyzostoma reichenspergeri* Remscheid, 1918, and four currently being described Eeckhaut *et al.* (*in prep*) and three undescribed species in Summers & Rouse (2014). All of these species have a similar body form and occupy the coelom and/or gonads of feather star crinoids. The species are best distinguished by molecular data, followed by host use. This is likely a highly undersampled lifestyle due to the requirement of dissection.

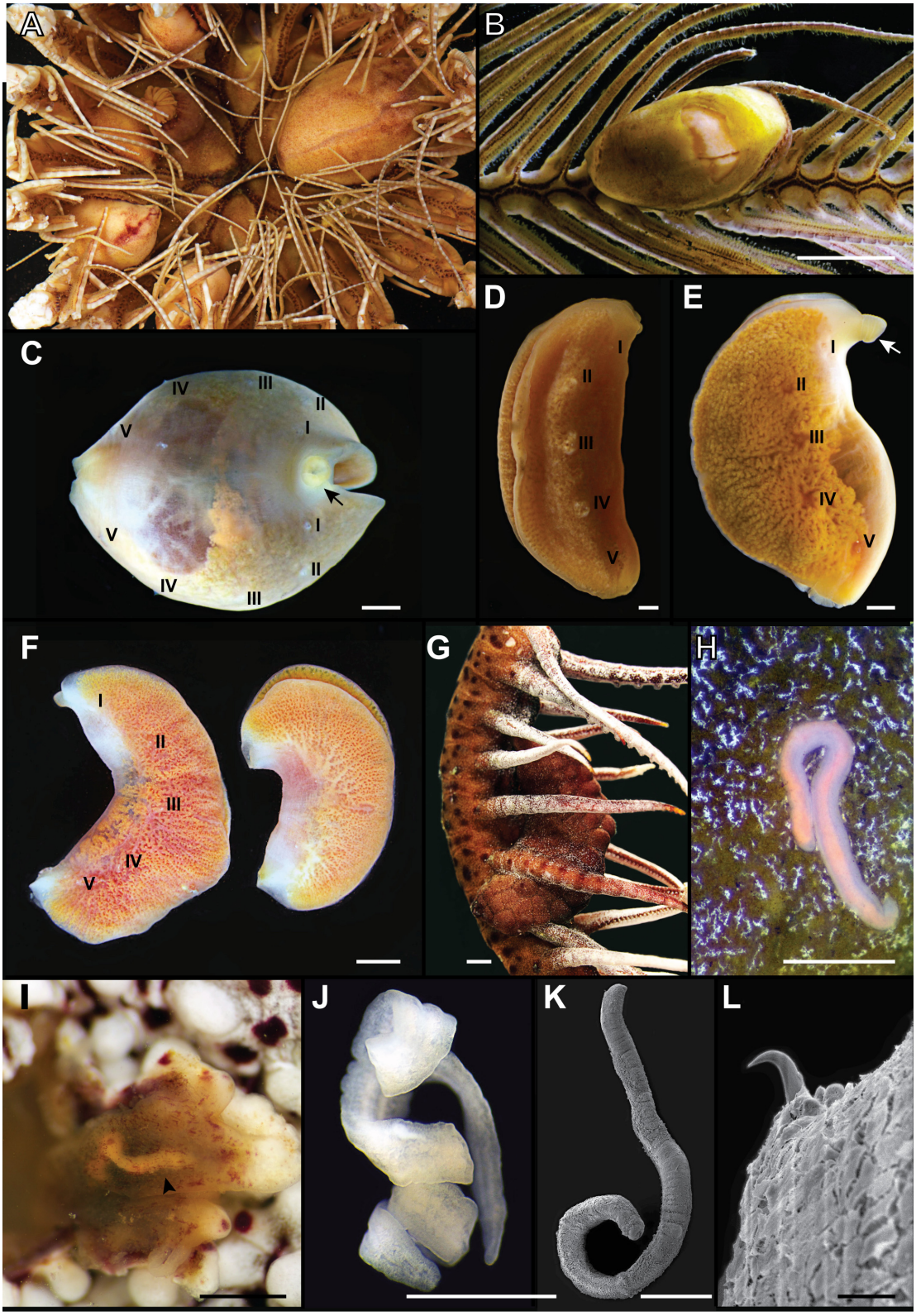

FIGURE 2. (A–E) Live photographs of *Endomyzostoma scotia* **n. sp.**—(A, B) SIO-BIC A3876 (non-types) on host *Promachocrinus kerguelensis;* cysts on centrodorsal (A) and arm, cyst cut open to show animal (B); (C–E) non-types (SIO-BIC A3224, A3876, A3912) removed from cysts, ventral, arrow shows mouth, roman numerals indicate parapodia. (F–G) Live photographs of *Endomyzostoma neridae* **n. sp.** holotype (AM W.43447) and paratype (AM P.90322)—(F) removed from cyst, roman numerals indicate parapodia; (G) within cyst on host's arm. (H–L) *Mesomyzostoma lanterbecqae* **n. sp.**—(H–J) Live photographs: (H, I) non-type (SIO-BIC A3650) and paratype (SIO-BIC A3652) within host's coelom, arrowhead shows myzostomid in (I), (J) non-type (SIO-BIC A3649) dissected; (K–L) SEM of non-type (SIO-BIC A3648), (K) whole animal, (L) hook and reduced parapodia. Scalebars 5 mm (B); 1 mm (C–J); 0.5 mm (K); 10 µm (L).

***Hypomyzostoma* Perrier, 1897**

***Hypomyzostoma jasoni* n. sp. Summers & Rouse**
Fig. 3 A–F

Hypomyzostoma crosslandi B—Lanterbecq *et al.* (2006)

Holotype: SIO-BIC A4020 (1 spm: 95% ethanol). South Wongat Reef, Madang Harbor, Papua New Guinea (5°8'25.8"S, 145°49'22.7928"E), <20 m. Collected using scuba on 29 November 2012 by MMS and GWR. Genbank (COI—KM491745).

Host. *Stephanometra indica* (Smith) (Mariametridae, Comatulida, Crinoidea). MNHN-IE-2013-8125 (dried voucher) & SIO-BIC E5883 (tissue subsample in 95% ethanol). Genbank (COI—KM491776).

Paratypes: SIO-BIC A3702 **paragenophores** (2 spms: 1—in 70% ethanol following fixation in formalin; 1 spm—95% ethanol). Same host and locality. Genbank (COI—KM491746). SAM E3398 **syngenophores** (3 spms: 1—in 70% ethanol following fixation in formalin; 1 spm—95% ethanol; 1 spm—mounted for SEM). Horseshoe Reef, Lizard Island, Australia (14°41'12.2"S, 145°26'31.4"E), 3 m. Collected using scuba on 17 November 2001 by GWR. Genbank (COI-DQ238198). Host: *Stephanometra indica*, SAM K2030.

Etymology. Named for Jason Rouse, brother of GWR, in honor of his birthday.

Diagnosis and description. Holotype body elongate, rounded anteriorly and posteriorly. Length ~ 6 mm following fixation. Body margin dentate, composed of many triangular cirri (Fig. 3B–E). Mouth and cloaca on ventral surface, subterminal (Fig. 3D). Extended proboscis smooth. Five pairs of parapodia with small, low cirri and hooks restricted to the anterior 3/5 of the body. Paired penes in line with third pair of parapodia. Small lateral organs, alternating with parapodia. Dorsal surface smooth (Fig. 3E). Color in life and preserved white with ten thick, dark transverse lines.

Remarks. *Hypomyzostoma jasoni* **n. sp.** is most similar to *H. crosslandi* (Boulenger, 1913), *H. elongatum* (Graff, 1887) and *H. jonathoni* **n. sp.** —taxa with a scalloped or dentate margin from numerous cirri, rounded anterior and posterior margin, and smooth dorsal surface with transverse bands of a different color (*H. crosslandi* and *H. jonathoni* **n. sp.**). *Hypomyzostoma crosslandi* was described from the Sudanese coast of the Red Sea associated with *Heterometra savignii* (Müller), *Oligometra serripinna* (Carpenter), and an unknown Comatulida. *Hypomyzostoma elongatum* was described from the Philippines, found on *Comanthus parvicirrus* (Müller). *Hypomyzostoma jonathoni* **n. sp.** (see below) is associated with *Liparometra articulata* (Müller). The location of the cloaca in *H. jasoni* **n. sp.**, approximately two-thirds of the way between parapodia and body margin, differs from both *H. jonathoni* **n. sp.**, *H. elongatum,* and *H. crosslandi* which have clearly subterminal cloacae. *Hypomyzostoma jasoni* **n. sp.** is further distinguished based on host use, and for *H. jonathoni* **n. sp.**, molecular data.

Other members of *Hypomyzostoma* have transverse ridges or other raised features on the dorsal surface, one of which, *H. membranaceum* (Graff, 1887) was described from *Stephanometra indica*—the host of *H. jasoni* **n. sp.** The types of *H. membranaceum* have been lost, yet the description provides multiple features which allow it to be distinguished to *H. jasoni* **n. sp.** *Hypomyzostoma membranaceum* possesses longitudinal swellings and five pairs of oval prominences on the dorsal surface, does not have lateral organs, the color is noted to be uniform, and the drawings show a subterminal cloaca close to the margin and parapodia distributed evenly along the entire length of the body.

***Hypomyzostoma jonathoni* n. sp. Summers & Rouse**
Fig. 3 G–K

Hypomyzostoma crosslandi A—Lanterbecq *et al.* (2006)

Holotype: SAM E3397 **hologenophore** (1 spm: 95% ethanol). Snake Pit, Lizard Island, Australia (14° 40.14'S, 145° 34.64'E), 14 m. Collected using scuba on 20 November 2001 by GWR. Genbank (COI—DQ238197).

Host. *Dichrometra/Lamprometra/Liparometra* sp. 1 (Müller) (Mariametridae, Comatulida, Crinoidea). SAM K2049.

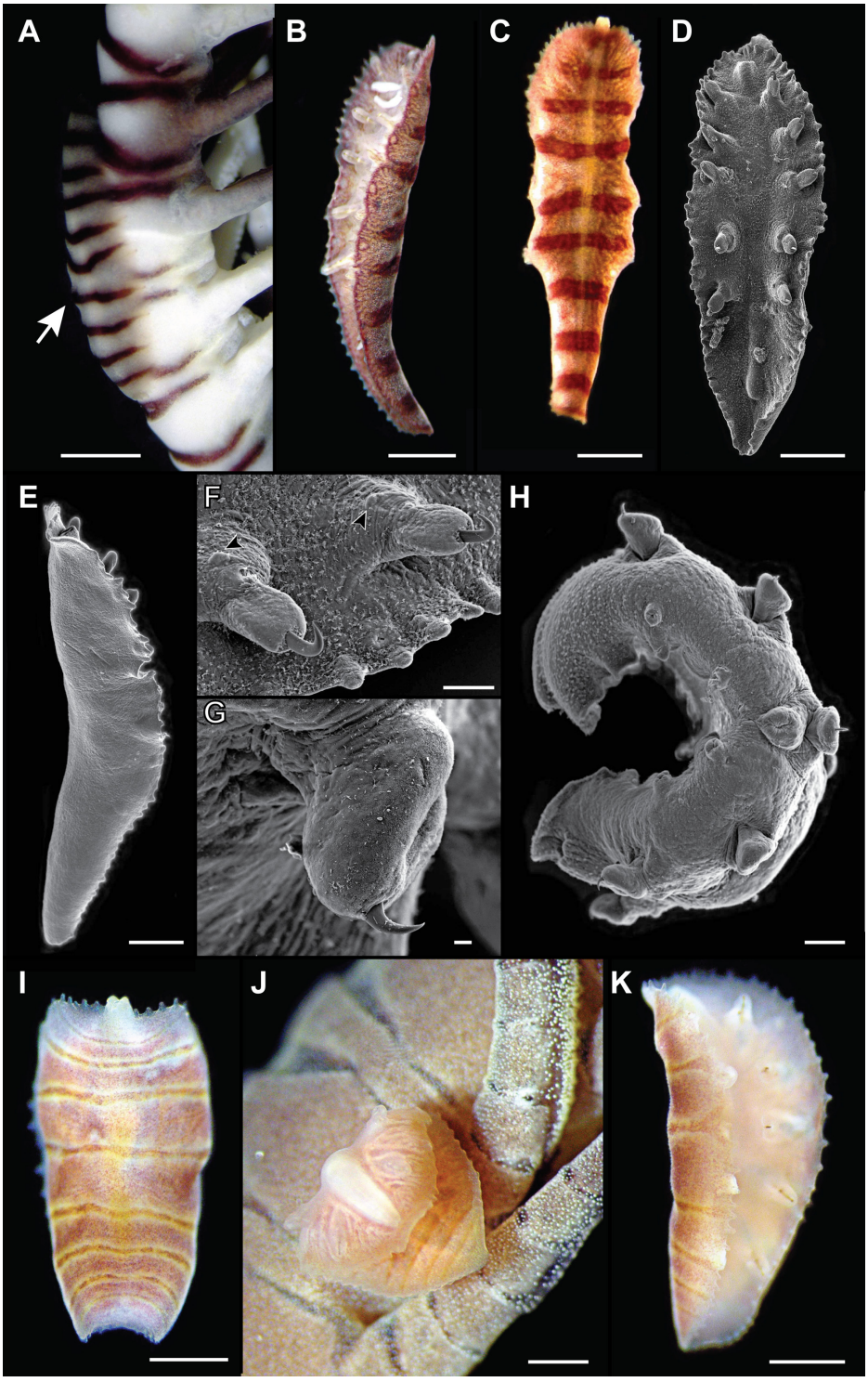

FIGURE 3. (A–B) *Hypomyzostoma jasoni* **n. sp.** —(A–C) live photographs, (A) non-type (SIO-BIC 4025) on arm of host *Stephanometra indica*, arrow indicating myzostomid; (B) paratype (SAM E3398) side profile, showing scalloped margin; (C) paratype (SAM E3398) dorsal view, showing transverse lines and extended, smooth proboscis; (D–F) SEM of paratype (SAM E3398), (D) ventral, showing five pairs of parapodia restricted to anterior two-thirds of body and cloaca positioned between last pair of parapodia and body margin; (E) side view, showing smooth dorsal surface and scalloped margin; (F) parapodia with hooks and small cirri buds, indicated by arrowheads. (G–K) *Hypomyzostoma jonathoni* **n. sp.**—(G–H) SEM of paratype (SIO-BIC A4024), (G) parapodia with hook, (H) side profile, showing parapodia with hooks and penis aligned with third parapodia; (I–K) live photographs of paratypes (SIO-BIC A4026), (I) dorsal view showing transverse lines and smooth extended proboscis; (J) juvenile removed from cyst on arm of host, folded ventral side facing upwards; (K) side profile, showing scalloped margin and range of parapodia. Scalebars 1 mm (A-E); 0.5 mm (I-K); 0.25 mm (J); 100 µm (F, H); 10 µm (G) (J); 100 µm (F, H); 10 µm (G).

Paratypes: SIO-BIC A3807/A4024 **syngenophore** (2 spms: 1spm—95% ethanol, 1 spm—mounted for SEM). Horseshoe Reef, Lizard Island, Australia (14° 41.12'S, 145° 26.31'E), 3 m. Collected using scuba on 20 November 2001 by GWR. Genbank (COI –KM491747). Host: *Dichrometra/Lamprometra/Liparometra* sp. 1 (Müller) (Mariametridae, Comatulida, Crinoidea). SAM K2039. Genbank (COI—KM491777). SIO-BIC A4021 **syngenophores** (3+ spms: 2 juveniles + multiple cysts—in 70% ethanol following fixation in formalin; 1 spm—95% ethanol). Granite Bluff, Lizard Island, Australia (14° 39.07'S, 145° 26.91'E), 15 m. Collected using scuba on 19 March 2000 by GWR. Genbank (18S—KM491764). Host: *Dichrometra/Lamprometra/Liparometra* sp. 4, SAM K1966; Genbank (COI—GQ913319). SIO-BIC A3833 **syngenophore** (1 spm: 95% ethanol). Gulewa Village, north Misima Island, Papua New Guinea (10°37'58.7994"S, 152°41'59.9994"E), <20 m. Collected using scuba on 14 August 2006 by GWR. Genbank (COI—KM491748). Host: unknown. SIO-BIC A3825 **syngenophore** (1 spm: 95% ethanol). Gulewa Village, north Misima Island, Papua New Guinea (10°37'58.7994"S, 152°41'59.9994"E), <20 m. Collected using scuba on 21 August 2006 by GWR. Host: unknown.

Etymology. Named for Jonathan Rouse, brother of GWR, in honor of his birthday.

Diagnosis and description. Holotype body elongate, rounded anteriorly and posteriorly (Fig. 3I). Length ~2 mm; width ~1 mm following fixation. Body margin scalloped, composed of many irregularly-sized triangular cirri (Fig. 3K). Mouth and cloaca on ventral surface, subterminal. Extended proboscis smooth. Paired penes in line with third pair of parapodia. Five pairs of acirrate parapodia with hooks. Small lateral organs, alternating with parapodia. Dorsal surface smooth. Color light pink with yellow transverse lines in life, transverse lines faded in preservative.

Remarks. *Hypomyzostoma jonathoni* **n. sp.** is most similar to *H. crosslandi*, *H. elongatum*, and *H. jasoni* **n. sp.** (see remarks for *H. jasoni* **n. sp.** above). *Hypomyzostoma jonathoni* **n. sp.** can be differentiated from *H. jasoni* **n. sp.** by the location of the cloaca and molecular data, and from all of these taxa by host use. Young specimens were recovered in cysts along the hosts' pinnules. These forms were lightly colored in life (Fig. 3I-K) and dark purple in preservative. Paratypes range in size up to ~5 mm, in the largest specimen the parapodia are restricted to the anterior-most four-fifths of the body and the color following fixation is light purple with ten dark transverse lines on the dorsal surface.

Myzostoma Leuckart, 1827

Myzostoma debiae n. sp. Summers, Al-Hakim & Rouse

Fig. 4 A–B

Holotype: MZB.Pol. 00127 **paragenophore** (1 spm: in 70% ethanol after formalin fixation). Kri Eco Jetty, Raja Ampat, Indonesia (0°33'27.42"S, 130°40'36.23"E), less than 20 m. Collected at night using scuba on 26 October 2013 by MMS and GWR.

Host. *Comactinia titan* Messing (Comatulidae, Comatulida, Crinoidea). SIO-BIC E6159 (DNA subsample only). Genbank (COI—KM491778).

Paratypes: SIO-BIC A3794 **paragenophores** (3 spms: 2—in 70% ethanol after formalin fixation; 1—in 9% ethanol following fixation in DMSO). Same host and locality. Genbank (COI—KM014210).

Etymology. Named for Deborah Summers, mother of MMS.

Diagnosis and description. Holotype body circular, diameter ~4 mm following fixation. Body margin with 20 medium-long cirri (Fig. 4A–B). Mouth and cloaca on ventral surface. Mouth, cloaca, and 8 lateral organs positioned midway between margin and parapodia, alternating with the latter. Extended proboscis with 9 long, triangular papillae (Fig. 4B). Five pairs of parapodia. Paired penes in line with third pair of parapodia. Dorsal color pattern with margin resembling ten white hearts (Fig. 4A).

Remarks. *Myzostoma debiae* **n. sp.** is distinct in its dorsal color pattern, the margin resembling ten white hearts. It can be further distinguished from other disc-shaped myzostomids by its cirri, which are equal in length, as well as its association with *Comactinia titan.* Other disc-shaped myzostomids with long cirri show noticeable differences in cirral length, the most anterior and posterior pairs longer than the rest. Paratype SIO-BIC A3794 (fixed in formalin—Figure 4 A–B) has 7 papillae on the proboscis.

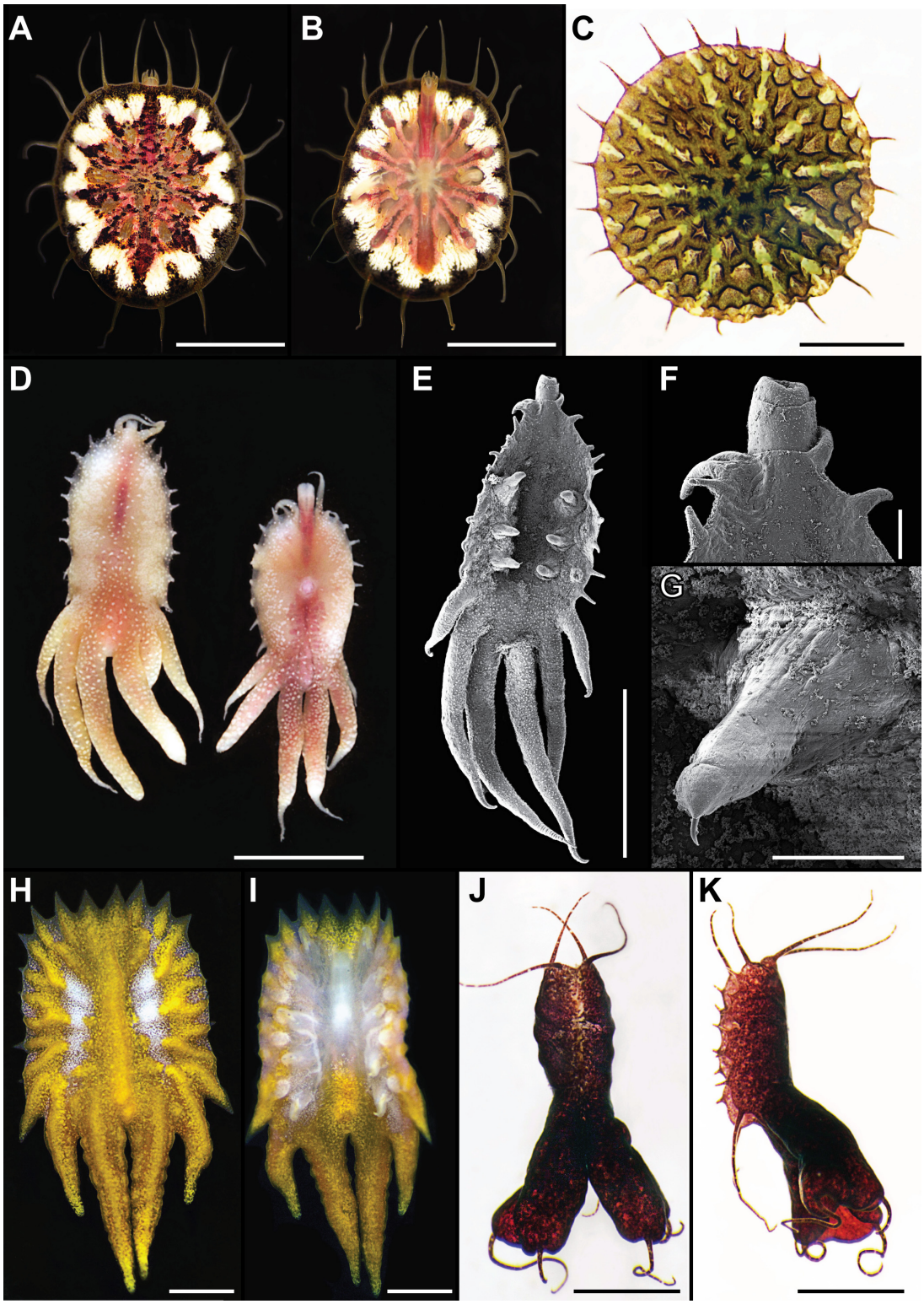

FIGURE 4. (A–B) Live photographs of *Myzostoma debiae* **n. sp.** paratype (SIO-BIC A3794)—(A) dorsal, showing characteristic color and patterning; (B) ventral, extended penises adjacent to third pair of parapodia and extended proboscis with seven papillae. (C) Live photograph of *Myzostoma miki* **n. sp.** holotype (SIO-BIC A3662), dorsal, unique honeycomb pattern shown. (D–G) *Myzostoma eeckhauti* **n. sp.** paratypes (SIO-BIC A3668)—(D) dorsal; (E–G) SEM, (E) ventral, specimen with only three pairs of parapodia—all other types had five pairs; (F) smooth extended proboscis, (G) parapodia with hook. (H–I) Live photograph of *Myzostoma hollandi* **n. sp.** holotype SIO-BIC A3791—(H) dorsal; (I) ventral, showing six acirrate caudal processes and eight distinctive anterior triangular cirri. (J–K) Live photographs of *Myzostoma indocuniculus* **n. sp.** paratypes (SIO-BIC A3763)—(J) dorsal showing two wide bunny ear-shaped caudal processes; (K) from the side, showing the cirri on the body margin and their relative lengths. Scalebars 2 mm (A-B); 1 mm (C–E, H–K); 100 µm (F, G).

***Myzostoma eeckhauti* n. sp. Summers & Rouse**
Fig. 4 D–G

Holotype: SIO-BIC A4013 **paragenophore** (1 spm: 95% ethanol). Madang Harbor, Papua New Guinea (5° 13.200'S, 145° 48.879'E), 5–20 m. Collected at night using scuba on 7 December 2012 by MMS and GWR.

Host. *Dichrometra/Lamprometra/Liparometra* sp. 1 (Müller) (Crinoidea, Comatulida, Mariametridae). SIO-BIC E5913 (tissue subsample in 95% ethanol).

Paratypes: SIO-BIC A3668 **paragenophores** (15 spms: 1—in 70% ethanol after formalin fixation; 13—95% ethanol; 1—mounted for SEM). Same host and locality as holotype. Genbank (COI—KM014192). SIO-BIC A3667 **syngenophores** (6 spms: 95% ethanol). Same locality as holotype. **Host.** *Dichrometra/Lamprometra/ Liparometra* sp. 1. MNHN-IE-2013-8128 (dried voucher) & SIO-BIC E5912 (tissue subsample in 95% ethanol). Genbank (COI—KM014351).

Etymology. Named after Igor Eeckhaut, for his extensive contributions to our understanding of myzostomid biology and systematics.

Diagnosis and description. Holotype body elongate, terminating in 6 cylindrical caudal processes (Fig. 4D–E). Length ~2.5 mm (including caudal processes), width ~ 1 mm following fixation. Medialmost pair of caudal processes longest; outermost pair shortest. Body margin with 20 cirri, most anterior pair more than three times as long as rest, which are short, triangular. Short cirri on some caudal processes, others acirrate. Mouth and cloaca terminal, cloaca located between caudal processes. Extended proboscis smooth (Fig. 4F). Five pairs of parapodia, midway between midpoint and body-margin with hooks (Fig. 4G). Live color pink, white in preservative.

Remarks. Four other species are known with 6 caudal processes (Table 1). Two have caudal processes with cirri as in *Myzostoma eeckhauti* **n. sp.** *Myzostoma intermedium* Graff, 1884 was described from a badly damaged specimen collected on *Zygometra microdiscus* (Bell) in the Torres Strait. A specimen very similar to the description and drawing in Graff (1884) was collected from the same host species in Lizard Island, Australia (Accession: SIO-BIC A4017). This specimen has a circular body with 20 long marginal cirri and six caudal processes with very long cirri—all features which distinguish it from *Myzostoma eeckhauti* **n. sp.** DNA sequences were not amplified from this specimen. *Myzostoma jaegersteni* Eeckhaut *et al.* 1994 also possesses caudal processes with cirri. It was described from *Heterometra savignii* (Müller) from Johore Shoal, Singapore, and specimens assigned to this species by the authors were also found on *Neometra multicolor* (AH Clark) and *Tropiometra carinata* (Lamarck). All identified specimens were dredged, presumably from deeper waters. We collected specimens of a similar size and color (thin and translucent), but from a different host—*Dichrometra flagellata*—from Lizard Island, Australia. Although we expect these to be a different species from those described in Singapore, we refer to these specimens as *Myzostoma* cf. *jaegersteni*. *Myzostoma eeckhauti* **n. sp.** can be distinguished from *Myzostoma* cf. *jaegersteni* by molecular data, host use, and general appearance (*M. eeckhauti* **n. sp.** is thick and pink).

***Myzostoma hollandi* n. sp. Summers, Al-Hakim & Rouse**
Fig. 4 H–I

Holotype: MZB Pol. 00128 **hologenophore** (½—in 70% ethanol after formalin fixation; ½—in 95% ethanol following fixation in DMSO). Near Kri Eco Resort Jetty, Raja Ampat, Indonesia (0°33'27.42"S, 130°40'36.23"E), less than 20 m. Collected at night using scuba on 13 October 2013 by MMS and GWR. Genbank (COI—KM014208).

Host. *Stephanometra tenuipinna* (Hartlaub) (Mariametridae, Comatulida, Crinoidea). SIO-BIC E5842. Genbank (COI—KM014353).

Etymology. Named after Nick Holland, for his appreciation of all things crinoidal, including their symbionts.

Diagnosis and description. Holotype body elongate, terminating in 6 cylindrical acirrate caudal processes (Fig. 4H–I). Entire specimen ~5 mm long including caudal processes following fixation. Medialmost pair of caudal processes longest, decreasing in length to outermost pair. Body margin with 16 triangular cirri, pairs 1–4 large, 5–7 very small, and pair 7 half the length of the most anterior pairs. Five pairs of parapodia, located halfway between the midpoint and body-margin (Fig. 4I). Four pairs of lateral organs midway between parapodia and body margin, alternating with the former. Live color orange, white in preservative.

Remarks. Four other species possess 6 cylindrical caudal processes (see remarks for *M. eeckhauti* **n. sp.**), but only *Myzostoma fissum* Graff, 1884 has acirrate caudal processes as in *M. hollandi* **n. sp.** *Myzostoma fissum* was described from a specimen bent and rolled upon itself from an unknown host southwest of the Fiji Islands. This species and its potential hosts were discussed in Eeckhaut *et al.* (1998), which also includes a description of specimens from *Dichrometra flagellata* in Papua New Guinea (which we advise be considered as the host for this species). *Myzostoma hollandi* **n. sp.** can be distinguished from *M. fissum* based on molecular data (Lanterbecq *et al.* 2006) and morphology. SEM of Papua New Guinean *M. fissum* in Eeckhaut *et al.* (1998) suggests that the caudal processes of *M. fissum* are more robust and less cylindrical than in *Myzostoma hollandi* **n. sp.** *Myzostoma fissum* specimens also had 18–24 marginal cirri, with the most anterior pair shortest (sometimes only a fringe), with more posterior pairs increasing in size (Eeckhaut *et al.* 1998). *Myzostoma hollandi* **n. sp.** has 16 marginal cirri, the most anterior pairs being largest.

Myzostoma indocuniculus n. sp. Summers, Al-Hakim & Rouse

Fig. 4 J–K

Holotype: MZB Pol. 00129 (1 spm: in 70% ethanol after formalin fixation). Mios Kon, Raja Ampat, Indonesia (0°29'55.54"S, 130°43'38.14"E), less than 20 m. Collected using scuba on 24 October 2013 by MMS and GWR.

Host. *Clarkcomanthus alternans* (Carpenter) (Comatulidae, Comatulida, Crinoidea). SIO-BIC E6161. Genbank (COI—KM491779).

Paratypes: SIO-BIC A3763 **paragenophores** (2 spms: 1—in 70% ethanol after formalin fixation, 1—95% ethanol). Genbank (COI—KM014209). Same host and locality.

Etymology. Named for the type locality in Indonesia and the 'bunny-ear' caudal processes—a feature shared with its closest relatives *Myzostoma cuniculus* Eeckhaut *et al.*, 1998 and *M. pseudocuniculus* Lanterbecq & Eeckhaut 2003.

Diagnosis and description. Holotype body oval, separated posteriorly into two broad 'ear-shaped' caudal processes, slightly longer than length of main body (Fig. 4J). Length ~2.2 mm, width ~1.5 mm following fixation. Caudal processes twice as long as wide. Two long posterior cirri on each caudal process of holotype [2–4 observed on paratypes]. Main body has scalloped margin with 18 cirri, first and last pair very long, second pair long, pairs 3–8 short (Fig. 4K). Mouth and cloaca terminal, cloaca between caudal appendages. Five pairs of parapodia. Color dark red-brown in life, color faded in preservative.

Remarks. Two other species have 'ear-shaped' caudal processes. *Myzostoma cuniculus* Eeckhaut *et al.*, 1998 has been recorded from Hansa Bay, Papua New Guinea and McCluer Islands, Australia, associated with *Clarkcomanthus albinotus* Rowe *et al., Clarkcomanthus littoralis* Rowe *et al.* (likely = *C. albinotus,* see Summers *et al.* (*in prep*)), and *Comanthus wahlbergii* (Müller) (Eeckhaut *et al.* 1998). *Myzostoma pseudocuniculus* Lanterbecq & Eeckhaut, 2003 was described from Toliara, Madagascar on *Comanthus* sp. aff. *wahlbergii* (later reported as *Comanthus parvicirrus* by the original authors in Lanterbecq *et al.* (2006)). These two species and *Myzostoma indocuniculus* **n. sp.** formed a well-supported clade in the molecular phylogeny of Summers & Rouse (2014).

Myzostoma indocuniculus **n. sp.** is distinguished from both *M. cuniculus* and *M. pseudocuniculus* by molecular data and occupied host. In addition, *Myzostoma indocuniculus* **n. sp.** differs from *M. cuniculus* by the presence of cirri on the caudal processes (caudal processes acirrate in *M. cuniculus*) and three pairs of long cirri on the trunk (*M. cuniculus* has 20 trunk cirri, all approximately equal in size). It can be distinguished from *M. pseudocuniculus* by its elongate form, longer and more developed caudal processes, and uniform color. Eeckhaut *et al.* (1998) also reported specimens of four undescribed species close to *M. cuniculus* from Okinawa, Enewatak Atoll, and southern Papua New Guinea. The description of those specimens does not match *Myzostoma indocuniculus* **n. sp.**

Myzostoma josefinae n. sp. Summers & Rouse

Fig. 5 A–D

Holotype: SIO-BIC A4016 **paragenophore** (1 spm: in 70% ethanol after paraformaldehyde/glutaraldehyde

fixation). Near 'Francisco' whalefall, Monterey Canyon, California (36° 46' 19.1994"N, 122° 4' 58.7994"W), 1020 m. Collected via the R/V *Western Flyer* using the ROV Doc Ricketts (Dive 9) on 10 March 2009 by GWR.

Host. *Psathyrometra fragilis* (AH Clark). SIO-BIC E4567. Genbank (COI—KM491780).

Paratypes: SIO-BIC A3798 **paragenophores** (7 spms: 6—in 70% ethanol after paraformaldehyde/glutaraldehyde fixation; 1—95% ethanol). Same host and locality as holotype. Genbank (COI—KM014189). SIO-BIC A3829 **syngenophores** (12 spms: 6 spms—in 70% ethanol after paraformaldehyde/glutaraldehyde fixation; 6 spms—95% ethanol). Guaymas Basin (26° 45' 12.8514"N, 111° 10' 19.632"W), 1314 m. Collected via the R/V *Western Flyer* using the ROV Doc Ricketts (Dive 390) on 16 April 2012 by GWR. Genbank (COI—KM491749). Host: *Psathyrometra fragilis* (AH Clark, 1907), SIO-BIC E6149 (DNA subsample only).

Etymology. Named for Josefin Stiller, an enthusiast of polychaetes.

Diagnosis and description. Holotype body circular disc with two elongated, cylindrical caudal appendages, approximately as long as body (Fig. 5A–D). Length ~2.1 mm; width ~1 mm, following fixation. Body margin with 18 cirri, alternating in length, most anterior pair up to twice as long as the rest (Fig. 5C–D). Caudal appendages with long terminal cirri. Mouth terminal. Proboscis smooth [seen in paratypes]. Cloaca terminal, between caudal appendages. Paired penes. Five pairs of parapodia, positioned two-thirds of way from center of disc to margin.

Remarks. *Myzostoma josefinae* **n. sp.** is the first myzostomid with paired elongate caudal appendages described from the eastern Pacific and *Psathyrometra fragilis.* Four other species are known to possess paired elongate caudal appendages, two recovered on Antedonidae, one from Comatulidae, one possibly with a Mariametroidea, and one associated with an uncertain host (Table 1).

Myzostoma josefinae **n. sp.** is most similar in form to *M. divisor* Grygier, 1989, *M. filicauda* Graff, 1883, and *M. tentaculatum* Jägersten, 1940a. *Myzostoma filicauda* was recorded on *Coccometra hagenii* (Pourtalès) (Antedonidae) from Sand Key, Florida. *Myzostoma divisor* was described from *Promachocrinus kerguelensis* Carpenter (Antedonidae) from Antarctica, and the description includes notes on the juvenile stages. *Myzostoma tentaculatum* was described from Japan, on an unknown host. As all identified hosts for this set of taxa are Antedonidae, it is likely that *M. tentaculatum* was collected on a Japanese antedonid. In addition to differences in host and locality, *Myzostoma josefinae* **n. sp.** is distinguished from *M. divisor* by molecular data published by Summers & Rouse (2014) and in having marginal cirri of unequal length (equal in *M. divisor*), *M. filicauda* by lacking papillae on the proboscis, and from *M. tentaculatum* by the length of the most anterior pair of cirri (six times longer than rest, resembling 'tentacles', in *M. tentaculatum*).

Two other taxa have two elongate caudal appendages. *Myzostoma bicaudatum* Graff, 1883 was described from *Comactinia meridionalis* (Agassiz) west of Tortugas in the Caribbean. *Myzostoma filiferum* Graff, 1884a was recorded on *Antedon bidentata* (nomen nudum) (possibly *Heterometra variipinna* (Carpenter) from the Torres Strait. [Nomenclatural issue of *M. filiferum* and *M. filicauda* discussed in Grygier (1989)]. *Myzostoma bicaudatum* and *M. filiferum* differ from *M. filicauda, M. divisor,* and *M. josefinae* **n. sp.** by possessing 20 (rather than 18) marginal cirri on the main body. In addition, *M. bicaudatum* is unique among all of the forms by having a subterminal mouth and lacking terminal cirri on the caudal appendages.

Myzostoma divisor and *M. josefinae* **n. sp.** were recovered as well-supported sister-taxa in the molecular phylogeny of Summers & Rouse (2014). We suspect that *M. filicauda* and *M. tentaculatum* will form a clade with these two taxa, while the evolutionary affinity of *M. bicaudatum* and *M. filiferum* may instead be with myzostomids with caudal processes and 20 marginal cirri, associated with Comatulidae and Mariametroidea respectively. The type specimens for *M. bicaudatum, M. filiferum,* and *M. filicauda* have been lost, and the location of types of *M. tentaculatum* is unknown.

Myzostoma kymae n. sp. Summers & Rouse

Fig. 5 E–I

Holotype: SIO-BIC A3681 **hologenophore** (1 spm: 95% ethanol). Madang Harbor, Papua New Guinea (5°12'27.63"S, 145°48'32.45"E), 3–17 m. Collected at night using scuba on 4 December 2012 by MMS and GWR. Genbank (COI—KM014197).

Host. *Alloeocomatella* **n. sp.** (AH Clark) (Comatulidae, Comatulida, Crinoidea). MNHN-IE 2013-8027 (dried voucher) & SIO-BIC E5862 (tissue subsample in 95% ethanol). Genbank (COI—KJ874980).

FIGURE 5. (A–D) Live photographs of *Myzostoma josefinae* **n. sp.**—(A, B) paratype (SIO-BIC A3829) on host, *Psathyrometra fragilis;* (C) dorsal view of paratype (SIO-BIC A3829), showing long cirri on body margin and elongate, cylindrical caudal appendages full of oocytes; (D) ventral view of paratype (SIO-BIC A3798). (E–I) *Myzostoma kymae* **n. sp.**—(E–G) SEM of paratype (SIO-BIC A3682), ventral surface, showing five pairs of parapodia (E), penises aligned with third pair (F), and alternating lateral organs (G); (H–I) Live photographs of holotype (SIO-BIC A3681) and paratypes (SIO-BIC A3682), (H) on host, *Alloeocomatella pectinifera*, showing faint dorsal longitudinal ridge, (I) side and ventral views, showing small cirri along body margin and extended proboscis with papillae. (J–L) Live photographs of *Myzostoma laurenae* **n. sp.** holotype (SIO-BIC A3809), (J) on host, *Capillaster multiradiatus*, (K) dorsal view showing color pattern and medium-long cirri along body margin, (L) ventral view showing extended proboscis with papillae, five pairs of parapodia and alternating lateral organs. Scalebars 1 mm (H-I); 0.5 mm (A–E, J–L); 100 µm (F, G).

Paratypes: SIO-BIC A3682 **paragenophore** (2 spms: 1—95% ethanol; 1—mounted for SEM). Same host and locality as holotype.

Etymology. Named for Kym Vercoe, sister-in-law of GWR, in honor of her birthday.

Diagnosis and description. Holotype body oval-shaped, ~4 mm long, 2 mm wide following fixation. Dorsal longitudinal ridge; otherwise smooth surface (Fig. 5H). Body margin with 20 short, triangular cirri (Fig. 5I). Mouth and cloaca on ventral surface. Mouth and cloaca sub-terminal, in line with lateral organs. Proboscis with ~20 papillae. Paired penes in line with third pair of parapodia. Five pairs of parapodia, midway between midline and body margin. Lateral organs closer to parapodia than body margin. Color bright red in life, faded in preservative.

Remarks. This species most resembles *Myzostoma viride* Atkins, 1927, which was described from the Great Barrier Reef (Australia) associated with *Comanthus annulatus (=Comanthus parvicirrus).* This description was of three green-colored specimens with a white anterior-posterior ridge on the dorsal surface and red extended proboscis with papillae. In two of the specimens studied here, the anterior and posterior margins were broadly rounded, while in the third the body tapered to a point posteriorly. We collected yellow specimens, with a dorsal ridge from *Comatella nigra* (Carpenter) at Lizard Island, Australia. We suggest that these species are most closely allied to the green specimens described, and that the host of Atkin's specimens may have been *Comatella* (most of Atkin's species were described from *Comanthus annulatus*). *Myzostoma kymae* **n. sp.** differs from these specimens assigned to *Myzostoma viride* in color, placement of mouth (nearer to the body margin in *M. viride*), lack of clear dorsal ridge, host use, and molecular data (*Myzostoma* cf. *viride* published in Summers & Rouse (2014)). The paratype of *M. kymae* **n. sp.** is slightly larger, brown, and the proboscis has fewer (~7) papillae.

Myzostoma laurenae n. sp. Summers & Rouse

Fig. 5 J–L

Holotype: SIO-BIC A3657 **hologenophore** (1 spm—95% ethanol). Madang Harbor, Papua New Guinea (5°12'27.63"S, 145°48'32.45"E), 3–17 m. Collected using scuba at night on 4 December 2012 by MMS and GWR. Genbank (COI—KM014203).

Host. *Capillaster multiradiatus* s.l. AH Clark, MNHN-IE-2013-8029 (dried voucher) & SIO-BIC E5863 (tissue subsample in 95% ethanol), Genbank (COI—KJ874984).

Paratypes: SIO-BIC A4089 **paragenophore** (1 spm: in 70% ethanol after formalin fixation). Same host and locality as holotype. SIO-BIC A3809 **syngenophore** (1 spm: ½—in 70% ethanol after formalin fixation; ½—95% ethanol). South Island, Lizard Island Reef, Australia (14°42'23.5" S, 145°27'10.4" E, less than 20 m. Collected using scuba on 22 November 2001 by GWR. Genbank (COI—KM014198). Host: *Capillaster multiradiatus* (Linnaeus) (Comatulidae, Comatulida, Crinoidea). Specimen not collected. SIO-BIC A3674 **syngenophores** (3 spms: 1 spm—in 70% ethanol after formalin fixation; 2 spms—95% ethanol). Inside of Tabat Island, Madang Harbor, Papua New Guinea (5° 8.187'S, 145° 48.700'E), 5–20 m. Collected using scuba on 9 December 2012 by GWR and MMS. Genbank (COI—KM491750). Host: *Capillaster multiradiatus* s.l., MNHN-IE-2013-8127 (dried voucher) & SIO-BIC E5933 (tissue subsample in 95% ethanol); Genbank (COI—KM491781). SIO-BIC A3660 **syngenophores** (3 spms: 1 spm—in 70% ethanol after formalin fixation; 2 spms—95% ethanol). Madang Harbor, Papua New Guinea (5°12'27.63"S, 145°48'32.45"E), 3–17 m. Collected using scuba at night on 4 December 2012. Host: *Capillaster multiradiatus* s.l., SIO-BIC E5905 (tissue subsample in 95% ethanol).

Etymology. Named for Lauren Rouse, niece of GWR, in honor of her birthday.

Diagnosis and description. Holotype body circular, ~1 mm diameter following fixation. Body margin with 20 medium-long cirri (Fig. 5K). Dorsal surface smooth, with irregular white pigment in lace-like pattern. Mouth and cloaca on ventral surface, in line with lateral organs. Extended proboscis with 7 triangular papillae (Fig. 5L). Paired penes. Five pairs of parapodia. Lateral organs closer to parapodia than body margin.

Remarks. *Myzostoma laurenae* **n. sp.** is most similar to *M. stochoeides* Atkins, 1927 and *M. longicirrum* Graff, 1887—both with records on (but not originally described from) *Capillaster multiradiatus* and *Capillaster sentosus* respectively. *Myzostoma stochoeides* was originally described from the Great Barrier Reef associated with *Comanthus annulatus* (i.e. *Comanthus parvicirrus*). We collected specimens from near the type locality of Badu Island, Australia associated with *Comanthus parvicirrus* (SIO-BIC A3661, A3678-79, A3723-24, A3795, A3810—molecular data published in Summers & Rouse (2014)), which we consider most similar to those

described by Atkins (1927) (some showing the ringed-pattern of the drawings). These specimens can be distinguished from *Myzostoma laurenae* **n. sp.** based on molecular data, host use, size, length of cirri (longer in *M. laurenae* **n. sp.**), and color pattern (*M. stochoeides* translucent to dark brown). It is possible that those specimens associated with *Capillaster* previously referred to *M. stochoeides* in Eeckhaut *et al*. (1994) may instead be *M. laurenae* **n. sp.**

Myzostoma longicirrum Graff, 1887 was described originally from Zamboanga, Philippines on *Comanthus parvicirrus.* The specimen was badly damaged and the drawing included was a 'restoration' and is a ventral view only. Eeckhaut *et al.* (1994) redescribed this species from material found loose in jars with *Capillaster sentosus*, *Capillaster* sp., *Comatula pectinata*, and *Pontiometra andersoni* from Singapore, the Philippines, and the Sulu Archipelago. These specimens were described as of the same general size and shape of *M. laurenae* n. sp, but were dark brown, possessed 'membranous marginal lobes between the marginal cirri,' and the three most anterior and posterior pairs of cirri were much longer than the rest. In the one paratype with intact cirri (SIO-BIC A3674), the first three and last four pairs of cirri were approximately two times longer than cirri pairs 4–6. Preserved material was white and translucent, and although slight scalloping might be interpreted, the distinct marginal lobes were not observed in *M. laurenae* **n. sp.** In the original description of *M. longicirrum*, the mouth was in line with the parapodia and the lateral organs were midway between the parapodia and body margin; this placement differs from that observed in *M. laurenae* **n. sp.**, but these features were suggested by Eeckhaut *et al.* (1994) to have been a misinterpretation based on the poor quality of the specimens. We consider *Myzostoma laurenae* **n. sp.** distinct from *M. longicirrum* based on color, relative lengths of cirri, host, and locality.

Myzostoma miki n. sp. Summers & Rouse

Fig. 4 C

Holotype: SIO-BIC A3662 **hologenophore** (1 spm: 95% ethanol). Wongat Island, Madang, Papua New Guinea (5° 8.093'S, 145° 49.338'E), less than 20 m. Collected using scuba on 4 December 2012 by MMS and GWR. Genbank (COI—KM491751).

Host. *Clarkcomanthus luteofuscum* HL Clark (Comatulidae, Comatulida, Crinoidea). SIO-BIC E5951 (tissue subsample in 95% ethanol). Genbank (COI—KM491782).

Paratypes: SIO-BIC A3834 (2 spms: 95% ethanol). Hook Reef, Whitsunday Islands, Australia (20° 7'5.03"S, 148°55'25.30"E), 10 m. Collected using scuba on 22 June 2011 by GWR and Nerida Wilson. Genbank (COI—KM014201). Host: *Clarkcomanthus luteofuscum,* SIO-BIC E4726; Genbank (16S—KM491765).

Etymology. Named for Michael Summers, father of MMS.

Diagnosis and description. Holotype body circular, ~2 mm in diameter following fixation. Dorsal surface with elevated hexagonal ridges in 5 rings, resembling a honeycomb (Fig. 4C). Body margin with 20 short-medium length cirri, equal length. Mouth and cloaca on ventral surface, in line with parapodia. Proboscis with 9 papillae. Five pairs of parapodia midway between midline and body margin. Paired penes in line with third pair of parapodia. Four pairs of lateral organs midway between parapodia and body margin, alternating with the former.

Remarks. *Myzostoma miki* **n. sp.** can be distinguished from other shallow-water myzostomids by its hexagonal honeycombed ridged pattern on the dorsal surface (Table 1). Two other species have been described with a pentagonal dorsal patterning. *Myzostoma chelonium* McClendon, 1906 and *Myzostoma chelonoidium* McClendon, 1906 were both described associated with the same host—*Calometra discoidea* Carpenter, 1888—from the same locality—Suruga Gulf and Sagami Sea, Japan, and are possibly the same species. These specimens are described as circular and elongate, respectively, and drawings show two to three rings of large (relative to their dorsal surface) square to hexagonal combs (the author stated that they gave the appearance of a turtle shell) (McClendon 1906). The two anterior and posterior pairs of cirri were observed to be smaller than the rest in *M. chelonium*—a feature not seen in *Myzostoma miki* **n. sp.** The difference in host, locality, and overall appearance of the pentagonal ridges allows separation of these two Japanese species from *Myzostoma miki* **n. sp.**

One species known to associate with Comatulidae may (or may not) have a complex dorsal patterning—*Myzostoma atrum* Atkins, 1927. *Myzstoma atrum* was described from the Great Barrier Reef, associated with *Comatula pectinata* (Linnaeus) and another unidentified crinoid. This species has a dorsal surface that varied among specimens, likely due to poor preservation. One drawing depicts a specimen with many small

ridges, similar to *Myzostoma miki* **n. sp.**, but these ridges were described as irregular folds in the dorsal surface. *Myzostoma atrum* was also found on a different host, recorded as dark purple, and lacked marginal cirri—all features which distinguish it from *Myzostoma miki* **n. sp.**

***Myzostoma pipkini* n. sp. Summers, Al-Hakim & Rouse**

Fig. 6 A–I

Hypomyostoma **n. sp.** 1—Lanterbecq *et al.* (2006).

Holotype: MZB Pol. 00130 **paragenophore** (1 spm: in 70% ethanol after formalin fixation). New Reef, Raja Ampat, Indonesia (0°32'40.44"S, 130°41'39.52"E), less than 20 m. Collected using scuba on 20 October 2013 by MMS and GWR.

Host. *Colobometra perspinosa* (Carpenter) (Colobometridae, Comatulida, Crinoidea). Genbank (COI—KM491783).

Paratypes: SIO-BIC A4018 **paragenophore** (1 spm: 95% ethanol). Same host and locality as holotype. Genbank (COI—KM491752). AM-W.43459 **syngenophores** (4 spms: in 70% ethanol after formalin fixation), AM-W.43460 **syngenophore** (1 spm: in 70% ethanol after formalin fixation), AM-W.43460 **syngenophore** (1 spm: 95% ethanol), and AM-W.43452 **syngenophores** (18 spms—95% ethanol). West of Dili, off Tibar, Banda Sea, Timor-Leste (8°33'47"S, 125°28'31"E), 4–10 m. Collected using scuba on 21 Sep 2012 by GWR and Nerida Wilson. Genbank (COI—KM491753; KM491754). Host: *Colobometra perspinosa*, AM-J.25415; Genbank (COI—KM491784). SIO-BIC A3753 **syngenophore** (1 spm: 95% ethanol). West Mansuar, Raja Ampat, Indonesia (0°36'30.10"S, 130°32'37.53"E), less than 20 m. Collected using scuba on 23 October 2013 by MMS and GWR. Genbank (COI—KM491755). Host: *Colobometra perspinosa,* SIO-BIC E6151. SIO-BIC A3818 **syngenophores** (3 spms: 1 spm—in 70% ethanol after formalin fixation; 1 spm—95% ethanol; 1 spm—mounted for SEM). Cobia Hole, Lizard Island, Australia (14°39'6.9834"S, 145° 27' 30.9954"E), 18 m. Collected using scuba on 21 March 2000 by GWR. Genbank (COI—KM491756). Host: *Colobometra perspinosa.* SIO-BIC A3742 **syngenophores** (4 spms: 3 spms—in 70% ethanol after formalin fixation; 1 spm—95% ethanol). New Reef, Raja Ampat, Indonesia (0°32'40.44"S, 130°41'39.52"E), less than 20 m. Collected using scuba on 20 October 2013 by MMS and GWR. Host: *Colobometra perspinosa,* SIO-BIC E6152; Genbank (COI—KM491785). SIO-BIC A3743 **syngenophores** (2 spms: 1½ spm—in 70% ethanol after formalin fixation; ½ spm—95% ethanol). New Reef, Raja Ampat, Indonesia (0°32'40.44"S, 130°41'39.52"E), less than 20 m. Collected using scuba on 20 October 2013 by MMS and GWR. Host: *Colobometra perspinosa,* SIO-BIC E6153. SIO-BIC A3745 **syngenophores** (2 spms: 1½ spm—in 70% ethanol after formalin fixation; ½ spm—in 95% ethanol following DMSO fixation). Citrus Reef, Gam Island, Raja Ampat, Indonesia (0°32'20.34"S, 130°36'4.13"E), less than 20 m. Collected using scuba on 21 October 2013 by MMS and GWR. Host: *Colobometra perspinosa,* SIO-BIC E6154. SIO-BIC A3746 **syngenophores** (2 spms: 1 spm—in 70% ethanol after formalin fixation; 1 spm—in 95% ethanol after DMSO fixation). Yenbuba Jetty, eastern side of Mansuar, Raja Ampat, Indonesia (0°34'18.30"S, 130°39'30.28"E), less than 20 m. Collected using scuba on 13 October 2013 by MMS and GWR. Host: *Colobometra perspinosa,* SIO-BIC E6155. SIO-BIC A3747 **syngenophore** (1 spm: ½ spm—in 70% ethanol after formalin fixation; ½ spm—95% ethanol). Sorido Blue Hole, Raja Ampat, Indonesia (0°33'28.19"S, 130°41'37.90"E), less than 20 m. Collected using scuba on 19 October 2013 by MMS and GWR. Host: *Colobometra perspinosa,* SIO-BIC E6156. SIO-BIC A3751 **syngenophore** (1 spm: 95% ethanol). Otdima Reef, Raja Ampat, Indonesia (0°32'59.70"S, 130°37'10.88"E), less than 20 m. Collected using scuba on 22 October 2013 by MMS and GWR. Host: *Colobometra perspinosa,* SIO-BIC E6157; Genbank (COI—KM491786). SIO-BIC A3755 **syngenophore** (1 spm: ½ spm—in 70% ethanol after formalin fixation; ½ spm—95% ethanol). New Reef, Raja Ampat, Indonesia (0°32'40.44"S, 130°41'39.52"E), less than 20 m. Collected using scuba on 20 October 2013 by MMS and GWR. Host: *Colobometra perspinosa,* SIO-BIC E6162. SIO-BIC A3756 **syngenophores** (2 spms: 1 spm—in 70% ethanol after formalin fixation; 1 spm—95% ethanol). Otdima Reef, Raja Ampat, Indonesia (0°32'59.70"S, 130°37'10.88"E), less than 20 m. Collected using scuba on 22 October 2013 by MMS and GWR. Host: *Colobometra perspinosa,* SIO-BIC E6158.

Etymology. Named for Jason Pipkin, an explorer of annelid neuroanatomy.

Diagnosis and description. Holotype body elongate, terminating in a point posteriorly (Fig. 6A–C, G–I).

Length ~ 1.2 cm following fixation. Body margin scalloped, composed of many irregularly-sized triangular cirri. Mouth and cloaca on ventral surface. Mouth subterminal, positioned midway between first pair of parapodia and body margin. Extended proboscis smooth (Fig. 6C, I). Five pairs of parapodia with small, low cirri and hooks (Fig. 6D–E) restricted to the anterior half of the body (Fig. 6C, I). Cloaca positioned midway between last pair of parapodia and body margin. Paired penes in line with third pair of parapodia. Small lateral organs, alternating with parapodia. Dorsal surface with longitudinal ridge and 12 lateral ridges, of which the four most anterior are not continuous.

Remarks. *Myzostoma pipkini* **n. sp.** is most similar to *Myzostoma attenuatum* Grygier, 1989, *Hypomyzostoma folium* (Graff, 1884a), *Hypomyzostoma nanseni* (Graff, 1887), and *Myzostoma moebianum* (Graff, 1884a). These taxa are elongate with the posterior end terminating in a point and have a scalloped margin composed of many irregularly shaped cirri, subterminal mouth, and the cloaca and parapodia restricted to the anterior two-thirds of the body.

Myzostoma attenuatum was described from the Philippines associated with *Capillaster sentosus* (Carpenter), with paratypes from a variety of other hosts distributed throughout the Indo-Pacific (*Comaster multifidus* (Müller), *Colobometra perspinosa, Oxymetra finschii* (Hartlaub), *Pontiometra andersoni* (Carpenter), *Decametra mylitta* AH Clark, *Cenometra bella* (Hartlaub), *Stephanometra indica* (Smith), *Phanogenia gracilis* (Hartlaub), *Petasometra helianthoides* AH Clark). *Myzostoma attenuatum* was suggested as a possible synonymn of *M. moebianum* in Grygier (1989, 1992). *Myzostoma moebianum* was described from a poorly preserved specimen collected at Fouquet Island (Seychelles) on an unknown feather star host (referred to as *Comatula* sp.). In *M. moebianum* the skin is ciliated (not mentioned in descriptions of *M. attenuatum*). Specimens assignable to *M. attenuatum* (or *M. moebianum*—dorsal cilia present) were collected and sequenced in Summers & Rouse (2014). These specimens were associated with three hosts (*Cenometra bella, Petasometra clarae* (Hartlaub), and *Pontiometra andersoni*), confirming the wide range of recorded hosts included in the original descriptions for *M. attenuatum* (see Genbank KM014182; KM491757; KM491758; KM491759; KM491760; KM491761; KM491762). *Myzostoma pipkini* **n. sp.** is distinguished from *M. attenuatum/M. moebianum* by molecular data, lack of cilia on the dorsal surface, parapodia midway between the midline and margin (in *M. attentuatum* the parapodia are closer to the margin), and a continuous scalloped margin (the cirri are sparse in the posterior region of *M. attenuatum*).

Hypomyzostoma folium was described from southwest of West Papua, Indonesia associated with *Cyllometra manca* (Carpenter). *Hypomyzostoma folium* differs from *M. pipkini* **n. sp.** by having a distinctive elevated longitudinal ridge, lacking lateral organs, and occupied host. *Hypomyzostoma nanseni* was described from the Maluku Islands, Indonesia found lying loose with a collection of feather stars. This species was distinguished by a dorsal line along the mid-line and the color was recorded as a uniform dirty brown and reddish. A specimen matching this description was collected from *Basilometra boschmai* AH Clark and sequenced in Summers & Rouse (2014). We suggest that the host now be considered *Basilometra boschmai* for this species. The cirri of these specimens were cylindrical, more elongate, and spaced apart, of a much different appearance than the scalloped margin of *M. pipkini* **n. sp.** These specimens also possessed a wide dorsal ridge above the intestinal track, which is not present in *M. pipkini* **n. sp.**

Myzostoma pipkini **n. sp.** can be further distinguished from all of these taxa by the horizontal ridges on the dorsal surface, which ranges among types from approximately seven to 12. The live dorsal coloring of *M. pipkini* **n. sp.** varies from white and black (Fig. 6 F–G), white-green (Fig. 6 H–I), and red, with or without white patterning (not shown). In preservative, colors are faded or mostly white. Length of types 1 mm—1.2 cm.

Myzostoma susanae **n. sp. Summers & Rouse**

Fig. 6 J–M

Myzostoma coriaceum (Fig. 1A; DNA from other specimen)—Lanterbecq *et al.* (2006)

Holotype: SAM E3879 **hologenophore** (1 spm: ½—in 70% ethanol after formalin fixation; ½—95% ethanol). Mermaid Cove, Lizard Island Reef, Australia (14°38’51.1” S, 145°27’9.6” E), 6 m. Collected using scuba on 18 November 2001 by GWR. Genbank (COI—KM014200).

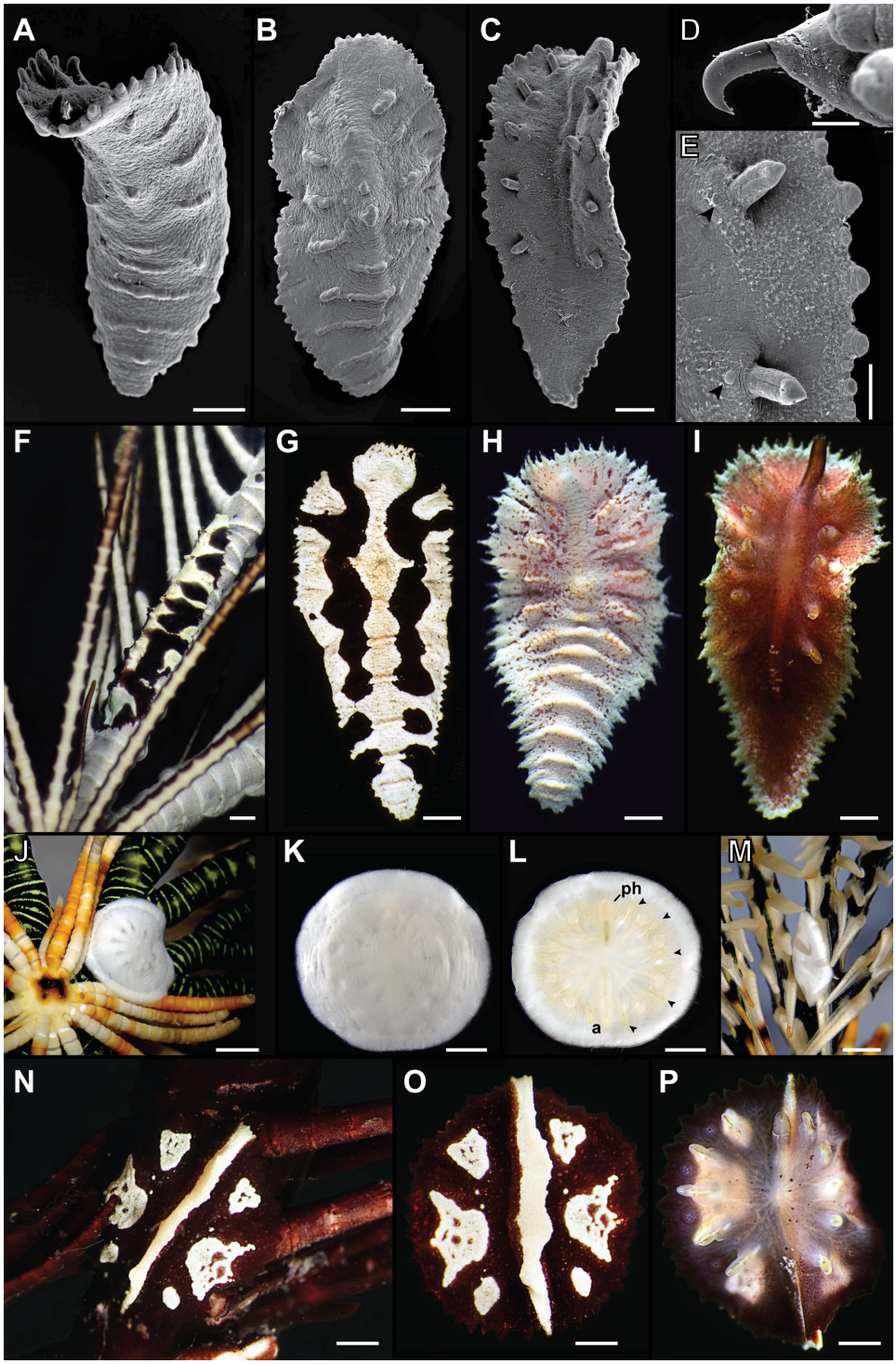

FIGURE 6. (A–I) *Myzostoma pipkini* **n. sp.**—(A–E) SEM of paratype (SIO-BIC A3818), (A–B) dorsal, showing transverse ridges and scalloped margin, (C) ventral showing smooth extended proboscis, five pairs of parapodia restricted to anterior two-thirds of body, and position of cloaca midway between last pair of parapodia and body margin, (D) hook within parapodia, (E) two parapodia with small cirrus buds, indicated by arrow head; (F–I) live photographs, (F–G) paratype SIO-BIC A3746, dorsal view on host *Colobometra perspinosa* (F) and separated, showing transverse ridges and scalloped margin (G), (H–I) paratype (SIO-BIC A 3755), (H) dorsal view, (I) ventral, showing smooth proboscis, restricted parapodia, and position of cloaca. (J–M) Live photographs of *Myzostoma susanae* **n. sp.** holotype (SIO-BIC A3803), (J, M) on host, *Comaster schlegelii*, (K) dorsal view, a few small cirri visible on body margin, (L) ventral view showing five pairs of parapodia, indicated with an arrow head, and alternating lateral organs, anus (a) and pharynx (ph). (N–P) Live photographs of *Myzostoma tertiusi* **n. sp.** holotype (SIO-BIC A3793)—(N) on host, *Colobometra perspinosa*, (O) dorsal view showing color pattern and scalloped margin, (P) ventral view showing five pairs of parapodia and smooth extended proboscis. Scalebars 2 mm (J-M); 1 mm (N–P); 0.5 mm (A–C, F–I); 200 μm (E); 20 μm (D).

Host. *Comaster schlegelii* (Carpenter) (Comatulidae, Comatulida, Crinoidea). SAM K2025. Genbank (28S—KM491766).

Etymology. Named for Susan Rouse, mother of GWR, in honor of her birthday.

Diagnosis and description. Holotype body circular, ~5 mm in diameter following fixation. Body margin with 20 very small, thin cirri (Fig. 6J–M). Mouth and cloaca on ventral surface, in line with first and last pair of parapodia respectively. Five pairs of parapodia. Lateral organs closer to parapodia than body margin (Fig. 6L). Live and preserved color bright white.

Remarks. There are five other species with short marginal cirri recorded from feather stars, all of which are large in size (> 3 mm) (Table 1). *Myzostoma seymourcollegiorum* Rouse & Grygier, 2005 has low parapodial cirri and thicker marginal cirri and is also clearly different from DNA sequence data, though it is closely related to *M. susanae* **n. sp.** (Summers & Rouse 2014). *Myzostoma seymourcollegiorum* is found in southern Australia, associated with *Cenolia trichoptera* (Müller) and possibly *Cenolia glebosus* Rowe *et al.* (Rouse & Grygier 2005), though the latter association has yet to be assessed with DNA sequencing. The other four species with short marginal cirri were all described by Graff and his descriptions were all brief. *Myzostoma brevicirrum* Graff, 1884a was described from Tonga (31 m depth), collected with *Clarkcomanthus comanthipinnus* (Gislén). Specimens were up to 5 mm in diameter, transparent yellow-ish in color (one specimen was brown), and with a proboscis with papillae. *Myzostoma pallidum* Graff, 1877 and *Myzostoma triste* Graff, 1877 were described from Bohol, Philippines. *Myzostoma pallidum* was found on three species of crinoids—*Comatula solaris* and *Comanthus parvicirrus* (hosts revised in Graff, 1884a). Specimens were ~ 3 mm in diameter and pale grey-brown with a dirty-yellow edge, the drawing showing a proboscis with papillae. *Myzostoma triste* was recorded from *Comanthus parvicirrus* (in Graff, 1884a). Material was around 4.5 mm long and 4 mm wide and dark brown in color. *Myzostoma coriacium* Graff 1884a was described from Port Denison, Australia associated with *Colobometra perspinosa* (though host identification seems dubious). The diameter of the three specimens were between 2.7 to 9 mm, with the margins bent downwards. The specimens were darkish brown in color. The lateral organs described as located midway between the parapodia and body margin (though the drawing shows them closer to the parapodia). *Myzostoma susanae* **n. sp.** is distinguishable from all of these species based on color and host.

Myzostoma tertiusi n. sp. Summers, Al-Hakim & Rouse

Fig. 6 N–P

Holotype: MZB Pol. 00131 **hologenophore** (1 spm: ½—in 70% ethanol after formalin fixation; ½—95% ethanol). Otdima Reef, Raja Ampat, Indonesia (0°32'59.70"S, 130°37'10.88"E), less than 20 m. Collected using scuba on 22 October 2013 by MMS, GWR, and Tertius Kammeyer. Genbank (COI—KM491763).

Host. *Colobometra perspinosa* (Carpenter) (Colobometridae, Comatulida, Crinoidea). SIO-BIC E6157. Genbank (COI—KM491786).

Paratypes: SIO-BIC A3703 (2 spms: 1—in 70% ethanol after formalin fixation; 1—95% ethanol). Outside of Tab Island, Madang, Papua New Guinea (5° 10.013'S, 145° 50.455'E), 5–20 m. Collected using scuba on 7 December 2012 by MMS and GWR. Genbank (COI—KM014206). Host: *Cenometra bella* (Hartlaub). MNHN-IE-2013-8070 (dried voucher) & SIO-BIC E5939 (tissue subsample in 95% ethanol). Genbank (COI—KM491787).

Etymology. Named for Tertius Kammeyer, an avid myzostomid hunter who found the holotype with MMS and GWR.

Diagnosis and description. Holotype body circular, ~4 mm in diameter following fixation. Body margin scalloped from many unequal-sized triangular cirri (Fig. 6N–P). White dorsal longitudinal ridge (Fig. 6N–O). Mouth and cloaca subterminal, in line with parapodia. Extended proboscis smooth. Five pairs of parapodia, two-thirds of the way to body margin (Fig. 6P).

Remarks. The body shape of *Myzostoma tertiusi* **n. sp.** is not entirely circular, the scalloped margin resembling that of *M. pipkini* **n. sp.** One circular myzostomid species has been described from the same host, *Colobometra perspinosa*. This species, *Myzostoma coriaceum* Graff, 1884a is circular, over 9 mm in diameter and most similar in form to specimens found on Comatulidae (see remarks for *M. susanae* **n. sp.**). The host identification for this specimen is dubious and it is easily differentiated from *Myzostoma tertiusi* **n. sp.** Many species associated with Mariametroidea have a scalloped margin, particularly the elongated forms of *Hypomyzostoma.* Of these, only *M. attenuatum* Grygier, 1989 and *Myzostoma pipkini* **n. sp.** and have been reported

from *Colobometra perspinosa* and *Cenometra bella*, both of which differ morphologically and in molecular data (Summers & Rouse 2014) from *M. tertiusi* **n. sp.**

Protomyzostomatidae Stummer-Traunfels, 1926

***Protomyzostomum* Fedotov, 1912**

***Protomyzostomum lingua* n. sp. Summers & Rouse**
Fig. 7 A–F

Holotype: SIO-BIC A4088 (S1976) **paragenophore** (1 spm: in 70% ethanol after formalin fixation). Discovery Bank, Antarctica (Stn. DB1-67)(60° 7' 38.733"S, 34° 54' 11.1954"W), 379 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 15 October 2011 by Nerida Wilson, GWR, MMS, and science team.

Host. *Gorgonocephalus chilensis* (Philippi) (Gorgonocephalidae, Euryalida, Ophiuroidea). SIO-BIC E6110 (S4088) (DNA subsample only). Genbank (COI—KM491789).

Paratypes: SIO-BIC A3226 (S1977) **paragenophore** (2 spms: 1—in 70% ethanol after formalin fixation; 1—95% ethanol), SIO-BIC A3238 (S1976) **paragenophores** (2 spms: 1—in 70% ethanol after formalin fixation; 1—95% ethanol). Genbank (COI—KM014171). Same host and locality as holotype. SIO-BIC A3227 (S4381) **syngenophores** (2 spms: 1—form and 1—95% ethanol). Discovery Bank, Antarctica (Stn. DB1-58)(60° 6' 39.726"S, 34° 49' 35.7594"W), 439 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 13 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Gorgonocephalus chilensis,* SIO-BIC E6109 (S4561) (DNA subsample only). SIO-BIC A3244 **syngenophore** (S1034) (1 spm: in 70% ethanol after formalin fixation). Discovery Bank, Antarctica (Stn. DB1-74)(60°8'15.3594"S, 34° 51' 38.6274"W), 407–409 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 16 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Gorgonocephalus chilensis,* SIO-BIC E6111 (S1033) (DNA subsample only). SIO-BIC A3853 (S5732) **syngenophores** (2 spms: 95% ethanol). Burdwood Banks, Antarctica (Stn. BB1-106)(54°39'54.039"S, 61°14' 8.682"W), 307 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 31 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Gorgonocephalus chilensis*, SIO-BIC E6136 (S5660). SIO-BIC A3854 (S5733) **syngenophore** (1 spm: 95% ethanol). Burdwood Banks, Antarctica (Stn. BB1-106)(54°39'54.039"S, 61°14' 8.682"W), 307 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 31 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Gorgonocephalus chilensis*, SIO-BIC E6137 (S5661); Genbank (COI—KM491788). SIO-BIC A3855 (S5734) **syngenophore** (1 spm: 95% ethanol). Burdwood Banks, Antarctica (Stn. BB1-106)(54°39'54.039"S, 61°14' 8.682"W), 307 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 31 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Gorgonocephalus chilensis*, SIO-BIC E6134 (S5658). SIO-BIC A3856 **syngenophore** (S5735) (1 spm: 95% ethanol). Burdwood Banks, Antarctica (Stn. BB1-106)(54°39'54.039"S, 61°14' 8.682"W), 307 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 31 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Gorgonocephalus chilensis*, SIO-BIC E6135 (S5659). SIO-BIC A3857 (S5737) **syngenophores** (2 spms: 95% ethanol). Burdwood Banks, Antarctica (Stn. BB1-106)(54°39'54.039"S, 61°14' 8.682"W), 307 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 31 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Gorgonocephalus chilensis*, SIO-BIC E6141 (S5665). SIO-BIC A3858 (S5737) **syngenophores** (5 spms: 95% ethanol). Same host and locality as SIO-BIC A3857. SIO-BIC A4005 (S5541) **syngenophore** (1 spm: 95% ethanol). Burdwood Banks, Antarctica (Stn. BB1-104)(54°39'2.8794"S, 60°1'36.4614"W), 195 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 31 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Gorgonocephalus chilensis*, SIO-BIC E6130 (S5600). SIO-BIC A4006 (S5543) **syngenophore** (1 spm: 95% ethanol). Burdwood Banks, Antarctica (Stn. BB1-104)(54°39'2.8794"S, 60°1'36.4614"W), 195 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 31 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Gorgonocephalus chilensis*. SIO-BIC A4003 (S5739) **syngenophore** (3 spms: 95% ethanol). Burdwood Banks, Antarctica (Stn. BB1-107)(54°40'17.328"S, 61°14'1.428"W), 305 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 31 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Gorgonocephalus chilensis*, SIO-BIC E6147 (S5730). SIO-BIC A4004 (S5738) **syngenophores** (5 spms: 95% ethanol). Burdwood Banks, Antarctica

(Stn. BB1-107)(54°40'17.328"S, 61°14'1.428"W), 305 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 31 October 2011 by Nerida Wilson, GWR, MMS, and science team. Host: *Gorgonocephalus chilensis*, SIO-BIC E6145 (S5669). SIO-BIC A4022 (S21383) **syngenophores** (2 spms: 1—in 70% ethanol after formalin fixation; 1—95% ethanol). Burdwood Banks, Antarctica (Stn. BBW-78)(53°58'9.4794"S, 61°28'2.28"W), 158 m. Collected via the R/V *Nathaniel B. Palmer* using a Blake trawl on 5 May 2013 by Nerida Wilson, GWR, and science team. Host: *Gorgonocephalus chilensis,* SIO-BIC E6150 (S21308).

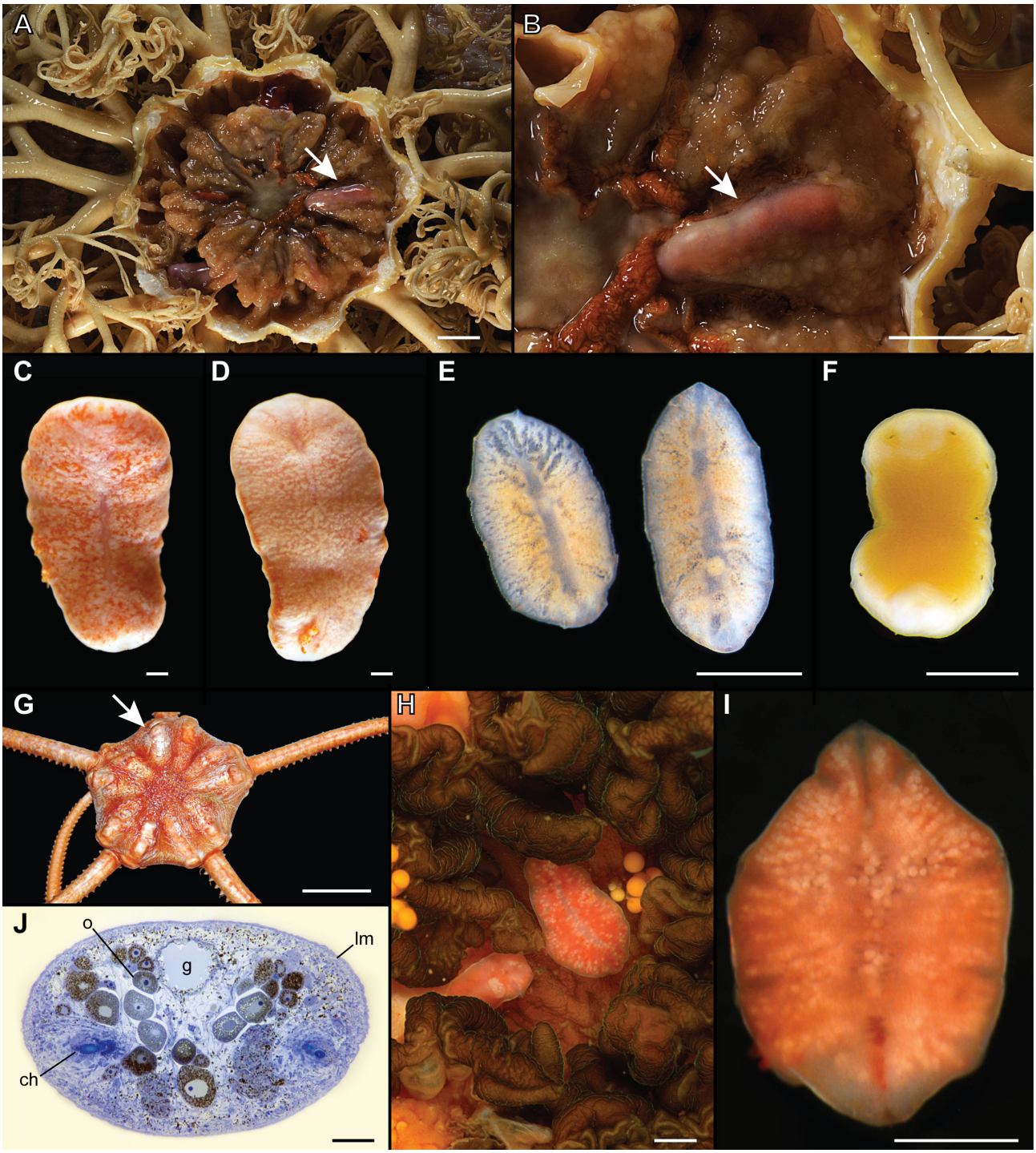

FIGURE 7. (A–F) Live photographs of *Protomyzostomum lingua* **n. sp.** (A, B) in host, *Gorgonocephalus chilensis*, arrows show one specimen within bursa, (C, D) adults, ventral (C) and dorsal (D), (E, F) juveniles, ventral showing five pairs of parapodia and small chaetae. (G) Live photograph of infected *Asteronyx longifissus,* host of *Protomyzostomum roseus* **n. sp.**, arrow indicating enlarged site of infection. (H–J) *Protomyzostomum roseus* **n. sp.**—(H, I) live photographs of paratypes (SIO-BIC 3797) in the host's bursa (H) and removed (I); (J) stained thin section, abbreviations: chaetae (ch); gut (g); longitudinal muscle (lm); oocyte (o). Scale bars 1 cm (A, B, G); 1 mm (C–F, H–I); 100 µm (J).

Etymology. Latin for tongue, named for its resemblance to a mammalian tongue.

Diagnosis and description. Holotype recovered from host's bursa (Fig. 7A–B). Body elongate, rounded posteriorly and anteriorly (Fig. 7C–F). Length ~ 1.3 cm, width ~ 6 mm following fixation. Mouth and cloaca terminal. Five pairs of low parapodia with chaetae small and barely emergent. Orange in life, color faded in preservative.

Remarks. Four species of *Protomyzostomum* have been previously described—*Protomyzostomum glanduliferum* Bartsch & Faubel, 1995, *P. polynephris* Fedotov, 1912, *P. astrocladi* Fedotov, 1925, and *P. sagamiense* Okada, 1922. *Protomyzostomum polynephris* and *P. sagamiense* were recorded from basketstar hosts (*Gorgonocephalus*), from Arctic and Japanese waters respectively. *Protomyzostomum glanduliferum* is known from Antarctic waters, but inhabits the brittlestar *Ophiacantha antarctica*. Sequences of Lanterbecq *et al.* (2006) for *P. glanduliferum* and *P. polynephris* were found to be incorrect in Summers & Rouse (2014). An undescribed myzostomid has also been recorded from another Antarctic brittlestar, *Ophionotus victoriae* Bell, 1902 by Bartsch & Faubel, 1995.

***Protomyzostomum roseus* n. sp. Summers & Rouse**
Fig. 7G–J

Holotype: SIO-BIC A4019 **paragenophore** (1 spm in 70% ethanol after formalin fixation). Off Monterey Canyon, California (36° 48' 7.9194" N, 121° 59' 42" W), 632 m. Collected via the R/V *Western Flyer* using the ROV *Tiburon* (Dive 1160) on 18 October 2007 by GWR, Nerida Wilson and R. C. Vrijenhoek.

Host. *Asteronyx longifissus* Döderlein (Asteronychidae, Euryalida, Ophiuroidea). SIO-BIC E6108. Genbank (16S—KM014337; 28S—KM014340).

Paratypes: SIO-BIC A3799 **paragenophore** (1 spm: 95% ethanol). Genbank (COI—KM014172); SIO-BIC 3797 **paragenophores** (2 spms: 1—in 70% ethanol after formalin fixation; 1—95% ethanol); SIO-BIC A3799 **paragenophores** (2 spms: in 70% ethanol after paraformaldehyde/glutaraldehyde fixation); SIO-BIC A4023 **paragenophore** (1 spm: embedded in Spurr's resin after fixation in glutaraldehyde and osmium tetroxide, some in 1µm sections). Same host and locality as holotype.

Etymology. Latin for red, in reference its color in life.

Diagnosis and description. Holotype recovered from a host's bursa (Fig. 7H). Body elongate, tapering posteriorly and anteriorly (Fig. 7I). Length ~ 4 mm, width ~ 2.5 mm following fixation. Mouth and cloaca terminal. Five pairs of parapodia, more pronounced in small specimen. Color red in life, white in preservative.

Remarks. This is the first species of myzostomid described that infests ophiuroids in the eastern Pacific, and the first record in *Asteronyx longifissus*.

Preliminary histological study showed the body to be ellipsoidal in transverse section (Fig. 7J). The region sectioned (near anterior) showed the gut to lie dorsally above and adjacent to ovarian tissue, containing oocytes in various stages of development. No testis tissue was in this region. Bases of the chaetae were placed ventrolaterally in chaetal sacs with surrounding musculature for protrusion. Ventral nerve cord not discernable.

Pulvinomyzostomatidae Jägersten, 1940b

***Pulvinomyzostomum* Jägersten, 1940b**

***Pulvinomyzostomum inaki* n. sp. Summers & Rouse**
Fig. 8 A–C

Holotype: SIO-BIC A1408 **paragenophore** (1 male: in 70% ethanol after formalin fixation). Jaco Scarp, Costa Rica (9.1172° N, 84.8417° W), 1866 m. Collected via the R/V *Atlantis* using the HOV Alvin (Dive 4509) on 3 March 2009.

Host. *Antedon* sp. (Antedonidae, Comatulida, Crinoidea) SIO-BIC E4399. Genbank (COI—KM014345).

Paratypes: SIO-BIC A1579 **paragenophores** (2 males: 95% ethanol). Same host and locality. Genbank (COI—KM014173).

Etymology. Named for Jose Ignacio Carvajal.

Diagnosis and description. Large female in host's mouth, smaller males on female's ventral surface (Fig. 8B). Female thick, circular, body margin slightly scalloped from 20 small cirri (Fig. 8A–B). Dorsal surface of female ridged and with papillae. Holotype (male) circular, slightly wider than long, body margin strongly scalloped from 20 triangular cirri (Fig. 8C). Mouth and cloaca terminal. Extended proboscis smooth. Five pairs of parapodia, positioned equal distance from the midline to the body margin.

Remarks. *Pulvinomyzostomum inaki* **n. sp.** possesses the same lifestyle as *Pulvinomyzostomum pulvinar* Graff, 1884b—a large female located in the mouth with small males. The female specimen was found with the small males on the ventral surface, the *in situ* arrangement in the mouth is not known. *Pulvinomyzostomum pulvinar* was described from *Leptometra phalangium* (Müller, 1841) collected in Scottish waters. *Pulvinomyzostomum pulvinar* possesses a dorsal proboscis and has a smooth dorsal surface (re-examined in Jägersten, 1940b and Eeckhaut & Lanterbecq, 2005), distinguishing it from *P. inaki* **n. sp.**

The free-living *Myzostoma graffi* Nansen, 1885 and *M. giganteum* Nansen, 1885 from Norwegian waters are described as having a scalloped margin similar to the males of *Pulvinomyzostomum inaki* **n. sp.** As the host is similar, *Leptometra celtica* (M'Andrew & Barrett), these records could be males of *Pulvinomyzostomum pulvinar* and warrant further collection now that molecular data are available. *Pulvinomyzostomum inaki* **n. sp.** is the first record of this lifestyle (large female in mouth, smaller free-living males) from Pacific waters, and is also distinguished from *P. pulvinar* based on molecular data (provided in Lanterbecq *et al.* (2006)).

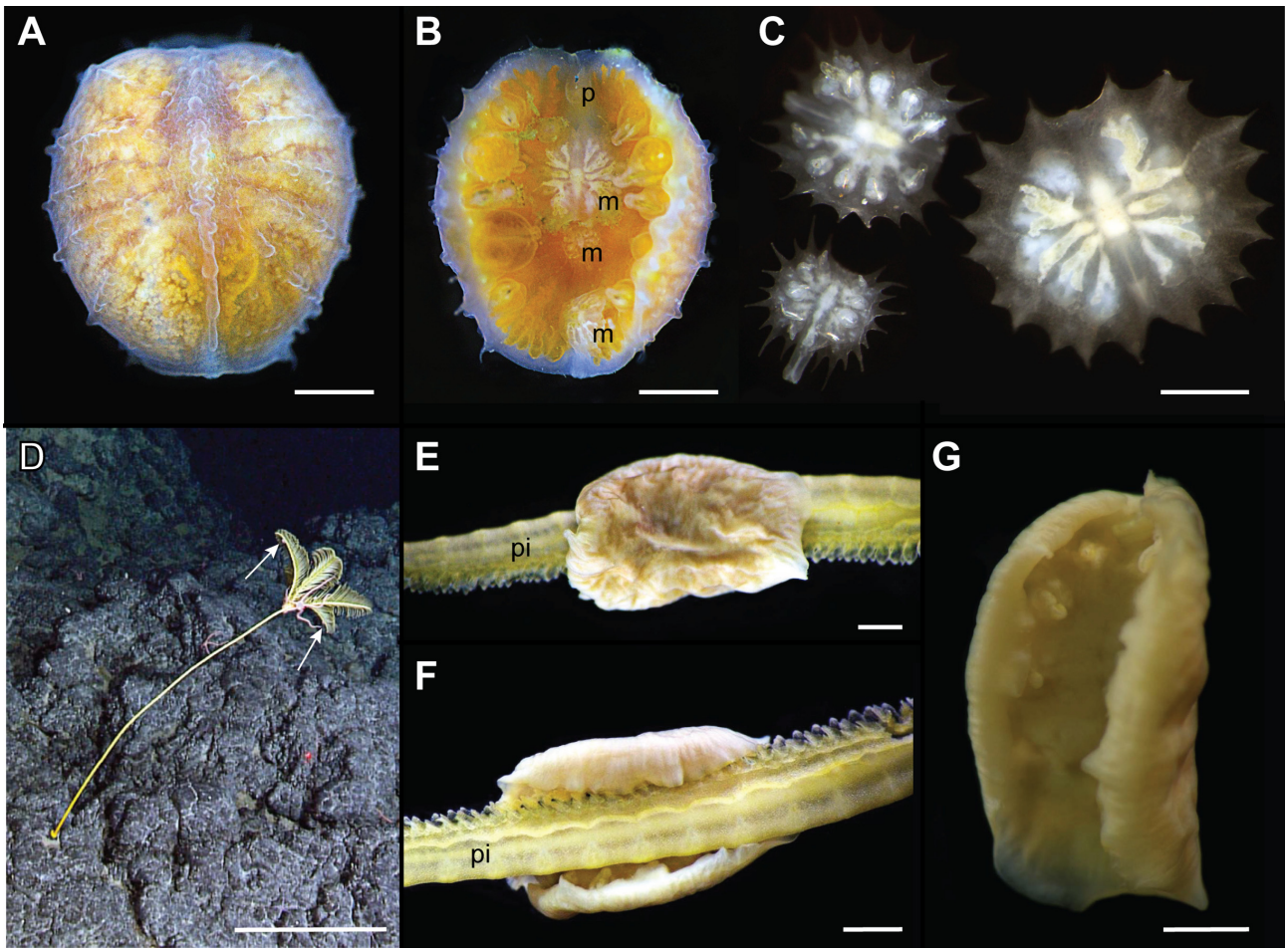

FIGURE 8. (A–C) Live photographs of *Pulvinomyzostomum inaki* **n. sp.**—(A, B) female, (A) dorsal view showing raised ridges, (B) ventral view showing five pairs of parapodia, cirri on body margin, and small dwarf males, abbreviations: males (m); pharynx (p); (C) males, ventral and dorsal views showing extended smooth proboscis and scalloped margin. (D–G) *Pulvinomyzostomum messingi* **n. sp.**—(A) live photograph of host, *Gephyrocrinus messingi* with ophiuroid associate and possible myzostomids on arms, indicated with arrows; (E–G) photographs of fixed samples, (E–F) on host's arms, dorsal view showing ridged surface (E), abbreviation: host pinnule (pi), (G) ventral view, showing acirrate body margin. Scalebars 30 cm (D); 1 mm (E–G); 0.5 mm (C); 0.2 mm (A, B).

***Pulvinomyzostomum messingi* n. sp. Summers & Rouse**
Fig. 8 D–G

Holotype: SIO-BIC A3800 **hologenophore** (1 spm: 95% ethanol). Off southwest Oregon (42° 44' 28.104" N, 128° 5' 48.2994" W), 1650 m. Collected via the R/V *Western Flyer* using the ROV *Doc Ricketts* (Dive 82) on 4 September 2007 by Julio Harvey. Genbank (COI—KM014174).

Host. *Gephyrocrinus messingi* Roux & Lambert (Hyocrinidae, Hyocrinida, Crinoidea). SIO-BIC E5662. Genbank (COI—KM014350).

Etymology. Named for Charles Messing, for whom its host crinoid is also named for, and in recognition for his often noticing and collecting myzostomids on crinoids.

Diagnosis and description. Holotype free-living (Fig. 8D). Body elongate. Length ~6 mm; width ~4 mm following fixation. Dorsal surface furrowed (Fig. 8E). Body margin acirrate (Fig. 8G). Mouth and cloaca subterminal on ventral surface, midway between first and last pairs of parapodia and body margin. Five pairs of parapodia. Color in life unknown, pale yellow following fixation.

Remarks. Unlike other members of *Pulvinomyzostomum,* where a large female remains stationary in the mouth, *Pulvinomyzostomum messingi* **n. sp.** was collected living free on the host. This is the first record of *Pulvinomyzostomum* on a stalked crinoid—*Pulvinomyzostomum pulvinar* and *Pulvinomyzostomum messingi* **n. sp.** were both found on antedonid hosts. *Pulvinomyzostomum messingi* **n. sp.** is also the first description of a myzostomid associated with a stalked crinoid in the east-Pacific and, with the exception of *Stelechopus hyocrini* Graff, 1884, is the only known myzostomid from a hyocrinid. The other free-living myzostomids on stalked crinoids (currently in *Eenymeenymyzostoma* Summers & Rouse (2014), *Myzostoma* Graff, 1884a, and *Stelechopus* Graff, 1884a) are known from Japan, south of the Philippines, Antarctica, and the Caribbean (Table 1). All but *Stelechopus* have noticeable marginal cirri, unlike *Pulvinomyzostomum messingi* **n. sp.**

Discussion

We are arguably in a period of taxonomic renaissance (Zhang 2011). Much of the early taxonomic literature is available online and the cost of obtaining molecular data is rapidly decreasing. Despite this access to information, we are also in an age of 'dark taxa' (Page 2013)—an abundance of molecular data not connected to a formal name, much of which becomes suppressed by GenBank (Kwong *et al.* 2010; Parr *et al.* 2012). Lack of names hinders accurate biodiversity estimates and prevents data from multiple publications to be connected and accessible (i.e. it is difficult to track '*Myzostoma* sp. 1', especially using automated techniques). Establishing accurate names early is therefore of utmost importance, as they play an important role in organizing and tracing many types of data (e.g. molecular, biogeographic, etc.), including additional morphological details that are published at a later date.

An efficient and robust approach to species naming is developed and used here for Myzostomida, a group with much under-sampled diversity. This method includes a concise description combined with molecular data, live photograph, and accurate host identification, with the host ideally sampled and sequenced with the myzostomid. The comprehensive table of available names and relevant information for identification allows users to narrow the most similar species to around five to ten species. Although the taxonomic challenges of each group is unique, this method can, and should, be developed for other taxa. Among annelids, there are many examples of 'species' left unnamed (e.g., the 12 species of *Osedax* yet to be named *(*Vrijenhoek *et al.* 2009); five of the six sibling species in complex of *Capitella* identified by Grassle & Grassle (1976)). Establishing a clear rationale and criteria for naming within a group will allow more rapid and thorough species descriptions, as well as accurate and objective review.

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TABLE 1. Species of Myzostomida organized by host association, including information on geographic locality, host identity and distinctive morphological features. New species in bold.

Asteroidea

	Authority	Lifestyle	Type host(s)	Type Locality	Distinguishing Features	Notes
Asteromyzostomum arcticum	Wagin, 1954	Internal/external, punctured through body wall	*Urasterias lincki*	Arctic		
Asteromyzostomum multiplicatum	Wagin, 1954	Internal/external, punctured through body wall	*Crossaster papposus*	Arctic		
Asteromyzostomum witjasi	Wagin, 1954	Internal/external, punctured through body wall	*Psilaster pectinatus*	Arctic		
***Asteromyzostomum grygieri* nsp.**	**Summers & Rouse, 2014**	**Internal/external, punctured through body wall**	***Labidiaster annulatus***	**Antarctica - Elephant Island and South Georgia, 190 - 247 m**		
Asteriomyzostomum asteriae	(Marenzeller, 1895)	Internal, in digestive track	*Sclerasterias neglecta* (as *Stolasterias neglecta*) and *Sclerasterias richardi* (as *Asterias richardi*)	Mediterranean - Eastern Mediterranean, 160-710 m		
Asteriomyzostomum fisheri	(Wheeler, 1905)	Internal, in coelom	*Ceramaster leptoceraum* (as *Tosia (Pentagonaster) leptoceramus*)	Pacific - off southern California (Stn 4427), dredging		

Ophiuroidea

	Authority	Lifestyle	Type host(s)	Type Locality	Distinguishing Features	Notes
***Protomyzostomum lingua* n. sp.**	**Summers & Rouse, 2014**	**Internal, in gonads**	***Gorgonocephalus chilensis***	**Antarctica - Discovery Banks & Burdwood Banks, 158 - 439 m**		
Protomyzostomum glanduliferum	Bartsch & Faubel, 1995	Internal, in coelom	*Ophiacantha antarctica* (as *Ophiacantha disjuncta*)	Antarctica - Weddell Sea, 531 m		
Protomyzostomum polynephris	Fedotov, 1912	Internal, in gonads	*Gorgonocephalus eucnemis*	Arctic - Kola Ford, Kara Sea, 100 - 180 m		
Protomyzostomum astrocladi	Fedotov, 1925	Internal, in gonads	*Astrocladus coniferus*	Pacific - Japan, dredging		
Protomyzostomum sagamiense	Okada, 1922	Internal, in gonads	*Gorgonocephalus* sp.	Pacific - Japan, 274 m		
***Protomyzostomum roseus* n. sp.**	**Summers & Rouse, 2014**	**Internal, in gonads**	***Asteronyx longifissus***	**Pacific - Monterey, California, 632 m**		
Myzostoma holotuberculatum	Jägersten, 1940a	Free-living	*?Astrodendrum sagaminum*	Pacific - Japan, 180 m	dorsal surface covered in papillae	
Myzostoma japonicum	McClendon, 1906	Free-living	*Ophiocreas* sp. and *Astroceras pergamena* (as *Asteroceras pergamena*)	Pacific - Japan, eastern coast (*Albatross* Stn 3755), dredging	oval, with cirri, 20 very short cirri	
Myzostoma gerlachei	Fauvel, 1936	Free-living, in grooves of arm base	Unknown Ophiuroidea	Arctic - Foxe Basin, dredging	circular, with cirri, 20 cirri alternating long and short	

Stalked crinoids

	Authority	Lifestyle	Type host(s)	Type Locality	Distinguishing Features	Notes
Endomyzostoma cryptopodium	(Wheeler, 1896)	Gall-forming	*Metacrinus interruptus*	Uncertain - label marked 'Indian Museum, Calcutta'		
Endomyzostoma clarki	(McClendon, 1906)	Gall-forming	*Metacrinus rotundus*	Pacific - Japan, dredging		
Endomyzostoma robustum	(Hara & Okada, 1921)	Gall-forming	*Metacrinus rotundus*	Pacific - Japan, "inside Yodomi" Sagami Sea, 180 - 275 m		probably a synonym of *E. clarki*
Endomyzostoma belli	(Wheeler, 1896)	Gall-forming	*Endoxocrinus alternicirrus* (as *Pentacrinus alternicirrus*)	Pacific - south of Philippines, dredging		probably a synonym of *E. pentacrini*
Endomyzostoma eremita	(Wheeler, 1896)	Gall-forming	*Metacrinus wyvilli* (as *Metacrinus moseleyi*)	Pacific - south of Philippines, dredging		
Endomyzostoma deformator	(Graff, 1884a)	Gall-forming	*Endoxocrinus alternicirrus* (as *Pentacrinus alternicirrus*)	Pacific - southeast of Philippines, dredging		probably a synonym of *E. pentacrini*
Endomyzostoma pentacrini	(Graff, 1884a)	Gall-forming	*Endoxocrinus alternicirrus* (as *Pentacrinus alternicirrus*)	Pacific - southeast of Philippines, dredging		
Mycomyzostoma calcidicola	Eeckhaut, 1998	Gall-forming on stalk	*Saracrinus nobilis*	Pacific - New Caledonia, 360-440m		
Stelechopus hyocrini	Graff, 1884a	Free-living	*Hyocrinus* sp. and *Bathycrinus* sp.	Antarctica - Crozet Islands (*Challenger* Stn 147), 2.5-2.9 km		
Myzostoma compressum	Graff, 1884a	Free-living	*Bathycrinus aldrichianus*	Antarctica - Crozet Islands, dredging	elongate, with cirri, 20 short cirri, dorsal ridge	
Myzostoma coronatum	Graff, 1884a	Free-living	*Bathycrinus aldrichianus*	Antarctica - west of Crozet Islands, dredging	elongate, with cirri, 20 broad cirri, dorsal longitudinal and transverse furrowing, ventral ridge	probably a synonym of *M. compressum*
Myzostoma vincentum	Reichensperger, 1906	Free-living	*Neocrinus decoras* (as *Pentacrinus decorus*)	Atlantic - Caribbean, St. Vincent, 230 m	circular, slightly elongate, with cirri, 20 cirri equal length, dorsal surface with small central oval and many furrows	
Eenymeenymyzostoma cirripedium	(Graff, 1885)	Free-living	*Metacrinus rotundus*	Pacific - Sagami Bay, Japan, 128 m	elongate, with cirri, 20 cirri	
Myzostoma terminale	Jägersten, 1937	Free-living	*Metacrinus* cf. *rotundus*	Pacific - Sagami Sea, Japan, 150 m	elongate, with cirri, 20 cirri	probably a synonym of *E. cirripedium*
Myzostoma wheeleri	McClendon, 1906	Free-living	*Metacrinus rotundus*	Pacific - Suruga Gulf and Sagami Sea, Japan, dredging	elongate, with cirri, 20 cirri	probably a synonym of *E. cirripedium*
Myzostoma wyvillethomseni	Graff, 1884a	Free-living	*Metacrinus costatus* and *Saracrinus angulatus* (as *Metacrinus angulatus*)	Pacific - south of Philippines and southwest of Papua New Guinea, dredging	damaged; elongate, with cirri, 20 cirri	possibly = *E. cirripedium*
Myzostoma asymmetricum	Graff, 1884a	Free-living	*Endoxocrinus alternicirrus* (as *Pentacrinus alternicirrus*)	Pacific - southeast of Philippines, dredging	damaged; elongate, with cirri, 10 cirri	

Myzostoma calycotle	Graff, 1884a	Free-living	*Endoxocrinus alternicirrus* (as *Pentacrinus alternicirrus*)	Pacific - south of Philippines, dredging	elongate, with cirri, numerous cirri	
Myzostoma circinatum	Wheeler, 1896	Free-living	*Endoxocrinus* sp.	Pacific - south of Philippines (*Challenger* Stn 214), dredging	with cirri, 20 long cirri	
***Pulvinomyzostomum messingi* n. sp.**	**Summers & Rouse, 2014**	**Free-living**	***Gephyrocrinus messingi***	**Pacific - off southwest Oregon, 1650 m**	**elongate, with cirri, 20 short cirri**	

Featherstar crinoids

Antedonidae

	Authority	Lifestyle	Type host(s)	Type Locality	Distinguishing Features	Notes
***Endomyzostoma scotia* n. sp.**	**Summers & Rouse, 2014**	**Cyst-forming**	***Promachocrinus kerguelensis* clade A**	**Antarctica -throughout Scotia Arc, 143-292 m**	**no cirri**	
Endomyzostoma inflator	(Graff, 1883)	Cyst-forming	*Adelometra angustiradia* (as *Antedon angustiradia*), also recorded from *Neocomatella pulchella* (as *Actinometra pulchella*)	Pacific - southwest of Papua (*Challenger* Stn 192), also recorded from Atlantic - Barbados (*Blake* Stn 294)	no cirri, pear-shaped body	Atlantic record likely different species
Endomyzostoma cystihymenoides	(McClendon, 1907)	Cyst-forming	*Florometra asperrima*	Arctic - Alaska, off the Trinity Islands, 274 m	no cirri	
Myzostoma divisor	Grygier, 1989	Free-living	*Promachocrinus kerguelensis*	Antarctica - multiple localities, 238-567 m	2 elongate caudal appendages, 18 marginal cirri	
Myzostoma antarcticum	Stummer-Traunfels, 1908	Free-living	*Anthometrina adriani* (as *Antedon adriani*)	Antarctica - Winter Quarters, 227 m	circular, with cirri, 20 medium length cirri	
Myzostoma gigas	Lütken, 1875 in Graff, 1884	Free-living	*Florometra magellanica* (as *Antedon eschrichti*)	Arctic - north Greenland, Norway Barets Sea, 91-265 (possibly 1156) m	circular, with cirri, 20 short cirri, dorsal surface covered in papillae	questionable record from *Tropiometra carinata* in Bahia, South Atlantic
Myzostoma graffi	Nansen, 1885	Free-living	*Leptometra celtica* (as *Antedon celtica*)	Arctic - Spitsbergen, Norway, dredging	circular, with cirri, 20 short cirri, scalloped margin	
Myzostoma giganteum	Nansen, 1885	Free-living	*Leptometra celtica* (as *Antedon celtica*)	Arctic - Spitsbergen, Norway, dredging	circular, with cirri, 20 short cirri, scalloped margin, dorsal surface covered in papillae	
Myzostoma carpenteri	Graff, 1884b	Free-living	*Hathrometra tenella* (as *Antedon dentata = A. sarsii*)	Atlantic - North Atlantic, southeast of Iceland, 520-790 m (*Triton* Stn 5)	circular, with cirri, 20 short cirri, alternating in height, scalloped margin, dorsal ridge	
Myzostoma alatum	Graff, 1884b	Free-li*ving*	*eptometra phalangium* (as *AntedonPhalangium*	Atlantic - Scottish waters, 402 m (Triton Stn 13)	circular, no cirri	DNA data from specimen collected in Mediterranean Sea
Myzostoma fimbriatum	Graff, 1884a	Free-living	*Florometra magellanica* (as *Antedon eschrichti)* or *Heliometra glacialis* (as *A. quadrata*)	Atlantic - South of Halifax, Nova Scotia (*Challenger* Stn 38), dredging	circular (extremely damaged), with cirri, 20 short cirri	

Myzostoma cirriferum	Leuckart, 1836	Free-living	*Antedon bifida*	Atlantic - European waters	circular/slightly elongate, with cirri, 20 short cirri	
Myzostoma agassizii	Graff, 1883	Free-living	*Coccometra hagenii* (as *Antedon hageni*) also possibly from *Stylometra spinifera* (as *Antedon spinifera*)	Caribbean - Bahia Honda (Florida), Monteserrat (*Blake* Stn 155) , St. Vincent (*Blake* Stn 269), 160-227 m	circular, with cirri, 20 long cirri	probably a synonym of *M. excisum*
Myzostoma excisum	Graff, 1883	Free-living	*Coccometra hagenii (as Antedon hageni)* in Florida; (also recorded from *Antedon impinnata* [taxon inquirendum] in Mauritius)	Caribbean - Alligator Reef (Florida), 176 m; also recorded from Indian Ocean - Mauritius (North Bay), 27 m	circular/heart shaped, with cirri, 20 cirri	Indian specimen likely a different species
Myzostoma filicauda	Graff, 1883	Free-living	*Coccometra hagenii* (as *Antedon hageni*)	Caribbean - Sand Key (Florida), dredging	2 elongate caudal appendages, 18 marginal cirri	
Myzostoma pseudogigas	Jägersten, 1940a	Free-living	*Florometra serratissima*	Pacific - Canada, Ruxton Passage and Nanaimo, British Columbia, dredging	circular, with cirri, 20 short cirri	
Myzostoma tuberculatum	Jägersten, 1937	Free-living	*Dorometra parvicirra*	Pacific - Sagami, Misaki and Bonin Islands, Japan, 135-600 m	circular, with cirri, 20 short cirri, dorsal surface covered in papillae	
***Myzostoma josefinae* n. sp.**	**Summers & Rouse, 2014**	**Free-living**	***Psathyrometra fragilis***	**Pacific - Monterey, California (also collected in Guaymas Basin), 1020-1314 m**	**2 elongate caudal appendages, 18 marginal cirri**	
Myzostoma deani	McClendon, 1906	Free-living	*Antedon* sp.	Pacific - Monterey, California, dredging	circular, with cirri, 20 short cirri	
Myzostoma echinus	Graff, 1884a	Free-living	probably *Charitometra incisa* (as *Antedon incisa*) or *Glyptometra inaequalis* (as *Antedon inaequalis*); *Clarkcomanthus exilis* (as *Actinometra mutabilis*)	Pacific - southwest of Fiji (*Challenger* Stn 174) and west of Taiwan, dredging	circular, no cirri, dorsal ridges	specimen from *C. exilis* (Comatulidae) probably *M. insigne*
Pulvinomyzostomum pulvinar	(Graff, 1884b)	Female in gut lumen; males free-living	*Leptometra phalangium* (as *Antedon phalangium*)	Atlantic - Minch, Scottish waters, 110-150 m	dorsal proboscis	
***Pulvinomyzostomum inaki* n. sp.**	**Summers & Rouse, 2014**	**Female in gut lumen; males free-living**	***Antedon* sp.**	**Pacific - Jaco Scarp, Costa Rica, 1866 m**	circular, with cirri, ventral proboscis	

Comatulidae						
	Authority	**Lifestyle**	**Type host(s)**	**Type Locality**	**Distinguishing Features**	**Notes**
Mesomyzostoma katoi	Okada, 1933	Internal	*Anneissia japonica*	Pacific - Japan		
***Mesomyzostoma lanterbecqae* n. sp.**	**Summers & Rouse, 2014**	Internal	***Clarkcomanthus alternans; Clarkcomanthus mirabilis; Comatella nigra***	**Pacific - Papua New Guinea, less than 20 m**		

Endomyzostoma cysticolum	(Graff, 1883)	Cyst-forming	*Comactinia meridionalis* (as *Actinometra* var. *carinata*)	Caribbean - Cape Frio Brazil (*Hassler* Exp.) and Grenada (*Blake* Stn 249), dredging; (also recorded from Antarctic; Australia, Red Sea, Japan, Indonesia)		records from various hosts likely different species
Contramyzostoma bialatum	Eeckhaut & Jangoux, 1995	Cyst-forming	*Phanogenia gracilis*	Pacific - Singapore, around Pulau Satumu (Raffles Lighthouse), 0-20 m		
Myzostoma sphaera	(Eeckhaut *et al.*, 1998)	Cyst-forming	*Comatella stelligera ?*; definitively recorded from *Comatella nigra*	Pacific - Hansa Bay, Papua New Guinea, dredging; also recorded from Raja Ampat, Indonesia, less than 20 m	ventral proboscis	
Myzostoma toliarense	Lanterbecq & Eeckhaut, 2003	Cyst-forming	*Comanthus* sp. aff. *wahlbergii* [later called *Comanthus parvicirrus* by authors]	Indian - Madagascar, Toliara, dredging	oval, slightly wider than long, with cirri, body with 21-28 cirri, parapodia acirrate	available COI almost identical to COI of *M. polycyclus*
Notopharyngoides platypus	(Graff, 1887)	Cyst-forming	*Comaster schlegelii*	Pacific - Philippines	ventral proboscis	
Myzostoma areolatum	Graff, 1883	Free-living	*Comactinia* sp. (as *Actinometra blakei*) and *Comactinia meridionalis* (as *Actinometra meridionalis* var. *quadrata*)	Caribbean - Guadeloupe (*Blake* Stn 172), Martinique (*Blake* Stn 203), Barbados (*Blake* Stn 278), dredging	elongate, with cirri, 20 cirri reduced to irregular tubercles, dorsal surface covered in furrows	
Myzostoma bicaudatum	Graff, 1883	Free-living	*Comactinia meridionalis* (as *Actinometra meridionalis*)	Caribbean - west of Tortugas (Bibb Exp), dredging	2 elongate caudal appendages, circular with 20 marginal cirri, most anterior longer than rest	
Myzostoma crenatum	Graff, 1883	Free-living	probably *Comactinia meridionalis* (as *Actinometra meridionalis*)	Caribbean - Martinique (*Blake* Stn 203); St. Lucia, 508 m	circular, with cirri, 20 thick, short cirri of equal length, scalloped margin	
Myzostoma irregulare	Graff, 1883	Free-living	*Comactinia meridionalis* (as *Actinometra meridionalis* & *A. meridionalis* var. *carinata*)	Caribbean - Grenada (*Blake* Stn 249), dredging; also recorded west of Tortugas or Martinique (*Blake* Stn 45 or 200)	circular, with cirri, 20 long cirri, smaller cirri inbetween	
Myzostoma oblongum	Graff, 1883	Free-living	*Comactinia meridionalis* (as *Actinometra meridionalis* var. *carinata*)	Caribbean - Grenada (*Blake* Stn 249), dredging	elongate, with cirri, 42 cirri (spm poorly preserved)	
Myzostoma radiatum	Graff, 1884a	Free-living	likely *Comactinia meridionalis* (as *Actinometra meridionalis*)	Caribbean - near Barbados, dredging	circular, ventral surface vaulted	
Myzostoma rotundum	Graff, 1883	Free-living	probably *Comactinia meridionalis* (as *Actinometra meridionalis* var. *carinata*)	Caribbean - Grenada (*Blake* Stn 249), dredging	circular, with cirri, 51 cirri of varying lengths	likely synonym of *M. oblongum*

Myzostoma evermanni	McClendon, 1907	Free-living	*Comactinia echinoptera*	Caribbean - off of Havana, Cuba, 358 m	circular, with cirri, nearly 80 cirri alternating in length	
Myzostoma marginatum	Graff, 1883	Free-living	*Davidaster discoideus* (as *Actinometra discoidea*)	Caribbean - Montserrat (*Blake* Stn 155), Martinique (*Blake* Stn 203), dredging	circular, with cirri, 20 cirri, dorsal surface vaulted and covered in tubercles of different sizes	probably = *M. testudo*
Myzostoma testudo	Graff, 1883	Free-living	*Davidaster rubiginosus* (as *Actinometra lineata*) (also recorded from *D. discoideus*)	Caribbean - Barbados (*Blake* Stn 285), dredging	circular, with cirri, 20 cirri, dorsal surface covered in tubercles	
Myzostoma carinatum	Graff, 1883	Free-living	*Neocomatella pulchella* (as *Actinometra pulchella*) from Caribbean; also recorded from *Antedon impinnata* (taxon inquirendum)	Caribbean - Martinique (*Blake* Stn 193), dredging; also recorded from Indian Ocean - Mauritius, 27 m	circular, with 20 cirri, no suction cups, 7 longitudinal dorsal elevations (spm poorly preserved)	Indian Ocean record likely different species
Myzostoma abundans	Graff, 1883	Free-living	*Neocomatella pulchella* as (*Actinometra pulchella*)	Caribbean - Martinique (*Blake* Stn 210) and St. Vincent (*Blake* Stn 224), dredging	circular, with cirri, ~100 cirri	
Myzostoma vastum	Graff, 1883	Free-living	*Comactinia sp.* (as *Actinometra blakei*) (also recorded from *Anneissia japonica*)	Caribbean - (*Blake* Stn 39 and 23), dredging; also recorded from Pacific - Location not recorded	circular with cirri, 20 cirri, 2 most anterior and posterior pairs longer than rest, pharynx with papillae	Caribbean record likely different species
Myzostoma pseudocuniculus	Lanterbecq & Eeckhaut, 2003	Free-living	*Comanthus parvicirrus* (originally described from *Comanthus* sp. aff. *wahlbergii*)	Indian - Toliara, Madagascar, dredging	2 'ear-shaped' caudal processes with 1-4 long cirri, trunk margin with 18 cirri	
Myzostoma cuniculus	Eeckhaut *et al.*, 1998	Free-living	*Clarkcomanthus albinotus* (also recorded from *Clarkcomanthus littoralis, Comanthus wahlbergi, Comanthus mirabilis*)	Pacific - Hansa Bay, Papua New Guinea, dredging	2 'ear-shaped' caudal processes, processes acirrate	
***Myzostoma indocuniculus* n. sp.**	**Summers *et al.*, 2014**	**Free-living**	***Clarkcomanthus alternans***	**Pacific - Raja Ampat, Indonesia, less than 20 m**	**2 'ear-shaped' caudal processes**	
Myzostoma lobatum	Graff, 1877	Free-living	*Capillaster multiradiatus (*as *Actinometra fimbriata)* (also recorded from *Oligometra serripinna, Decametra chadwicki,* and possibly *Lamprometra klunzingeri*)	Pacific - Philippines, Bohol, dredging; also recorded (on different hosts) from Hong Kong, and Gulf of Aqaba	4 caudal processes, equal size and lined with small blunt triangular/rounded cirri, lighter dorsal ridge, body margin with 24-38 bluntly triangular or rounded cirri	host identification as Comatulidae is questionable
Myzostoma mertoni	Remscheid, 1918	Free-living	*Comatula pectinata* (as *Actinometra pectinata*)	Pacific - Aru and Kei Islands, dredging	circular, no cirri	
***Myzostoma susanae* n. sp.**	**Summers & Rouse, 2014**	**Free-living**	***Comaster schlegelii***	**Pacific - Lizard Island Reef, Australia, less than 20 m**	**circular, no cirri**	
Myzostoma horologium	Graff, 1884a	Free-living	probably *Comatula rotalaria* (as *Actinometra jukesi*) (also recorded from *Comatula purpurea*) [Clark (1921) suggested that hosts may have *been Zygometra microdiscus* and *Z. elegans*.]	Pacific-Torres Strait (Challenger Stn 186 and 187); also recorded from Johore Shoal, Singapore, dredging;South China sea near Luzon	circular, no cirri	host identification as Comatulidae is questionable

				(Philippines), 33 m		
Myzostoma plicatum	Graff, 1884a	Free-living	*Comatella stelligera* (as *Antedon tenax*)	Pacific - Australia (recorded as New Holland), dredging	circular, no cirri, dorsal ridges	
Myzostoma insigne	Atkins, 1927	Free-living	*Clarkcomanthus mirus* [originally described from *Comanthus parvicirrus* (as *Comanthus annulatus*)]	Pacific - Great Barrier Reef, Australia, depth not recorded	circular, no cirri, dorsal furrows	
Myzostoma atrum	Atkins, 1927	Free-living	*Comatula pectinata*	Pacific - Great Barrier Reef, Australia, depth not recorded	circular, no cirri, dorsal surface covered in tubercles	
Myzostoma ambiguum	Graff, 1887	Free-living	*Anneissia bennetti* (as *Actinometra bennetti*) (original description was uncertain)	Pacific - Moluccas, dredging	circular, with cirri, 20 cirri, anterior and posterior pair longer than the rest, pharynx with 7-9 papillae	
Myzostoma longimanum	Jägersten, 1937	Free-living	*Anneissia pinguis* (as *Comanthus pinguis*)	Pacific - Kiuschiu, Goto Islands, Japan, 110 m	circular, with cirri, 20 medium-long cirri	
***Myzostoma laurenae* n. sp.**	**Summers & Rouse, 2014**	**Free-living**	***Capillaster multiradiatus***	**Pacific - Lizard Island Reef, Australia, less than 20 m**	**circular, with cirri, 20 long cirri, pharynx with 10 papillae**	
Myzostoma seymourcollegiorum	Rouse & Grygier, 2005	Free-living	*Cenolia trichoptera;* also recorded from *Cenolia glebosus* [not confirmed]	Pacific - Encounter Bay, southern Australia, 2 m	circular, with cirri, 20 short cirri	
Myzostoma brevicirrum	Graff, 1884a	Free-living	*Clarkcomanthus exilis* (as *Actinometra mutabilis*)	Pacific - Tonga, 31 m	circular, with cirri, 20 short cirri	
***Myzostoma miki* n. sp.**	**Summers & Rouse, 2014**	**Free-living**	***Clarkcomanthus luteofuscum***	**Pacific - Great Barrier Reef, Australia, less than 20 m**	**circular, with cirri, 20 short cirri, dorsal surface honeycomb pattern of ridges**	
***Myzostoma debiae* n. sp.**	**Summers *et al.* 2014**	**Free-living**	***Comactinia titan***	**Pacific - Raja Ampat, Indonesia, less than 20 m**	**circular, with cirri, 20 medium-length cirri**	
Myzostoma longicirrum	Graff, 1887	Free-living	*Comanthus parvicirrus* (as *Actinometra parvicirra*) (also recorded from *Capillaster sentosus, Pontiometra andersoni, Comatula pectinata*)	Pacific - Zamboanga, Philippines; also recorded from Gulf of Davao, Siasi, and Jolo, Philippines and Singapore	circular, with cirri, 20 long cirri, scalloped margin, parapodia acirrate	
Myzostoma elegans	Graff, 1877	Free-living	*Comanthus parvicirrus* (as *Actinometra parvicirra*) from Philippines; also recorded from Singapore, Fiji, Banda Islands and Sulu Archipelago (Indonesia) on *Phanogenia gracilis,* and Caribbean on *Comactinia meridionalis* (as *Actinometra meridionalis*)	Pacific - Bohol, Philippines, dredging; also recorded from Singapore, Fiji, and Indonesia, as well as Caribbean - French Reef, Florida Keys (*Bibb* Exp)	circular, with cirri, more than 80 of different lengths, parapodia acirrate	specimen recorded on *Comactinia meridionalis* likely different species
Myzostoma stochoeides	Atkins, 1927	Free-living	*Comanthus parvicirrus* (as *Comanthus annulatus* and *Comaster tenellus*); also recorded from *Capillaster multiradiatus*	Pacific - Badu Island, Torres Strait (Australia); also recorded from Singapore, Hansa Bay, Papua New Guinea	circular, with cirri, 20 short to medium-long tendril-like cirri, thin and translucent	record from *Capillaster* dubius
Myzostoma polycyclus	Atkins, 1927	Free-living	*Comanthus parvicirrus* (as *Comanthus annulatus*)	Pacific - Murray and Badu Island,	circular, with cirri, numerous cirri, parapodia with cirri	

				Queensland, Australia, depth not recorded		
Myzostoma singaporense	Eeckhaut *et al.*, 1994	Free-living	*Phanogenia gracilis* (as *Comaster gracilis*)	Pacific - Pulau Satumu (Raffles Lighthouse), Singapore, 0-15 m	circular, with cirri, 20 cirri, anterior and posterior pair slightly longer	probably = *M. nigromaculatum*
Myzostoma capitocutis	Eeckhaut *et al.*, 1994	Free-living	*Phanogenia gracilis* (as *Comaster gracilis*)	Pacific - Pulau Satumu (Raffles Lighthouse), Singapore, 0-15 m	circular, with cirri, 44-48 cirri of unequal length, dorsal surface covered in papillae	
Myzostoma nigromaculatum	Eeckhaut *et al.*, 1998	Free-living	*Phanogenia gracilis* (as *Comaster multifidus*) (also recorded from *Lamprometra palmata*)	Pacific - Hansa Bay, Papua New Guinea, no depth recorded	circular, with cirri, 20 long cirri slightly longer anteriorly, dorsal color pattern of spots	
Myzostoma mortenseni	Jägersten, 1940a	Free-living	probably *Clarkcomanthus* (as a white *Actinometra* without cirri)	Pacific - Jolo, Philippines, 45 m	circular, with cirri, numerous cirri	
Myzostoma pallidum	Graff, 1877	Free-living	*Comatula solaris* (as *Actinometra solaris)* and *Comanthus parvicirrus*	Pacific - Bohol, Philippines, dredging	circular, with cirri, 20 short cirri, proboscis with papillae	
Myzostoma triste	Graff, 1877	Free-living	*Comanthus parvicirrus* (as *Actinometra parvicirra*)	Pacific - Bohol, Philippines, dredging	circular, with cirri, 20 short cirri, smooth proboscis	
Myzostoma dubium	Graff, 1877	Free-living	Comatulidae (as *Comatula* sp.)	Pacific - Bohol, Philippines, dredging	circular, with cirri (juvenile?), scalloped edge	
Myzostoma viride	Atkins, 1927	Free-living	*Comanthus parvicirrus* (as *Comanthus annulatus*)	Pacific - Great Barrier Reef, Australia, depth not recorded	elongate, tapers to a point posteriorly, with 20 short triangular cirri, dorsal surface dark green with a white line down the middle, extended pharynx red	
Myzostoma longitergum	Eeckhaut *et al.*, 1998	Free-living	*Comaster schlegelii* (as *Comanthina schlegelii*) (also recorded from *Comaster audax*)	Pacific - Hansa Bay, Papua New Guinea, dredging; also recorded from Raja Ampat, Indonesia, less than 20 m	elongate, with cirri, 20 thin cirri	
***Myzostoma kymae* n. sp.**	**Summers & Rouse, 2014**	**Free-living**	***Alloeocomatella pectinifera***	**Pacific - Madang Harbor, Papua New Guinea, less than 20 m**	**oval, with cirri, 20 short, thin cirri**	
Myzostoma brachiatum	Graff, 1877	Free-living	*Comatella nigra* (as *Actinometra nigra*); also recorded from *Heterometra savignii*	Pacific - Bohol, Philippines; also recorded from *Heterometra savignii* at Johore Shoal (Singapore), dredging	elongate, with cirri, 30 cirri, 12 long, 18 short	record from *Heterometra* or original host ID dubius
Hypomyzostoma elongatum	(Graff, 1877)	Free-living	*Comanthus parvicirrus* (as *Comatula triquetra*)	Pacific - Bohol, Philippines, dredging	elongate, scalloped margin from ~60 blunt triangular cirri	host identification as Comatulidae is questionable - Grygier (1992) states 'host unknown'
Myzostoma verrucosum	Graff, 1877	Free-living	*Comanthus parvicirrus* (as *Antedon triquetra*)	Pacific - Bohol, Philippines, dredging	elongate, scalloped edge	
Myzostoma cornutum	Graff, 1877	Free-living	*Comanthus parvicirrus* (as *Antedon triquetra*)	Pacific - Bohol, Philippines, dredging	elongate, with cirri, 10 short, 2 long at anterior	

Myzostoma nigrescens	Graff, 1884a	Free-living	*Anneissia japonica* (as *Actinometra morsei*)	Pacific - Yeddo Bay, Japan, dredging	circular, with cirri, 20 medium-length cirri	
Mariametroidea						
	Authority	**Lifestyle**	**Type host(s)**	**Type Locality**	**Distinguishing Features**	**Notes**
Mesomyzostoma reichenspergeri	Remscheid, 1918	Internal	*Amphimetra tessellata* (as *Amphimetra discoidea*)	Pacific - Aru Island, Indonesia, dredging		
***Endomyzostoma neridae* n. sp.**	**Summers & Rouse, 2014**	**Cyst-forming**	***Cenometra bella***	**Pacific - East Timor, less than 20 m**	**no cirri**	
Myzostoma armatae	Grygier, 1989	Free-living	*Analcidometra armata*	Atlantic - Caribbean, Bahamas, 14-17 m (also recorded to 52 m)	oval, narrowing towards posterior end, with cirri, 10 short cirri	
Myzostoma filiferum	Graff, 1884a	Free-living	possibly *Heterometra variipinna* (as *Antedon bidentata - nomen nudum*)	Pacific - Torres Strait, dredging	2 elongate caudal appendages	
Myzostoma brevilobatum	Jägersten, 1937	Free-living	*Cyllometra manca* (as *Cyllometra pulchella*)	Pacific - Kiuschiu, Kagoshima, Japan, 200 m	4 caudal processes, weakly developed, elongate; no cirri on margin	
Myzostoma quadricaudatum	Graff, 1884a	Free-living	*Zygometra elegans* (as *Antedon fluctuans*)	Pacific - Arafura Sea (*Challenger* Stn 190), dredging	4 caudal processes; 20 marginal cirri	
Myzostoma quadrifilum	Graff, 1884a	Free-living	possibly *Heterometra variipinna* (as *Antedon bidentata - nomen nudum*)	Pacific - Torres Strait (*Challenger* Stn 186), dredging	4 caudal processes, terminating in a thread; 20 marginal cirri	
Myzostoma laingense	Eeckhaut *et al.*, 1998	Free-living	*Stephanometra indica* (as *Stephanometra oxycantha*)	Pacific - Hansa Bay, Papua New Guinea, dredging	5 caudal processes; irregular margin with many small cirri, dorsal stripe	
Myzostoma jaegersteni	Eeckhaut *et al.*, 1994	Free-living	*Heterometra savignii* (also recorded from [non-type] *Neometra multicolor, Tropiometra carinata*)	Pacific - Johore Shoal, Singapore, dredging	6 caudal processes with cirri; around 20 marginal cirri, anterior pair longer	
Myzostoma fissum	Graff, 1884a	Free-living	Host unknown; *Dichrometra flagellata* from PNG (recorded from many other hosts)	Pacific - Kandavu Island, Fiji (*Challenger* Stn 174), dredging; also recorded from throughout IndoPacific	6 caudal processes, robust and acirrate; 18-24 marginal cirri, anterior pair shortest	
***Myzostoma eeckhauti* n. sp.**	**Summers & Rouse, 2014**	**Free-living**	***Lamprometra palmata* type B**	**Pacific - Madang Harbor, Papua New Guinea, less than 20 m**	**6 caudal processes with cirri; 20 marginal cirri, anterior pair longer**	
***Myzostoma hollandi* n. sp.**	**Summers *et al.* 2014**	**Free-living**	***Stephanometra tenuipinna***	**Pacific - Raja Ampat, Indonesia, less than 20 m**	**6 caudal processes, acirrate; 16 marginal cirri anterior longest**	
Myzostoma intermedium	Graff, 1884a	Free-living	*Zygometra microdiscus* (as *Antedon multiradiata*)	Pacific - Torres Strait (*Challenger* Stn 187), dredging	6 caudal processes, badly damaged	
***Myzostoma tertiusi* n. sp.**	**Summers *et al.* 2014**	**Free-living**	***Cenometra bella; Colobometra perspinosa***	**Pacific - Papua New Guinea, less than 20 m**	**circular**	

Myzostoma coriaceum	Graff, 1884a	Free-living	*Colobometra perspinosa* (as *Antedon insignis*)	Pacific - Port Denison, Queensland, Australia (*Alert* Stn 110), 5-7 m	circular, with cirri, 20 short cirri, very thin	host identification as Mariametroidea is questionable
Hypomyzostoma crosslandi	(Boulenger, 1913)	Free-living	*Heterometra savignii* (as *Antedon savignyi*), *Oligometra serripinna* (as *Antedon serripinna*), and an unknown Comatulida	Indian - Red Sea, Sudanese coast, ~18 m	elongate, rounded anteriorly and posteriorly, serrated margin, cloaca situated at posterior end, last parapodia 1/3 to 1/4 distance from end of body, dorsal surface with 7+ light transverse bands	
Myzostoma bicorne	Remscheid, 1918	Free-living	*Amphimetra tessellata* (as *Amphimetra discoidea*)	Pacific - Aru Island, Indonesia, dredging	elongate, scalloped margin from ~28 triangular cirri, most posterior pair larger than rest	
Myzostoma cristatum	Remscheid, 1918	Free-living	*Amphimetra tessellata* (as *Amphimetra discoidea*)	Pacific - Aru Island, Indonesia, in shallow depths	elongate (slightly), longitudinal dorsal ridge with furrows outward	
***Myzostoma pipkini* n. sp.**	**Summers *et al.* 2014**	**Free-living**	***Colobometra perspinosa***	**Pacific - Lizard Island, Australia, less than 20 m**	**elongate, posterior terminating in a blunt point, finely serrated margin, cloaca lies at beginning of last quarter of body, last parapodia 1/3 to 1/4 distance from end of body**	
Hypomyzostoma folium	(Graff, 1884a)	Free-living	*Cyllometra manca* (as *Antedon manca*)	Pacific - southwest of Papua New Guinea (*Challenger* Stn 192), dredging	elongate, posterior terminating in a blunt point, serrated margin, no lateral organs, last parapodia 1/3 to 1/4 distance from end of body	
Hypomyzostoma sulcatum	(Remscheid, 1918)	Free-living	*Heterometra variipinna* (as *Amphimetra variipinna*)	Pacific - Aru Island, Indonesia, dredging	elongate, rounded anteriorly and posteriorly, scalloped margin from ~26 blunt rounded cirri	
Myzostoma dentatum	Graff, 1884a	Free-living	possibly *Heterometra variipinna* (as *Antedon bidentata - nomen nudum*)	Pacific - Torres Strait (*Challenger* Stn 186), dredging	elongate, rounded anteriorly and posteriorly, dentate margin	
Hypomyzostoma fasciatum	(Remscheid, 1918)	Free-living	*Himerometra martensi* (as *Himerometra crassipinna*)	Pacific - Kei Islands, Nahu Tawun, dredging	elongate, rounded anteriorly and posteriorly, dentate margin, 19 transverse dorsal ridges	
Myzostoma adhaerens	Remscheid, 1918	Free-living	*Himerometra martensi* (as *Himerometra crassipinna*)	Pacific - Kei Islands, Nahu Tawun, dredging	elongate, dentate margin from numerous cirri, 4 caudal processes (weakly developed), ridged	
***Hypomyzostoma jonathoni* n. sp.**	**Summers & Rouse, 2014**	**Free-living**	***Dichrometra/Lamprometra /Liparometra* sp. 1**	**Pacific - Lizard Island, Australia, less than 20 m**	**elongate, rounded anteriorly and posteriorly, serrated margin, cloaca situated at posterior end, last parapodia 1/3 to 1/4 distance from end of body,**	

***Hypomyzostoma jasoni* n. sp.**	**Summers & Rouse, 2014**	**Free-living**	***Stephanometra indica***	**Pacific - Lizard Island, Australia, less than 20 m**	**elongate, rounded anteriorly and posteriorly, serrated margin, cloaca situated at posterior end, last parapodia 1/3 to 1/4 distance from end of body,**	
Hypomyzostoma membranaceum	(Graff, 1887)	Free-living	*Stephanometra indica* (as *Antedon marginata*)	Pacific - Philippines (*Challenger* Stn 208), dredging	elongate, finely serrated margin, no lateral organs, dorsal surface with ridged longitudinal swelling and five pairs of oval prominences, parapodia evenly spaced, cloaca subterminal	
Hypomyzostoma nanseni	(Graff, 1887)	Free-living	Unknown Comatulida	Pacific - Moluccas, Indonesia, dredging	elongate, posterior terminating in a blunt point, serrated margin, cloaca lies at beginning of last quarter of body, last parapodia 1/3 to 1/4 distance from end of body	
Hypomyzostoma dodecaphalcis	(Grygier, 1992)	Free-living	*Zygometra comata* (also recorded from *Amphimetra tessellata* (as *Amphimetra tessellata discoidea*))	Pacific - Kei Islands, Indonesia (also recorded from Sulu Sea, Hong Kong, and Philippines), 1-49 m	elongate-oval, rounded anteriorly and posteriorly, with cirri, scalloped margin from 35-50 bluntly triangular cirri, ~12 transverse dorsal ridges	
Hypomyzostoma taeniatum	(Remscheid, 1918)	Free-living	*Zygometra microdiscus* (as *Zygometra mertoni*)	Pacific - Aru Island, dredging	elongate, rounded anteriorly and posteriorly, scalloped margin from ~28 rounded triangular cirri, 7-8 weak transverse dorsal ridges	
Myzostoma lutkeni	Graff, 1884a	Free-living	*Amphimetra tessellata* (as *Actinometra intricata*)	Pacific - Tonga, dredging	oval, with cirri, 20 cirri	
Tropiometroidea						
	Authority	**Lifestyle**	**Type host(s)**	**Type Locality**	**Distinguishing Features**	**Notes**
Endomyzostoma tenuispinum	(Graff, 1884a)	Cyst-forming	*Glyptometra inequalis* (as *Antedon inaequalis*), *Glyptometra angusticalyx* (as *Antedon angusticalyx*), *Charitometra basicurva* (as *Antedon basicurva*), and *Charitometra incisa* (as *Antedon incisa*)	Pacific - Kermadec Islands (*Challenger* Stn 170), southwest of Fiji (*Challenger* Stn 174), southeast of Philippines (*Challenger* Stn 214), dredging	14 marginal cirri	
Endomyzostoma beardi	(Graff, 1887)	Cyst-forming	*Monachometra flexilis* (as *Antedon flexilis*)	Pacific - Arafura Sea (*Challenger* Stn 192), dredging	20 marginal cirri	
Myzostoma willemoesii	Graff, 1884a	Cyst-forming	*Charitometra basicurva* (as *Antedon basicurva*) and *Glyptometra inaequalis* (as *Antedon inaequalis*)	Pacific - Kermadec Islands (*Challenger* Stn 170) and southwest of Fiji (*Challenger* Stn 174), dredging	20 long cirri and lateral organs	

Notopharyngoides ijimai	(Hara & Okada, 1921)	Cyst-forming	*Tropiometra macrodiscus* (as *Antedon macrodiscus*)	Pacific - Misaki Marine Biological Station and eastern coast of Japan, shallow waters	dorsal proboscis	
Endomyzostoma orientale	(McClendon, 1906)	Cyst-forming	*Calometra discoidea* (as *Antedon discoidea*)	Pacific - Japan, dredging	no cirri	
Endomyzostoma murrayi	(Graff, 1883)	Cyst-forming	*Horaeometra duplex* (as *Antedon duplex*) *also recorded from Adelometra angustiradia* (as *Antedon angustiradia*)	Carribean - St. Vincent (*Blake* Stn 269); Pacific - southwest of Papua (*Challenger* Stn 192) and Kermadec Islands (*Challenger* Stn 170), dredging	no cirri	Pacific record likely different species
Myzostoma brevipes	Graff, 1883	Free-living	*Crinometra brevipinna* (as *Antedon pourtalessi*)	Caribbean - Cariacou (*Blake* Stn 241), dredging	circular, with cirri, 20 short cirri, dorsal surface covered in deep folds	
Myzostoma cubanum	McClendon, 1907	Free-living	*Crinometra brevipinna*	Caribbean - Habana (*Albatross* Stn 2156), dredging	circular, with cirri, 20 short cirri form a scalloped margin	
Myzostoma pictum	Graff, 1883	Free-living	probably *Stylometra spinifera* (as *Antedon spinifera*)	Caribbean - Montserrat (*Blake* Stn 157), dredging	circular, with cirri?, dorsal surface has fine markings	
Myzostoma fuscomaculatum	Lanterbecq *et al.*, 2009	Free-living	*Tropiometra carinata*	Indian - False Bay, South Africa, shallow subtidal waters	elongate, no cirri	
Myzostoma gopalai	Subramaniam, 1938	Free-living	*Tropiometra carinata* (as *Tropiometra encrinus*)	Indian - Madras, India, depth not recorded	oval, 20-136 small cirri, probosics with 10 papillae	
Myzostoma labiatum	Graff, 1884a	Free-living	probably *Glyptometra inequalis* (as *Antedon inequalis*)	Pacific - southwest of Fiji (*Challenger* Stn 174), dredging	circular, no cirri, dorsal surface with ridges and wart-like processes	
Myzostoma bocki	Jägersten, 1937	Free-living	*Tropiometra macrodiscus* (as *Tropiometra afra macrodiscus*)	Pacific - Misaki, Sagami Bay, Japan, 3-5 m; also recorded from Australia and Hong Kong	oval, with cirri, 20 very small cirri hard to distinguish, dorsal surface texture variable, nearly smooth, partially wrinkled or heavily rugose	
Myzostoma chelonium	McClendon, 1906	Free-living	*Calometra discoidea* (as *Antedon discoidea*)	Pacific - Suruga Gulf and Sagami Sea, Japan, dredging	circular to oval, with cirri, 20 short cirri, dorsal surface furrowed in honeycomb pattern	
Myzostoma chelonoidium	McClendon, 1906	Free-living	*Calometra discoidea* (as *Antedon discoidea*)	Pacific - Suruga Gulf and Sagami Sea, Japan, dredging	elongate, with cirri, 20 short cirri, dorsal surface furrowed in honeycomb pattern	
Myzostoma cirricostatum	Jägersten, 1937	Free-living	*Parametra orion* (as *Perissometra aranea*)	Pacific - Kiuschiu, Goto Islands, Japan, 165 m	circular, with cirri, 20 short cirri, dorsal furrows	
Myzostoma nasonovi	Fedotov, 1938	Free-living	*Tropiometra macrodiscus* (as *Tropiometra afra macrodiscus*)	Pacific - Sagami Bay, Japan; also recorded from Hong Kong	oval; with cirri, numerous very small cirri, dorsal bands	possibly = *M. gopalai*

Myzostoma smithi	McClendon, 1906	Free-living	*Calometra discoidea* (as *Antedon discoidea*)	Pacific - Suruga Gulf and Sagami Sea, Japan, dredging	circular to oval, with cirri, 10 very small cirri	
Myzostoma australe	Rouse, 2003	Free-living	*Ptilometra macronema*	Pacific - St. Francis Isle, Nuyts Archipelago, Australia, 19 m	oval, with cirri, 20 short cirri	

Multiple hosts

	Authority	Lifestyle	Type host(s)	Type Locality	Distinguishing Features	Notes
Notopharyngoides aruensis	(Remscheid, 1918)	In digestive tube	*Comanthus briareus* (as *Comanthina briareus*) also recorded from many other Comatulida	Pacific - Aru Island, Indonesia, 50 m; also recorded from Enewetak and Kwajalein	dorsal proboscis	
Myzostoma cerriferoidium	McClendon, 1907	Free-living	*Crinometra brevipinna* and *Analcidometra armata*	Caribbean - St. Lucia, 514 m and Panama Canal, 62 m	circular, with cirri, 20 short cirri	
Myzostoma attenuatum	Grygier, 1989	Free-living	*Capillaster sentosa* (also recorded from *Comaster multifidus, Colobometra perspinosa, Oxymetra finschi, Pontiometra andersoni, Decametra mylitta, Cenometra cornuta, Stephanometra oxyacantha, Phanogenia gracilis, Petasometra heliantoides*)	Pacific - Philippines (*Albatross* Stn 5146), 44 m (also recorded throughout IndoPacific)	elongate, tapering, with cirri, numerous short irregularly sized marginal cirri, parapodia confined to front half of body	Sequencing supports wide range of hosts

Unknown host

	Authority	Lifestyle	Type host(s)	Type Locality	Distinguishing Features	Notes
Myzostoma caribbeanum	Graff, 1883	Free-living	Uncertain	Caribbean - *Blake* 1877-78 or 78-79 (label lost)	elongate, with cirri, up to 43 cirri	likely synonym of *M. oblongum*
Myzostoma longipes	Graff, 1883	Free-living	Uncertain	Caribbean - St. Vincent Island (*Blake* Stn 269), dredging	circular, no cirri, dorsal surface with tubercles (warts with deep furrows between)	
Myzostoma ingolfi	Jägersten, 1940a	Free-living	Unknown	Atlantic - southeast of Iceland, 791-1301 m	elongate, with cirri, 20 cirri	
Myzostoma moebianum	Graff, 1884a	Free-living	Unidentified	Indian - Fouqet Island, southeast from Mauritius	five pairs of lateral organs (third may be genital)	described from collector's notes
Myzostoma rubrofasciatum	Graff, 1884a	Free-living	Uncertain	Indian - Red Sea, near Sinai	elongate, parapodia distributed evenly, cloaca subterminal	
Myzostoma bucchichii	Wagner, 1887	Free-living	Unidentified	Mediterranean - Adriatic Sea, Dalmatia	circular, no cirri, dorsal tubercles, no suction cups	
Myzostoma chinesicum	Graff, 1884a	Free-living	Uncertain	Pacific - China Sea, dredging	circular, no cirri	
Myzostoma pottsi	Atkins, 1927	Free-living	Unidentified	Pacific - Great Barrier Reef, Australia, depth not recorded	circular, no cirri, dorsal ridges	likely synonym of *M. insigne*
Myzostoma antennatum	Graff, 1884a	Free-living	Uncertain	Pacific - Xiamen, China, dredging	circular, with cirri, 1st, 2nd, and last pairs of cirri longer than rest; proboscis with papillae	

Myzostoma gardineri	Atkins, 1927	Free-living	Unidentified	Pacific - Hulula Male Atoll, Maldives, depth not recorded	oval, cloaca not on most posterior end	
Hypomyzostoma maculatum	(Jägersten, 1937)	Free-living	Unknown	Pacific - Japan, Kiuschiu, Okinoshima, 140 m	elongate, margin with numerous lobe cirri	
Myzostoma tentaculatum	Jägersten, 1940a	Free-living	Unknown	Pacific - Japan, 65 m	2 elongate caudal appendages, margin with 18 cirri, most anterior pair much longer	probably an Antedonidae host
Myzostoma furcatum	Graff, 1887	Free-living	Unknown Comatulida	Pacific - Moluccas, dredging	4 caudal processes, unequal notching of margin, dorsal longitudinal and radial ridges which extend onto the caudal processes	

Not currently accepted

	Authority	**Status**	**Source of Designation**
Myzostoma glabrum	Leuckart in Graff, 1877	nomen dubium	Grygier 1992
Myzostoma hexalobatum	Vagin, 1974 (in Fischelson, 1974)	nomen dubium; nomen nudum	Grygier 1988; Eeckhaut *et al.* 1998
Myzostoma costatum	Leuckart, 1830	nomen dubium	Grygier 1992
Myzostoma parasiticum	Leuckart, 1827	nomen dubium	Grygier 1992
Myzostoma quadrilobatum	Vagin, 1974 (in Fischelson, 1974)	nomen nudum	Eeckhaut *et al*. 1998
Myzostoma striata	George, 1943	nomen nudum	Eeckhaut *et al.* 1998
Myzostoma metacrini	McClendon, 1906	synonym of *E. cirripedium*	Jägersten 1937

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