New and known free-living nematode species (Nematoda: Chromadorea) from offshore tsunami monitoring buoys, Southwest Pacific Ocean (#116800)

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New and known free-living nematode species (Nematoda: Chromadorea) from offshore tsunami monitoring buoys, Southwest Pacific Ocean

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Deep ocean Assessment and Reporting of Tsunami (DART) buoys are deployed across the Southwest Pacific and provide a substrate for biofouling communities. Two new free-living nematode species, *Atrochromadora tereroa* sp. nov. and *Euchromadora rebeccae* sp. nov. (family Chromadoridae), and one known species, *Halomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov. (family Monhysteridae), are described from buoys deployed off Raoul Island in the Kermadec/Rangitāhua region and off New Zealand's East Cape. *Thalassomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) Jacobs, 1987 and *T. anoxybiotica* (Jensen, 1986) Jacobs, 1987 are transferred to *Halomonhystera* based on the presence precloacal and caudal papillae in males, and *Halomohystera zhangi* Li, Huang & Huang, 2024 is synonymised with *Halomonhystera refringens*. Udated keys of *Atrochromadora*, *Euchromadora* and *Halomonhystera* species are provided. The presence of nematodes on buoys deployed >100 km from the nearest landmass and in deep waters (>3500 m water depth) shows that some nematode species are capable of dispersing over long distances to colonise new substrates. Long distance dispersal of *Atrochromadora*, *Euchromadora* and *Halomonhystera* species likely occurs via drifting macroalgal fragments.

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Abstract

Deep ocean Assessment and Reporting of Tsunami (DART) buoys are deployed across the Southwest Pacific and provide a substrate for biofouling communities. Two new free-living nematode species, *Atrochromadora tereroa* sp. nov. and *Euchromadora rebeccae* sp. nov. (family Chromadoridae), and one known species, *Halomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov. (family Monhysteridae), are described from buoys deployed off Raoul Island in the Kermadec/Rangitāhua region and off New Zealand's East Cape. *Thalassomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) Jacobs, 1987 and *T. anoxybiotica* (Jensen, 1986) Jacobs, 1987 are transferred to *Halomonhystera* based on the presence precloacal and caudal papillae in males, and *Halomohystera zhangi* Li, Huang & Huang, 2024 is synonymised with *Halomonhystera refringens*. Udated keys of *Atrochromadora*, *Euchromadora* and *Halomonhystera* species are provided. The presence of nematodes on buoys deployed >100 km from the nearest landmass and in deep waters (>3500 m water depth) shows that some nematode species are capable of dispersing over long distances to colonise new substrates. Long distance dispersal of *Atrochromadora*, *Euchromadora* and *Halomonhystera* species likely occurs via drifting macroalgal fragments.

Keywords. Nematoda, Monhysterida, Chromadorida, epiphytic, new species

Introduction

Molecular studies have shown that, although genetic connectivity among nematode populations generally appears to be limited to distances less than 100 km (Derycke et al., 2008, 2013; Hauquier et al., 2017), there is evidence of gene flow between nematode communities hundreds of kilometres apart (Bik et al. 2010, Apolonio Silva de Oliveira et al. 2017, de Groote et al. 2017). Nematodes have increasingly been recognized as having high dispersal abilities despite their very limited locomotion ability and lack a pelagic larval stage, with dispersal thought to occur mainly through passive means including drifting, rafting, zoochory and human-mediated transport (Cerca et al. 2018, Ptatscheck & Transpurger 2020). Artificial structures such as ship hulls constitute a suitable substrate for a range of epibiotic nematodes, particularly once they are colonized by biofilm-forming microorganisms and/or habitat-forming macroalgae and invertebrates (Jensen 1984, Kito & Nakamura 2001, Fonseca-Genevois et al. 2006, Majdi et al. 2011, Leduc 2020). Settlement plate experiments have also demonstrated the ability of nematodes to colonise artificial hard substrates deployed several meters above the seafloor in coastal environments (Fonseca-Genevois et al. 2006, Boeckner et al. 2009, von Ammon et al. 2018).

Tsunami detection and early warning is an international effort with systems deployed across the world's oceans. Twelve locations in the Southwest Pacific Ocean have been identified to comprise the New Zealand Tsunami Detection Network, with the first deployment voyage taking place in late 2019. Each of the deployed Deep ocean Assessment and Reporting of Tsunami (DART) systems comprise two major components: (a) a bottom pressure recorder with associated bottom acoustic release/flotation, and (b) a surface buoy with associated mooring lines, acoustic release and weights. The DART systems are deployed for about 24 months before being serviced and replaced, and during this period the surface buoys can accumulate a significant amount of biofouling. The presence of these buoys in locations across the Southwest Pacific provide a unique opportunity to study the nematode fauna colonizing structures located in deep water and far from the nearest landmass (> 100 km). Here, I describe two new species of the family Chromadoridae (*Atrochromadora tereroa* sp. nov. and *Euchromadora rebeccae* sp. nov.) and one known species of the family Monhysteridae (*Halomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov.) from buoys deployed off Raoul Island in the Rangitāhua/Kermadec region and off New Zealand's East Cape.

Materials & Methods

Biofouling community samples were obtained from DART buoy C deployed ca. 150 km east of New Zealand's East Cape and from DART buoy F deployed ca. 245 km east of Raoul Island in the Rangitāhua/Kermadec region (Figure 1 & 2, Table 1). Rangitāhua is within the rohe (territory) of Ngāti Kuri, with the islands having spiritual, cultural and customary significance (Ngāti Kuri Trust Board 2013). As kaitiaki (guardians / stewards), Ngāti Kuri seek to understand and protect the biota dwelling on land and in the seas around these islands, regarding the biota as taonga (treasures) and recognising the national and international significance of the unique diversity and assemblages found at Rangitāhua. One of the current priorities for Ngāti Kuri is the documentation of the species occurring within their rohe. The research reported here was undertaken collaboratively with Ngāti Kuri, who have contributed to the process of scientific naming of the Rangitāhua species through mātauranga Māori (Māori knowledge). Specimen collection was conducted under Ministry for Primary Industries Special Permit 666-9.

The entire biofouling community present in a 0.1 × 0.1 m quadrat placed on the side of each buoy was carefully scraped off using a plastic paint scraper, transferred to a plastic jar and fixed in buffered 10% formalin. In the laboratory, samples were passed through a 1 mm mesh to remove large biota (e.g., filamentous algae, gooseneck barnacles) and through a 45 µm mesh to retain nematodes. Nematodes were then picked under a dissecting microscope, transferred to pure glycerol and mounted onto permanent slides (Somerfield and Warwick 1996).

Species descriptions were made from glycerol mounts using differential interference contrast microscopy and drawings were made with the aid of a camera lucida. Measurements were obtained using an Olympus BX53 compound microscope with cellSens Standard software for digital image analysis. All measurements are in µm (unless stated otherwise), and all curved structures are measured along the arc. The terminology used for describing the arrangement of morphological features such as setae follows Coomans (1979), terminology of stoma structures follows Decraemer *et al.* (2014). Type specimens are held in the NIWA Invertebrate Collection (Wellington).

Abbreviations:

a = body length/maximum body diameter

b = body length/pharynx length

c = body length/tail length

c' = tail length/anal or cloacal body diameter

cbd = corresponding body diameter

L = total body length; n, number of specimens

V = vulva distance from anterior end of body

%V = V/total body length × 100

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Results

Phylum Nematoda Cobb, 1932

Class Chromadorea Inglis, 1932

Order Chromadorida Chitwood, 1933

Family Chromadoridae Filipjev, 1917

Family diagnosis (from Tchesunov (2014)) Cuticular ornamentation as punctuations which may be evenly distributed and of equal size (cuticle homogenous), or unevenly distributed, for example, enlarged in the lateral body regions or different along the body (cuticle

heterogenous) or the ornamentation may be made up of rods jointed in a "basket weave". Anterior sensilla arranged in two or three circles. Amphidial fovea a simple transverse slit, often inconspicuous, or ventrally wound spiral, located between the cephalic setae or posterior to them. Buccal cavity with dorsal tooth usually larger than ventrosublateral ones; teeth hollow or solid; denticles may be present; three nearly equal solid teeth also occur in some genera. Male monorchic with anterior testis (synapomorphy); pre-cloacal supplements cup-shaped (never tubular), may be absent. Females with two antidromously reflexed ovaries, the anterior gonad to the right of the intestine, the posterior gonad to the left of the intestine (synapomorphy).

Remarks. The family was revised by Venekey et al. (2019), who provided lists of valid species for all Chromadoridae genera.

Subfamily Chromadorinae Filipjev, 1917

Subfamily diagnosis (modified from Tchesunov (2014) and Venekey et al. (2019)) Cuticle homo- or heterogenous with or without lateral differentiation of larger dots. Anterior sensilla in three separate circles (6+6+4). Amphidial fovea oval, loop or transverse slit-like, sometimes difficult to be observed under light microscope. Buccal cavity usually with three subequal solid teeth (except for *Prochromadora* Filipjev, 1922 that present one single dorsal tooth and *Trichromadora* Kreis, 1929 with three hollow teeth). Pharyngeal tissue not enlarged around buccal cavity. Posterior pharyngeal bulb well defined (except for *Prochromadorella* and *Trichromadora* with poorly developed bulb). Precloacal cup-shaped supplements usually present in males.

Genus *Atrochromadora* Wieser, 1959

= *Chromadoropsis* Wieser 1954 nec Filipjev, 1918

Genus diagnosis (modified from Tchesunov (2014)). Cuticle with homogeneous punctation pattern along the entire body ~~and~~ with lateral differentiation of larger dots ~~usually~~ arranged in longitudinal rows. Amphidial fovea clearly visible; may be cryptocircular, unispiral, multispiral or open loop-shaped, with circular or transversely oval outline. Buccal cavity usually with three solid teeth, dorsal tooth larger than, or equal to, the ventrosublateral teeth. Males usually with cup-shaped precloacal supplements or without supplements.

Type species: *Atrochromadora parva* (de Man 1893) Wieser, 1954

Remarks. This genus is exclusively marine. The genus diagnosis is modified here to reflect the variety of amphidial fovea shapes found in the five previously described valid species as well as body cuticle lateral differentiation without longitudinal rows in *A. dissoluta* (Wieser, 1954) Wieser, 1959. In addition, the dorsal and ventrosublateral teeth may be of equal size, as in *A. verrucosova* sp. nov. The type species of the genus, *A. parva* (de Man 1893) Wieser, 1954 is the only species ~~of the genus for~~ which the amphidial fovea was not observed in the original description~~;~~ subsequent descriptions ~~of the species~~ by Schuurmans Stekhoven & Adam (1931) and Wieser (1954)~~, however,~~ do ~~note~~ the presence of a visible amphidial fovea. ~~For the time being,~~ it is assumed that this key morphological feature is present in all species of the genus.

List of valid species:

A. denticulata Wieser & Hopper, 1967

A. dissoluta (Wieser, 1954) Wieser, 1959

= *Chromadoropsis dissoluta* Wieser, 1954

A. microlaima (de Man, 1889) Wieser, 1959

= *Chromadora microlaima* de Man, 1889

= *Chromadorella microlaima* (de Man, 1889) Wieser, 1951

= *Chromadorina microlaima* (de Man, 1889) de Man, 1922

= *Chromadorina parva sensu* Schuurmans Stekhoven & Adam, 1931

A. obscura Wieser, 1959

A. parva (de Man, 1893) Wieser, 1959

= *Spiliphera parva* de Man, 1893

= *Chromadorina parva* (de Man, 1893) Micoletzky, 1924

= *Chromadoropsis parva* (de Man, 1893) Wieser, 1954

= *Spiliphera antarctica* Cobb, 1914

***Atrochromadora tereroa* sp. nov.**

(Table 2, Figs. 3–5)

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Type locality. Kermadec region (29.6782° S, 175.0127° W), RV *Tangaroa* voyage TAN2209, ~~on~~ surface of DART buoy F originally deployed in August 2021. ~~*Atrochromadora verrucosova* sp. nov. specimens~~ were recovered from filamentous green algae.

Type material. Holotype male (NIWA 181659)~~,~~ two paratype males and four paratype females (NIWA 181660), collected on 10 August 2022.

Measurements: See Table 2 for detailed measurements.

Description: Males. Body colourless~~,~~ cylindrical, tapering slightly towards both extremities. Pigment ~~spot~~ (ocelli) not observed. Cuticle with transverse striations and punctations; lateral differentiation consisting of 4–6 longitudinal rows of larger punctations extending from posterior to buccal cavity to near tail tip. Eight longitudinal rows of short somatic setae, 2–3 µm long, present from posterior to secretory-excretory pore to near tail tip. Cephalic region slightly rounded~~,~~ lip region not set off. Inner labial papillae not observed; six short outer labial papillae on lip region, anterior to four cephalic setae, 0.5–0.6 cbd long. Four sublateral rows of 2–3 cervical setae present, 2–5 µm long. Amphidial fovea cryptospiral with flattened oval outline, located at level of cephalic setae. Buccal cavity funnel-shaped with cuticularized walls, 14–15 µm deep and up to 6 µm wide; one dorsal and two ventrosublateral teeth, solid, strongly cuticularized, equal in size and shape, 4–5 µm long. Pharynx cylindrical~~,~~ muscular, with oval- to pyriform-shaped posterior bulb; pharyngeal lumen not cuticularised. Nerve ring at 52–62% of pharynx length from anterior. Secretory-excretory system present~~,~~ pore located approximately halfway between level of nerve ring and anterior body extremity; pore and distal portion of ampulla cuticularized and surrounded by thin glandular layer~~,~~ elongated renette cell located posterior to pharynx. Cardia small~~,~~ short, not surrounded by intestine.

Reproductive system monorchic with single anterior outstretched testis located left ~~relative~~ to intestine. Sperm cells globular, 4–7 × 5–8 µm. Spicules paired, with velum, curved near proximal and distal ends, tapering distally, 1.0–1.1 cloacal body diameters long. Gubernaculum funnel-shaped, strongly dilated distally and denticulated. Ejaculatory glands not observed. Two conspicuous sup-shaped precloacal supplements present, located 25–28 µm

anterior to cloaca and 26–28 µm apart. One short precloacal seta present ventrally. Tail conical. Three caudal glands and spinneret present.

Females. Similar to males, but often with slightly longer tail, 4.1–5.1 anal body diameters long. Reproductive system didelphic with two opposed and reflexed ovaries; anterior ovary to the right of intestine, posterior ovary to the left ~~of intestine~~. Surface of mature eggs with numerous bumps giving distinctive rough appearance, ~~ca.~~ 25–26 × 45–49 µm. Spermatheca not observed. Vulva situated near mid-body. Proximal portion of vagina surrounded by constrictor muscle, small vaginal glands present. Proximal portion of uterus opposite vulva not conspicuously cuticularized.

Diagnosis. *Atrochromadora tereroa* sp. nov. is characterised by body length 728–810 µm, cuticle with lateral differentiation consisting of 4–6 longitudinal rows of larger punctations~~,~~ cryptospiral amphidial fovea with flattened oval outline~~,~~ buccal cavity with three equal solid teeth~~,~~ secretory-excretory pore and distal portion of ampulla with cuticularized outline ~~and~~ surrounded by thin glandular layer~~,~~ spicules 21–26 µm long (1.0–1.1 cbd)~~,~~ two cup-shaped precloacal supplements in males~~,~~ mature eggs with distinct rough appearance due to presence of numerous small ‘bumps’ on surface.

Differential diagnosis. The new species can be distinguished from all other species of the genus in having two precloacal supplements and a buccal cavity with equal teeth. Other species in the genus all have a buccal cavity with subequal teeth~~,~~ and either ~~have no~~ precloacal supplements or at least eight supplements.

Etymology. The species name is a noun in apposition ~~and is~~ derived from te reo Māori terms ‘tere’ (= to float, drift, swim, flow, glide) and ‘roa’ (= a long time)~~, and refers~~ to the ability of this species to travel long distances.

Key to valid *Atrochromadora* species:

1 Precloacal supplements absent …2

Precloacal supplements present …3

2 Body length about 550 µm or less, male without ventral cuticular swelling on tail …***A. parva***

Body length greater than 700 µm, male with ventral cuticular swelling on tail …***A. denticulata***

3 More than 9 precloacal supplements present …4

Less than 9 precloaccal supplements present …5

4 Ten precloacal supplements, spicules 26 µm long, loop-shaped amphid with oval outline …***A. obscura***

Thirteen to fifteen precloacal supplements, spicules 35-36 µm long, multispiral amphid with circular outline …***A. microlaima***

5 Eight precloacal supplements, body length 540-770 µm, spiral amphid with round outline, buccal cavity with subequal teeth …***A. dissoluta***

Two precloacal supplements, body length 728-810 µm, unispiral amphid with oval outline, buccal cavity with equal teeth …***A. tereroa* sp. nov.**

Subfamily Euchromadorinae Gerlach & Riemann, 1973

Subfamily diagnosis (from Tchesunov (2014) and Venekey et al. (2019)) Cuticle usually with complex heterogenous ornamentation. The six outer labial and four cephalic setiform sensilla may be arranged in a single circle (6+10) or two separate circles (6+6+4). Amphidial fovea transverse slit-like or oval (elliptical). Buccal cavity with large or small dorsal tooth, with or without denticles or smaller ventrosublateral teeth. Pharynx with or without defined terminal bulb. Gubernaculum usually with hammer- or L-shaped lateral pieces (wrongly indicated as telamon in some descriptions). Precloacal supplements absent in males, but a precloacal differentiation of body cuticle may be present.

Remarks. The subfamily was recently revised by Datta & Al-Helal (2023)

Genus *Euchromadora* de Man, 1886

Genus diagnosis (modified from Tchesunov (2014)). Complex heterogeneous cuticle, structured with hexagonal or ovoid punctuations anteriorly and posteriorly, with slimmer markings restricted to the lateral surface over the middle of the body. Transversally elliptical amphidial fovea without surrounding cuticle fringe. Six outer labial sensilla and four cephalic sensilla setiform, arranged in separate circles. Buccal cavity with large dorsal tooth,

ventrosublateral teeth and rows of denticles. No distinct pharyngeal bulb. Gubernaculum with prominent hammer or L-shaped lateral pieces.

Remarks. Ten valid *Euchromadora* species are listed in the review of the family Chrmodoridae by Venekey et al. (2019). *Euchromadora gaulica* Inglis, 1962 may need to be synonymized with *E. tokiokai* Wieser, 1955 due to overlap in several key body measurements and in particular the strong resemblance in the structure of the copulatory apparatus, which is the main character used ~~in~~ differentiating among species of the genus.

Type species: *Euchromadora vulgaris* (Bastian, 1865) de Man, 1886

List of valid species:

E. atypica Blome, 1985

E. eileenae Inglis, 1969

E. ezoensis Kito, 1977

E. gaulica Inglis, 1962

= *E. chitwoodi* Coles, 1965

= *E. tridentata sensu* Wieser, 1951

E. meadi Wieser & Hopper, 1967

E. permutabilis Wieser, 1954

E. robusta Kulikov, Dashchenko, Koloss & Yushin, 1998

E. striata (Eberth, 1863) de Man, 1886

= *E. gaulica sensu* Inglis, 1962

= *Odontobius striatus* Eberth, 1863

E. tokiokai Wieser, 1955

E. vulgaris (Bastian, 1865) de Man, 1886

= *Chromadora vulgaris* Bastian, 1865

293

294 ***Euchromadora rebeccae* sp. nov.**

295 Table 3, Figs. 6–8

296 urn:lsid:zoobank.org:act:B27A134F-39C5-441B-A02C-67925A6537A1

297 **Type material**.: Holotype male (NIWA 182672), two paratype males and six paratype
298 females (NIWA 182673), collected on 10 December 2021.

299 **Type locality:** New Zealand region, off East Cape (38.2002° S, 179.7690° W), RV
300 *Tangaroa* voyage TAN2114, on surface of DART buoy C originally deployed in December
301 2019. *Euchromadora rebeccae* sp. nov. specimens were recovered from filamentous algae and
302 goose barnacles.

303 **Measurements:** See Table 3 for detailed measurements.

304 **Description:** Males. Body with slight golden colouration, cylindrical, tapering slightly
305 towards both extremities. Pigment spot (ocelli) not observed. Cuticle thick, particularly in
306 pharyngeal region and near tail tip (4–6 µm), thinner elsewhere (2–4 µm) with ornamentation
307 and annulations visible from slightly posterior to cephalic setae to level of spinneret. Lozenge or
308 hexagonal structures visible in cephalic and pharyngeal regions, morphing into tightly packed
309 rectangular structures or bars sometimes with lateral differentiation of punctations in the
310 posterior pharyngeal, mid-body and anal regions, reverting to lozenge structures in the tail
311 region. Eight longitudinal rows of somatic setae, 4–5 µm long, extending along entire body
312 length. Cephalic region slightly rounded, lip region not set off. Six inner labial papillae and six
313 outer labial papillae in separate circles on lip region; four cephalic setae, 0.3–0.4 cbd long.
314 Cervical setae absent. Amphidial fovea and aperture not observed. Mouth opening surrounded by
315 twelve cuticularized rugae. Buccal cavity funnel-shaped with cuticularized walls, ca. 30 µm deep
316 and up to 9 µm wide; one large dorsal tooth ca. 5 µm long and two smaller ventrosublateral
317 teeth, all teeth solid and strongly cuticularised. Two rows of denticles present along the
318 ventrosublateral sectors of the buccal cavity. Pharynx cylindrical, muscular, widening gradually
319 posteriorly but not forming true bulb; pharyngeal lumen not cuticularised. Nerve ring at 42–49%
320 of pharynx length from anterior. Secretory-excretory system present, pore located slightly

posterior to nerve ring; renette cell ca. 110 × 25 µm, located immediately posterior to pharynx. Cardia medium sized, 7–8 µm long, not surrounded by intestine.

Reproductive system monorchic with single anterior outstretched testis located to the right or left of intestine. Sperm cells globular, 3–4 × 5–6 µm. Spicules paired, curved, widest in middle portion, without velum, tapering distally, 1.8–2.0 cloacal body diameters long. Gubernaculum with relatively long (51–61 µm), slightly bent dorsal piece, most strongly cuticularized along dorsal side; lateral pieces of the gubernaculum (i.e., telamons) L-shaped, slightly shorter than dorsal piece (38–44 µm), without protrusions or serrations, tapered distally, rounded proximally. On pair of ejaculatory glands present, 3–4 cloacal body diameters anterior to cloaca. Precloacal supplements absent. One short precloacal seta present ventrally, 4–5 µm long. Tail conical. Three caudal glands present; spinneret well-developed with terminal pore.

Females. Similar to males, but often with slightly longer tail, 3.9–4.6 anal body diameters long. Reproductive system didelphic with two opposed and reflexed ovaries; both ovaries to the right of intestine. Mature eggs with smooth surface, ca. 38–43 × 49–71 µm. Spermatheca not observed. Vulva situated near mid-body. Proximal portion of vagina without conspicuous constrictor muscle, small vaginal glands not observed. Proximal portion of uterus opposite vulva not conspicuously cuticularized.

Diagnosis: *Euchromadora rebeccae* sp. nov. is characterised by body length 1237–2137 µm, cephalic setae 0.3–0.4 cbd long, equal spicules 1.8–2.0 cloacal body diameters long, L-shaped telamons without protrusions or serrations, 38–44 µm long (0.42–0.45 of spicule length).

Differential diagnosis: The new species is most similar to *Euchromadora ezoensis* and *E. permutabilis* in the structure of the copulatory apparatus with equal spicules and simple L-shaped telamons without serration or protrusions. *Euchromadora rebeccae* sp. nov. differs from both species in having relatively short telamons (44–49 *vs* ≥54 µm in both E. *ezoensis* and *E. permutabilis*). The new species also has spicules that are long relative to *E. ezoensis* (84–104 *vs* 75–85 µm in *E. ezoensis*) and short relative to *E. permutabilis* (84–104 *vs* 104–133 µm in *E. permutabilis*). The new species also differs from *E. ezoensis* in having a shorter body length (1237–2137 vs 2246–3052 µm in *E. ezoensis*), lower maximum body diameter (in males: 47–59 vs 59–74 µm in *E. ezoensis*; in females: 75–85 *vs* 94–128 µm in *E. ezoensis*) and shorter telamon

as a proportion of spicule length (0.42–0.45 *vs* 0.54–0.60 in *E. ezoensis*), and from *E. permutabilis* in having a higher ratio of a (in males: 24–27 *vs* 15–22 in *E. permutabilis*; in females: 22–24 *vs* 16–24 in *E. permutabilis*) and longer tail (in males: c′ = 4.6–4.7 *vs* 2.5–3.5 in *E. permutabilis*; in females: c′ = 5.0–5.2 *vs* 3.0–4.0 in *E. permutabilis*).

Etymology. The species is named after the author's partner, Rebecca Joy Styles.

Dichotomous identification key of *Euchromadora* species

1 Spicules unequal in length or ~~in~~ shape…2

Spicules equal in length and shape …3

2 Right spicule longer than left spicule …***E. vulgaris***

Right spicule uniformly narrow, left spicule markedly wider but truncated and narrow proximally …***E. atypica***

3 Telamons with serration or protrusions …4

Telamons without serration or protrusions …6

4 Telamons with anterior margin of distal limb serrated …***E. striata***

Telamons with protrusions but without serration …5

5 Telamons with well-developed protrusion directed dosrocaudally at junction of distal and proximal limbs …***E. robusta***

Telamons with distal swelling on anterior margin of distal limb …***E. eileenae***

6 Proximal and distal limbs of telamons do not meet at 90 degrees angle (telamon not L-shaped) …7

Telamon L-shaped …8

7 Body length 1670-2800 µm, a = 26–40, c = 9–12…***E. gaulica***

Body length 950-1690 µm, a = 20–28, c ratio = 7–9…***E. tokiokai***

8 Spicules not markedly narrower than dorsal limb of telamon, dorsal portion of gubernaculum without projection …9

Spicules uniformly slender, markedly narrower than dorsal limb of telamons, 45–56 µm long, telamon 22–24 µm long, dorsal portion of gubernaculum with proximal projection …***E. meadi***

9 Telamons total length ≥ 54 µm …10

Telamons total length 44–49 µm, spicules length 84–104 µm, body length 1237–2137 µm …***E. rebeccae sp. nov.***

10 Spicules 75–85 µm …***E. ezoensis***

Spicules 104–133 µm…***E. permutabilis***

Order Monhysterida Filipjev, 1929

Family Monhysteridae de Man, 1876

Family diagnosis (from Fonseca & Bezerra (2014)) Small, slender nematodes with body lengths usually less than 2.5 mm; body cuticle finely striated and frequently smooth under light microscopy. Anterior sensilla in two crowns: anterior circle with six inner labial sensilla (usually papilliform), posterior circle with six outer labial sensilla and four cephalic (usually setiform) sensilla. Amphidial fovea circular or cryptospiral ventrally wound, varying in size (may be a result of sexual dimorphism) and in position from the anterior end. Ocelli often present in shallow-water and inland species. Buccal cavity (excluding cheilostome) surrounded by pharyngeal tissue and of varying shape: either bipartite or single V-shaped, cylindrical or minute, with or without denticles. Pharynx cylindrical, well-muscularized, sometimes slightly swollen at its anterior end and in some genera with more or less developed muscular posterior bulb. Cardia with conoid part lying between pharynx and intestine, and oblong valve-like, inner part protruding into intestinal lumen. Intestine with few cells (oligocytous) arranged in two rows; dorsal and ventral. Ventral gland often present in marine and freshwater species; secretory – excretory pore from just anterior to nerve ring to the labial region. Female reproductive system monodelphic-prodelphic, with the gonad almost always outstretched on the right side of intestine. Male monorchic, spicules generally simple, of varying length, one to five times the anal body diameter. Gubernaculum of varying shape: thin without apophysis to robust with apophysis. Spermatozoa spherical. Tail conoid to elongate – conoid, similar in sexes with caudal glands opening through a single pore at the terminal spinneret; terminal setae absent.

Remarks. The family was revised by Fonseca & Decraemer (2008), who provided lists of valid species for all Monhysteridae genera.

Genus *Halomonhystera* Andrássy, 2006

Genus diagnosis (modified from Tchesunov et al. (2015)) Body stout to slender. Cuticle thin and optically smooth. Labial region not set off. Inner labial sensilla as papillae, outer labial and cephalic sensilla as very short setae. Amphidial fovea circular, relatively small to moderate and situated from less than one to three labial diameters from the cephalic apex. One to three lateral cervical setae situated at some distance posterior to the amphidial fovea; other somatic setae sparse, short and inconspicuous. Pharyngostoma cup- to funnel-shaped, small, with cuticularised walls. Pharynx cylindroid, evenly muscular throughout its length. Anteriormost stomach-like portion of the intestine (progaster) composed of four cells set off from posterior intestine by a constriction. Ventral pore usually at labial region if discernible; ventral gland cell body large and situated at anterior intestine. Female ovary long, outstretched and located to the right of the intestine; vulva often but not always located close to the anus; posterior cuticular wall of the vagina may be thickened and cuticularised (pars refringens vaginae) closer to the vulva. Uterus of ripe females normally filled with numerous eggs and embryos; possibly most species ovoviviparous. Male gonad long, outstretched and located to the right of the intestine. Spicules slender and arcuate, slightly knobbed posteriorly. Gubernaculum with a short dorso-caudal apophysis. One midventral preanal papilla close to the cloacal opening and two or three pair of subventral papillae on the posterior half of the tail present. Three caudal glands present, two of them very conspicuous; terminal conical spinneret with an internal funnel-like structure.

Type species: *Halomonhystera disjuncta* (Bastian, 1865) Andrássy, 2006

Remarks. The genus was most recently revised by Tchesunov et al. (2015). The latter authors retained *H. paradisjuncta* (De Coninck, 1943) Tchesunov, Portnova & Campenhout, 2015 as a valid species even though it had been synonymised with *H. disjuncta* by Andrássy (2006). No reason was provided for this decision, however the species is retained here until a more thorough investigation of the genus is conducted. The diagnosis by Tchesunov et al. (2015) states that the ventral pore is located at the labial region (if discernible), but the ventral pore is sometimes located well posterior to the buccal cavity of some species such as *H. cameroni* (Steiner, 1958) Andrássy, 2006 and *H. tangaroa* Leduc, 2014.

Tchesunov et al. (2015) noted that some species of the closely-related genus *Thalassomonhystera* meet all described *Halomonhystera* characters except for the position of the vulva, which can be located more anteriorly with respect to the anus. They stated that the

position of the vulva can be in conflict with a number of other *Halomonhystera* characters. They concluded that the vulva can vary gradually in position from one species to another and does not necessarily need to be located far posteriorly (as stated in in previous diagnoses of the genus *Halomonhystera*) for a species to be ascribed to *Halomonhystera*, as long as the other characters agree with the genus diagnosis. The overlap between the genera *Halomonhystera* and *Thalassomonhystera* includes not only the position of the vulva, but also other morphological characters such as tail shape (conical in all *Halomonhystera* species and in some *Thalassomonhystera* species), buccal morphology (either simple or double in *Halomonhystera* and simple in all *Thalassomohystera* species), and amphid size (small to medium in *Halomonhystera* and small to large in *Thalassomonhystera*).

The only trait which appears to differ consistently between *Halomonhystera* and *Thalassomonhystera* as they are currently defined by Tchesunov et al. (2015) and Fonseca & Decraemer (2008), respectively, is the presence of precloacal and caudal papillae in *Halomonhystera* and their absence in *Thalassomonhystera*. This difference was not discussed by Tchesunov et al. (2015), however, given the overlap in other key morphological characteristics previously used to distinguish between the two genera (i.e., the position of the vulva and buccal morphology in particular), it appears that the presence or absence of pre- and postcloacal papillae constitutes the best available character to differentiate *Halomonhystera* from *Thalassomonhystera*. According to this new definition, *Thalassomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) Jacobs, 1987 and *T. anoxybiotica* (Jensen, 1986) Jacobs, 1987 need to be transferred to *Halomonhystera* as they both possess precloacal and caudal papillae.

Halomonhystera zhangi Li, Huang & Huang, 2024 was recently described from coastal Sargassum in the Yellow Sea, and is identical to *H. refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov. in most key characteristics, including body length, body ratios (a, b, c and c′), size and arrangements of anterior sensilla, position of vulva (relatively far anteriorly for the genus), amphid size and position, stoma shape, and presence and position of pre- and postcloacal papillae (Li et al. 2024). The only slight inconsistencies are slightly longer spicules in *H. zhangi* (41–45 *vs* 39–40 µm in *H. refringens*) and opening of secretory-excretory system just posterior to level of cephalic setae (*vs* further posteriorly in *H. refringens*). The latter may be an erroneous observation; this feature can be difficult to observe and photomicrographs of the

holotype specimen appear to show the secretory pore at same level as the ampulla, as indicated by a slight bulge on cuticle (Figure 2A in Li et al. 2024). On balance, I suggest that *H. zhangi* be synonymised with *H. refringens*.

A tabular key to *Halomonhystera* species updated from Tchesunov et al. (2015) is provided in Supplementary Tables 1 and 2.

List of valid *Halomonhystera* species:

H. anoxybiotica (Jensen, 1986) **comb. nov.**

= *Monhystera anoxybiotica* Jensen, 1986

= *Thalassomonhystera anoxybiotica* (Jensen, 1986) Jacobs, 1987

H. antarctica (Cobb, 1914) Andrássy, 2006

= *Monhystera antarctica* Cobb, 1914

H. bathyislandica (Riemann, 1995) Tchesunov, Portnova & Campenhout, 2015

= *Thalassomonhystera bathislandica* Riemann, 1995

H. cameroni (Steiner, 1958) Andrássy, 2006

= *Monhystera cameroni* Steiner, 1958

H. chitwoodi (Steiner, 1958) Andrássy, 2006

= *Monhystera chitwoodi* Steiner, 1958

= *Geomonhystera chitwoodi* (Steiner, 1958) Jacobs, 1987

H. continentalis Andrássy, 2006

H. disjuncta (Bastian, 1865) Andrássy, 2006

= *Monhystera disjuncta* Bastian, 1865

= *Geomonhystera disjuncta* (Bastian, 1865) Jacobs, 1987

= *Monhystera ambigua* Bastian, 1865

= *Monhystera vivipara* Allgén, 1929

= *Desmolaimus viviparus* Allgén, 1929

= *Monhystera paraambigua* Allgén, 1933

= *Monhystera paraambiguoides* Allgén, 1932

H. fisheri (Zekely, Sørensen & Bright, 2006) Tchesunov, Portnova & Campenhout, 2015

= *Thalassomonhystera fisheri* Zekely, Sørensen & Bright, 2006

H. glaciei (Blome and Riemann, 1999) Andrássy, 2006

= *Geomonhystera glaciei* Blome & Riemann, 1999

H. halophila Andrássy, 2006

H. hermesi Tchesunov, Portnova & Campenhout, 2015

H. hickeyi Zekely Sørensen & Bright, 2006

H. islandica (De Coninck, 1943) Tchesunov, Portnova & Campenhout, 2015

= *Monhystera islandica* De Coninck, 1943

= *Eumonhystera islandica* (De Coninck, 1943) Andrássy, 1981

= *Thalassomonhystera islandica* (De Coninck, 1943) Jacobs, 1987

H. paradisjuncta (De Coninck, 1943) Tchesunov, Portnova & Campenhout, 2015

= *Monhystera paradisjuncta* (De Coninck, 1943) Andrássy, 2006

= *Geomonhystera paradisjuncta* (De Coninck, 1943) Jacobs, 1987

H. parasitica Poinar, Duarte & Santos Maria, 2009

H. refringens (Bresslau & Schuurmans-Stekhoven, 1933) **comb. nov.**

= *Monhystera refringens* Bresslau & Schuurmans-Stekhoven, 1933

= *Thalassomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) Jacobs, 1987

= *Monhystera britannica* Wieser, 1951op Wieser 1959

= *Monhystera refringens britannica* Wieser, 1951

H. rotundicapitata (Filipjev, 1922) Tchesunov, Portnova & Campenhout, 2015

= *Monhystera rotundicapitata* Filijev, 1922

= *Thalassomonhystera rotundicapitata* (Filipjev, 1922) Jacobs, 1987

H. socialis (Bütschli, 1874) Andrássy, 2006

= *Monhystera socialis* Bütschli, 1874

H. tangaroa Leduc, 2014

H. taurica Tsalolikhin, 2007

H. uniformis (Cobb, 1914) Andrássy, 2006

= *Monhystera uniformis* Cobb, 1914

= *Monhystera barentsi* Steiner, 1916

H. vandoverae (Zekely Sørensen & Bright, 2006) Tchesunov, Portnova & Campenhout, 2015

= *Thalassomonhystera vandorevae* Zekely Sørensen & Bright, 2006

***Halomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov.**

= *Monhystera refringens* Bresslau & Schuurmans-Stekhoven, 1933

= *Thalassomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) Jacobs, 1987

= *Monhystera britannica* Wieser, 1951op Wieser 1959

= *Monhystera refringens britannica* Wieser, 1951

= *Halomonhystera zhangi* Li, Huang & Huang, 2024

Table 4, Figs. 9–11

Material examined: Three males and three females (NIWA 182674), collected on 10 December 2021.

Sampling location. New Zealand region, off East Cape (38.2002° S, 179.7690° W), RV *Tangaroa* voyage TAN2114, on surface of DART buoy C originally deployed in December 2019. Specimens were recovered from filamentous algae and goose barnacles.

Distribution: Cosmopolitan. North Sea (Schuurmans Stekhoven 1935, Warwick et al. 1998), Chile (Wieser 1956), Washington coast (USA; Wieser 1959), Japan (Kito 1981), Yellow Sea (Li et al. 2024), New Zealand (present study).

Description: Males. Body colourless, cylindrical, tapering slightly towards both extremities. Cuticle smooth, faint striations visible in some specimens. Sparse sublateral somatic setae, 4–5 µm long, sometimes in pairs. Cephalic region slightly rounded, not set-off. Inner labial papillae not observed; six outer labial setae and four cephalic setae of similar length and in single circle, ca. 0.3 cbd long, located on lip region usually near base. Ocelli not observed. Amphidial fovea circular with lightly cuticularized outline, medium-sized, situated ca. 0.5 cbd from anterior

555 end. Buccal cavity funnel-shaped, with lightly cuticularized walls, 5–7 µm deep, up to 4 µm
556 wide. Pharynx cylindrical, muscular, without posterior bulb; pharyngeal ducts sometimes visible.
557 Pharyngeal lumen not cuticularised. Nerve ring at ca. 65% of pharynx length from anterior.
558 Secretory-excretory system present; pore located at 16–18% of pharyngeal length from anterior,
559 ampulla small, renette cell large, 10–17 × 30–32 µm, located posterior to pharynx. Cardia small,
560 4 µm long, partially surrounded by intestine; intestine of one specimen with multiple diatom
561 frustules, 3 × 14–18 µm.

562 Reproductive system monorchic with single anterior outstretched testis (though folds
563 usually present) located to right of intestine. Sperm cells globular, ca. 2 × 2–3 µm. Spicules
564 paired, curved, with thin velum, tapering distally, 2.0 cloacal body diameters long.
565 Gubernaculum with straight dorsal piece, without apophyses, surrounding spicules distally, ca.
566 15 µm long. Precloacal papilla present ventrally, 32–40 µm anterior to cloaca; another ventral
567 papilla usually present immediately anterior to cloaca. Postcloacal papillae located 7–9, 37–42
568 and 57–60 µm posterior to cloaca. Anteriormost postcloacal papilla consist of pair of subventral
569 papillae, not always distinct, each bearing one short (2 µm) seta; second ventral postcloacal
570 papillae most conspicuous, bearing pair of short (2 µm) setae; posteriormost ventral postcloacal
571 papilla bearing two pairs of short (2 µm) setae. Tail conical, with short terminal cyclindrical
572 portion and few short (3–5 µm) and sparse subdorsal setae. Three caudal glands and spinneret
573 present.

574 Females. Similar to males, but with slightly smaller amphids and slightly longer tail.
575 Reproductive system monodelphic with single anterior outstretched ovary (though fold usually
576 present) located to the right of intestine; mature eggs ca. 20 × 40 µm. Spermatheca not observed.
577 Vulva situated slightly posterior to mid-body. Proximal portion of vagina surrounded by
578 constrictor muscle, vaginal glands present.

579 **Remarks.** The *Halomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb.
580 nov. specimens from DART buoy C off New Zealand's East Cape agree well with the original
581 description of the species based on North Sea specimens (Schuurmans Stekhoven 1935). The
582 main difference is the longer spicules in the New Zealand specimens (2.0 cloacal body
583 diameters) relative to specimens from the North Sea (1.45 cloacal body diameters; Schuurmans

Stekhoven 1935, Breslau & Schuurmans Stekhoven 1940) and ~~also~~ Chile (1.25 cloacal body diameter; Wieser 1956). Descriptions based on specimens from Puget Sound (Pacific coast, USA) and Japan, however, show spicules that are of similar length (35–41 µm; or ca. 2 cloacal body diameters as measured from drawings).

Previous descriptions of *Halamonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov. all note the presence of the precloacal papilla as well as the two posteriormost (ventral) postcloacal papillae. The pair of subventral postcloacal papillae (each bearing a single seta) described here for the New Zealand specimens has not been noted in previous descriptions, however they are not visible in all specimens depending on their orientation, and all previous descriptions note the presence of the setae associated with the papillae.

Discussion

The presence of nematodes on buoys deployed >100 km from the nearest landmass and in deep waters (>3500 m ~~water~~ depth) shows that some nematode species are capable of dispersing over long distances to colonise new substrates. *Halomonhystera* is an opportunistic genus with the ability to colonise a wide range of habitats from intertidal seaweeds to ship hulls, food falls, cold seeps and hydrothermal vents (Ólafsson1992, Flint et al. 2006, Van Gaever et al. 2006, Chan et al. 2016). *Halomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov. has a cosmopolitan distribution consistent with the ability for long distance dispersal. The closely related species *H. disjuncta* is also cosmopolitan but molecular studies have shown it to be a species complex comprising several distinct species (Derycke et al. 2007, Fonseca et al. 2008). The presence of several diatom in the intestine of *H. refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov. shows that this species is able to feed on microalgae that grow among the filamentous seaweed that cover the buoys. *Halomonhystera disjuncta* has also been shown to ~~be able to~~ feed on diatoms and other algae in experimental settings (Moens & Vincx 1997).

Euchromadora species are often found living on macroalgae, for example *E. ezoensis* on subtidal *Sargassum confusum* (Kito 1977), *E. robusta* on shallow green and brown algae (Kulikov et al. 1998) and *E. eileenae* on kelp holdfasts (Inglis 1969). Likewise, *Atrochromadora* species such as *A. dissoluta* (Wieser 1954) and *A. parva* (de Man 1893) are frequently associated

with algal substrates. This habitat preference likely facilitates long distance dispersal via drifting macroalgal fragments (Ptatscheck & Transpurger 2020). *Atrochromadora tereroa* sp. nov. is the second species of the genus recorded from the New Zealand region; the first species, *Atrochromadora parva*, was recorded from the coast of Campbell Island by Allgén (1932). This is the first species of the genus *Euchromadora* to be recorded from the New Zealand region.

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744

745 **Figure captions**

746 **Figure 1.** Map showing location of the Deep ocean Assessment and Reporting of Tsunami
747 (DART) buoys C and F sampled in this study, in relation to New Zealand's North Island and
748 Raoul Island.

749 **Figure 2.** Deep ocean Assessment and Reporting of Tsunami (DART) buoys. A. Buoy F
750 (Kermadec region) immediately prior to retrieval; B. retrieval of buoy F; C. buoy F immediately
751 after retrieval, showing mix cover of filamentous algae and goose barnacles; D. close up of buoy
752 C (East Cape region) showing mixed cover of filamentous algae and goose barnacles. Photo
753 credit: Rachael Peart (NIWA).

754 **Figure 3**. *Atrochromadora tereroa* sp. nov. A. Pharyngeal body region of holotype male (NIWA
755 181659); B. anterior body region of female paratype (NIWA 181660); C. anterior body region of
756 male paratype (NIWA 181660); D. pharyngeal body region of female paratype (NIWA 181660);
757 E. copulatory apparatus of male holotype (NIWA 181659); F. posterior body region of male
758 paratype (NIWA 181660). Scale bar: A & D = 25 µm, B & C = 20 µm, E = 23 µm, F = 36 µm.

759 **Figure 4.** *Atrochromadora tereroa* sp. nov. A. posterior body region of female paratype (NIWA
760 181660); B. entire male paratype (NIWA 181660); C. reproductive system of female paratype
761 (NIWA 181660); D. posterior body region of male paratype (NIWA 181660). Scale bar: A = 50
762 µm, B = 100 µm, C = 60 µm, D = 40 µm.

763 **Figure 5.** *Atrochromadora tereroa* sp. nov. Light micrographs. A. Entire male paratype (NIWA
764 181660); B. surface view of female paratype anterior body region (NIWA 181660); C. optical
765 cross-section of female paratype anterior body region (NIWA 181660); D. pharyngeal bulb of
766 male holotype (NIWA 181659); E & D. mature egg and vulva of female paratype (NIWA
767 181660). Scale bar: A = 100 µm, B & C = 11 µm, D = 12 µm, E & F = 14 µm.

768 **Figure 6.** *Euchromaodra rebeccae* sp. nov. A. Pharyngeal body region of male holotype (NIWA
769 182672); B. anterior body region of male holotype (NIWA 182672); C. anterior body region of
770 female paratype (NIWA 182673); detail of lateral body cuticle of female paratype (NIWA
771 182673): D. slightly posterior to cephalic region; E. & F. posterior end of pharynx (different
772 focus); G. & H. mid-body (different focus); I. anal region; J. tip of tail. Scale bar: A = 100 µm, B
773 & C = 50 µm, D-J = 32 µm.

774 **Figure 7.** *Euchromaodra rebeccae* sp. nov. A. Entire male holotype (NIWA 182672); B.
775 posterior body region of female paratype (NIWA 182673); C. copulatory apparatus of male
776 paratype (NIWA 182673); D. posterior body region of male holotype (NIWA 182672); E.
777 reproductive system of female paratype (NIWA 182673). Scale bar: A = 150 µm, B = 86 µm, C
778 = 50 µm, D = 90 µm, E = 165 µm.

779 **Figure 8.** *Euchromaodra rebeccae* sp. nov. Light micrographs. A., B., C., & D. Optical cross
780 sections and surface view of anterior body region of male paratype (NIWA 182673); E. posterior
781 body region of female paratype (NIWA 182673). Scale bar: A-D = 20 µm; E = 44 mm.

782 **Figure 9.** *Halomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov. A.
783 Pharyngeal body region of male; B. female cephalic region; C. female posterior body region; D.
784 male posterior body region. Figure 1. Scale bar: A = 35 μm, B = 20 μm, C = 40 μm, D = 30 μm.

785 **Figure 10.** *Halomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov.
786 A. Entire male; B. entire female. Scale bar = 100 μm.

787 **Figure 11.** *Halomonhystera refringens* (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov.
788 Light micrographs. A. Entire male; B. male anterior body region; C. male intestine with several
789 diatoms; D. female anal body region. Scale bar: A = 100 μm, B = 13 μm, C & D = 18 μm.

790

791

Figure 1

Map of sampling locations

Map showing location of the Deep ocean Assessment and Reporting of Tsunami (DART) buoys C and F sampled in this study, in relation to New Zealand’s North Island and Raoul Island.

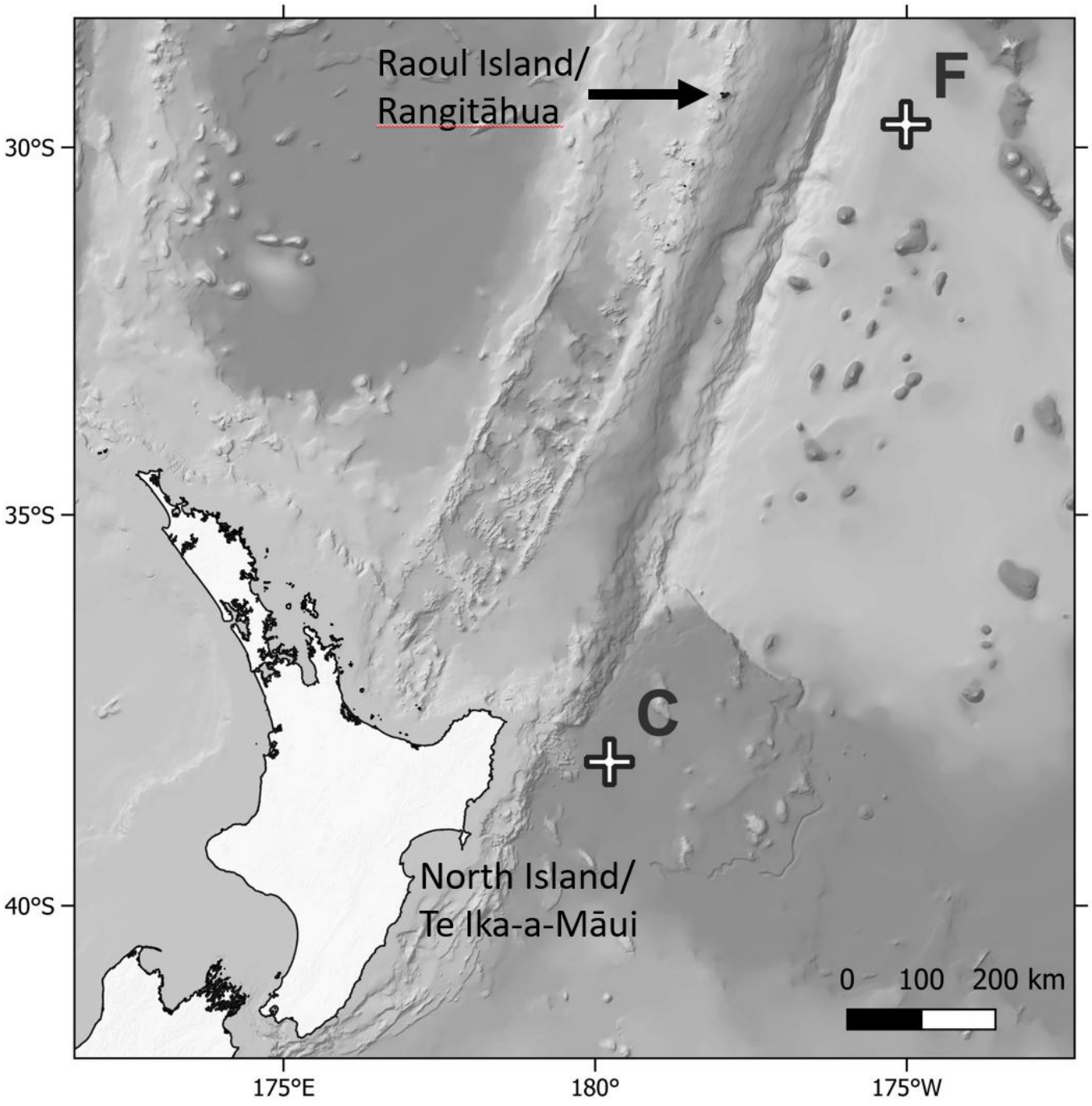
Raoul Island/
Rangitāhua
F
C
North Island/
Te Ika-a-Māui
30°S
35°S
40°S
175°E
180°
175°W
0 100 200 km

Figure 2

Deep ocean Assessment and Reporting of Tsunami (DART) buoys.

A. Buoy F (Kermadec region) immediately prior to retrieval; B. retrieval of buoy F; C. buoy F immediately after retrieval, showing mix cover of filamentous algae and goose barnacles; D. close up of buoy C (East Cape region) showing mixed cover of filamentous algae and goose barnacles.

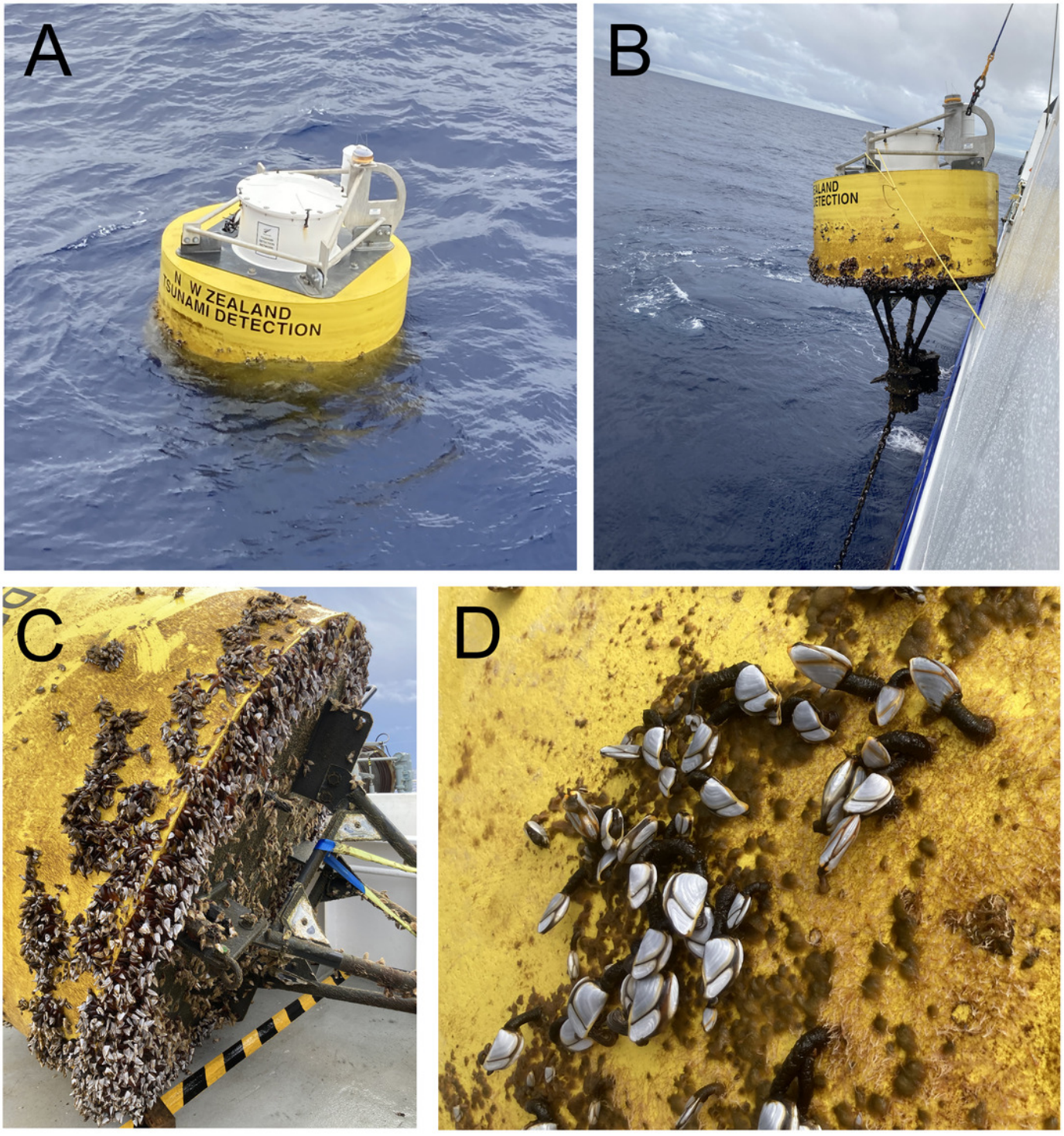
A
N W ZEALAND
TSUNAMI DETECTION
B
C
D

Figure 3

Atrochromadora tereroa sp. nov. drawings

A. Pharyngeal body region of holotype male (NIWA 181659); B. anterior body region of female paratype (NIWA 181660); C. anterior body region of male paratype (NIWA 181660); D. pharyngeal body region of female paratype (NIWA 181660); E. copulatory apparatus of male holotype (NIWA 181659); F. posterior body region of male paratype (NIWA 181660). Scale bar: A & D = 25 microns, B & C = 20 microns , E = 23 microns , F = 36 microns .

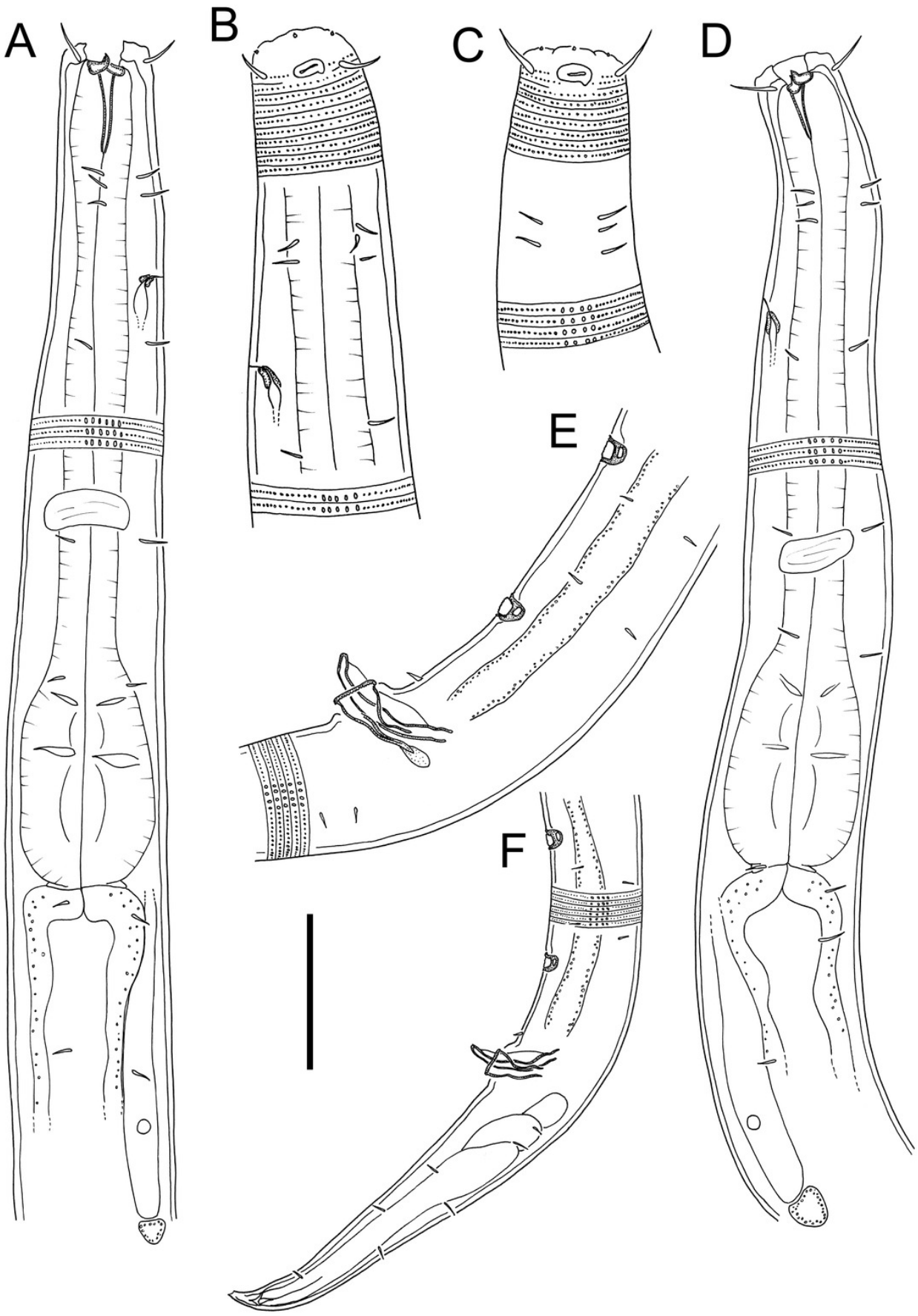
A
B
C
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Figure 4

Atrochromadora tereroa sp. nov. drawings

A. posterior body region of female paratype (NIWA 181660); B. entire male paratype (NIWA 181660); C. reproductive system of female paratype (NIWA 181660); D. posterior body region of male paratype (NIWA 181660). Scale bar: A = 50 microns , B = 100 microns , C = 60 microns , D = 40 microns .

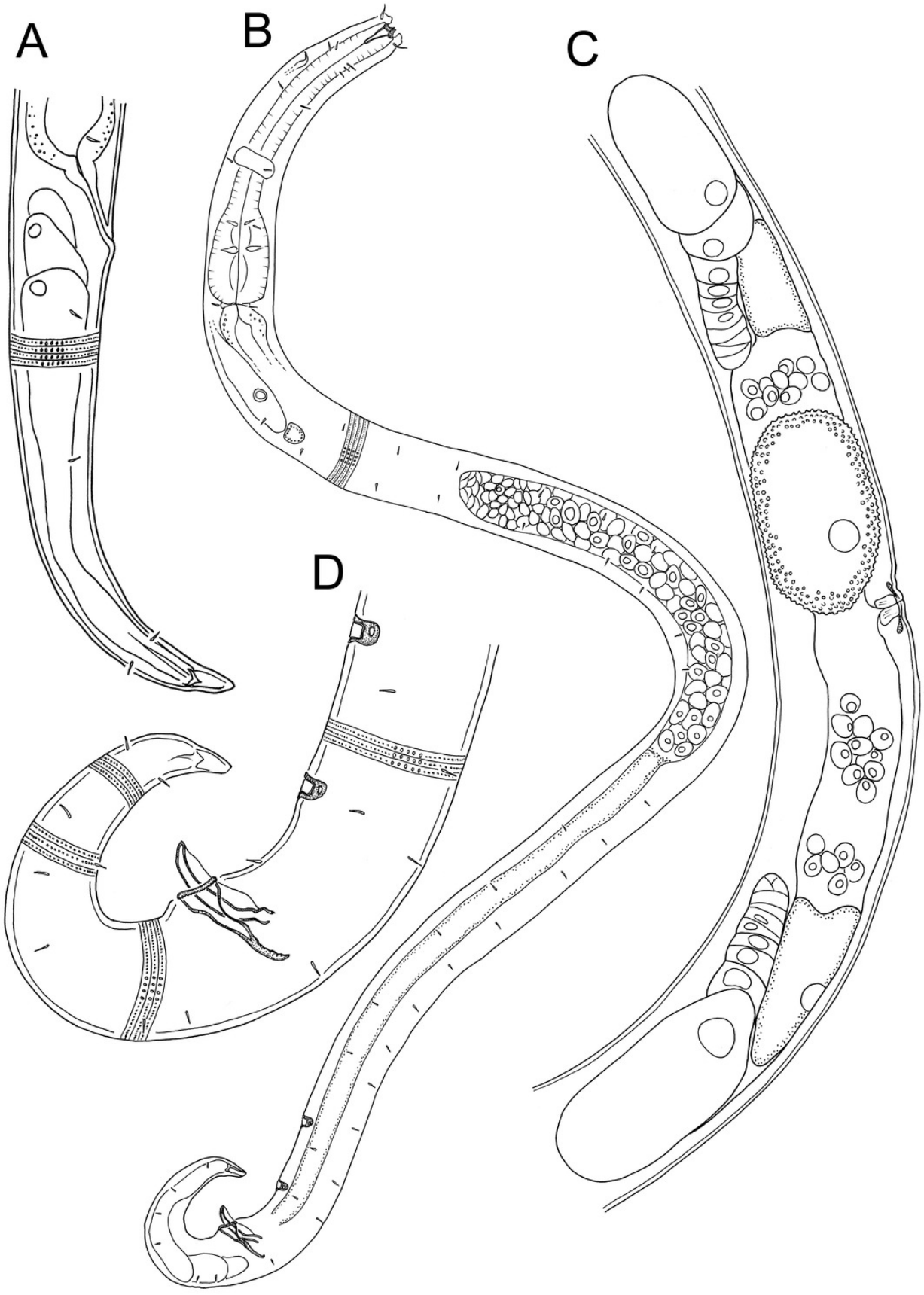
A
B
C
D

Figure 5

Atrochromadora tereroa sp. nov. l ight micrographs

A. Entire male paratype (NIWA 181660); B. surface view of female paratype anterior body region (NIWA 181660); C. optical cross-section of female paratype anterior body region (NIWA 181660); D. pharyngeal bulb of male holotype (NIWA 181659); E & D. mature egg and vulva of female paratype (NIWA 181660). Scale bar: A = 100 microns , B & C = 11 microns , D = 12 microns , E & F = 14 microns .

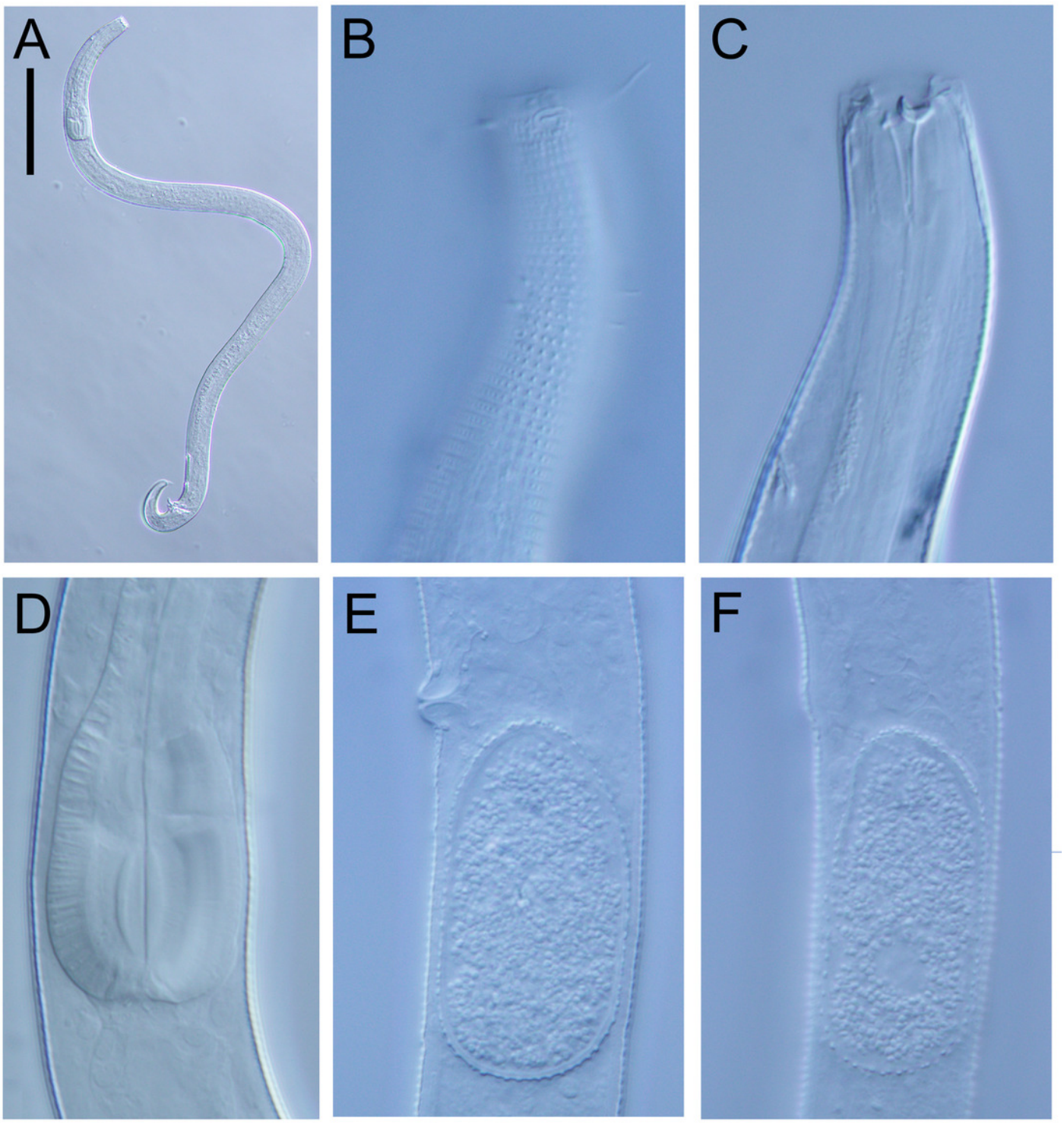
A
B
C
D
E
F

Figure 6

Euchromaodra rebeccae sp. nov. drawings

A. Pharyngeal body region of male holotype (NIWA 182672); B. anterior body region of male holotype (NIWA 182672); C. anterior body region of female paratype (NIWA 182673); detail of lateral body cuticle of female paratype (NIWA 182673): D. slightly posterior to cephalic region; E. & F. posterior end of pharynx (different focus); G. & H. mid-body (different focus); I. anal region; J. tip of tail. Scale bar: A = 100 microns , B & C = 50 microns , D-J = 32 microns .

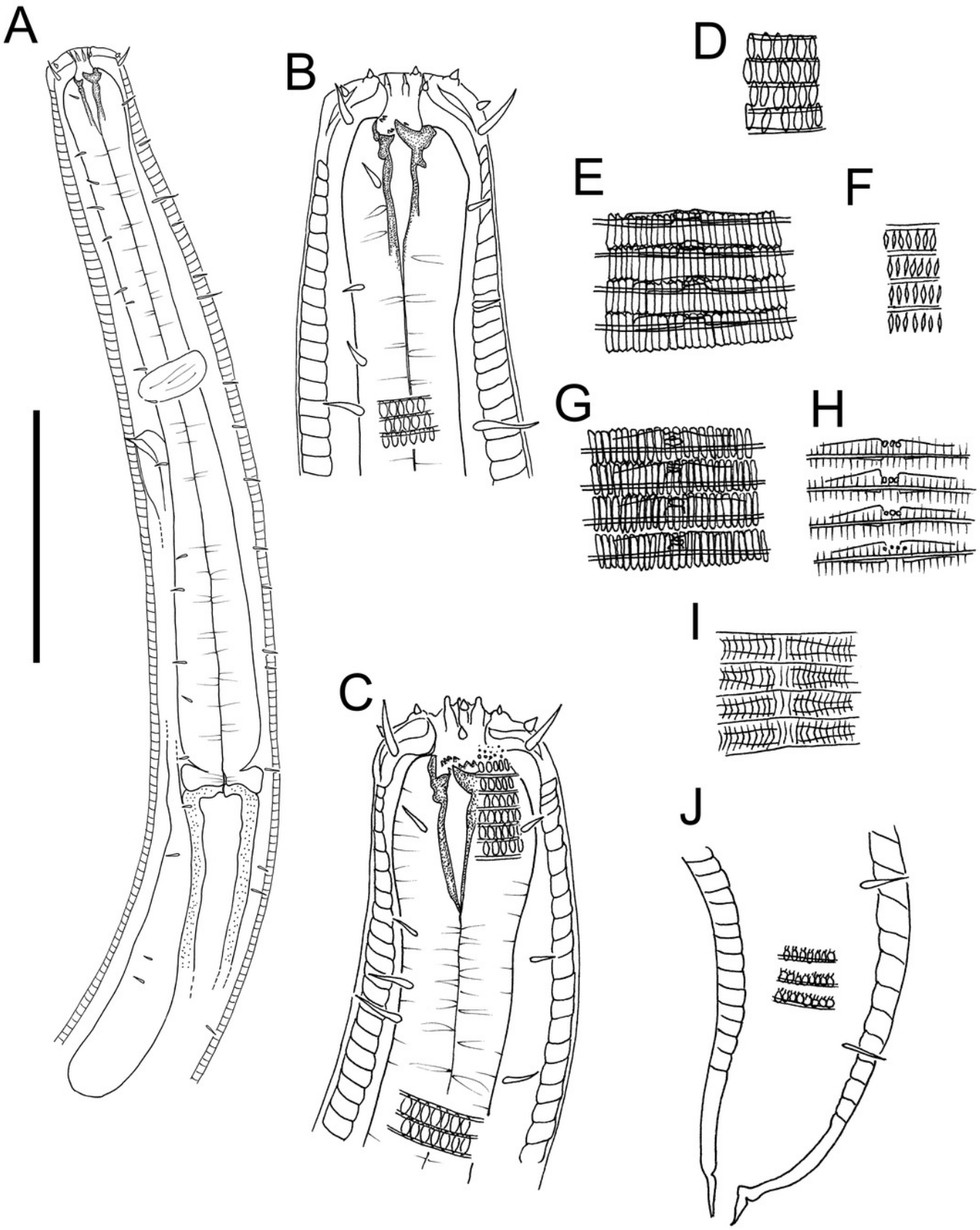
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Figure 7

Euchromaodra rebeccae sp. nov. drawings

A. Entire male holotype (NIWA 182672); B. posterior body region of female paratype (NIWA 182673); C. copulatory apparatus of male paratype (NIWA 182673); D. posterior body region of male holotype (NIWA 182672); E. reproductive system of female paratype (NIWA 182673). Scale bar: A = 150 microns , B = 86 microns , C = 50 microns , D = 90 microns , E = 165 microns .

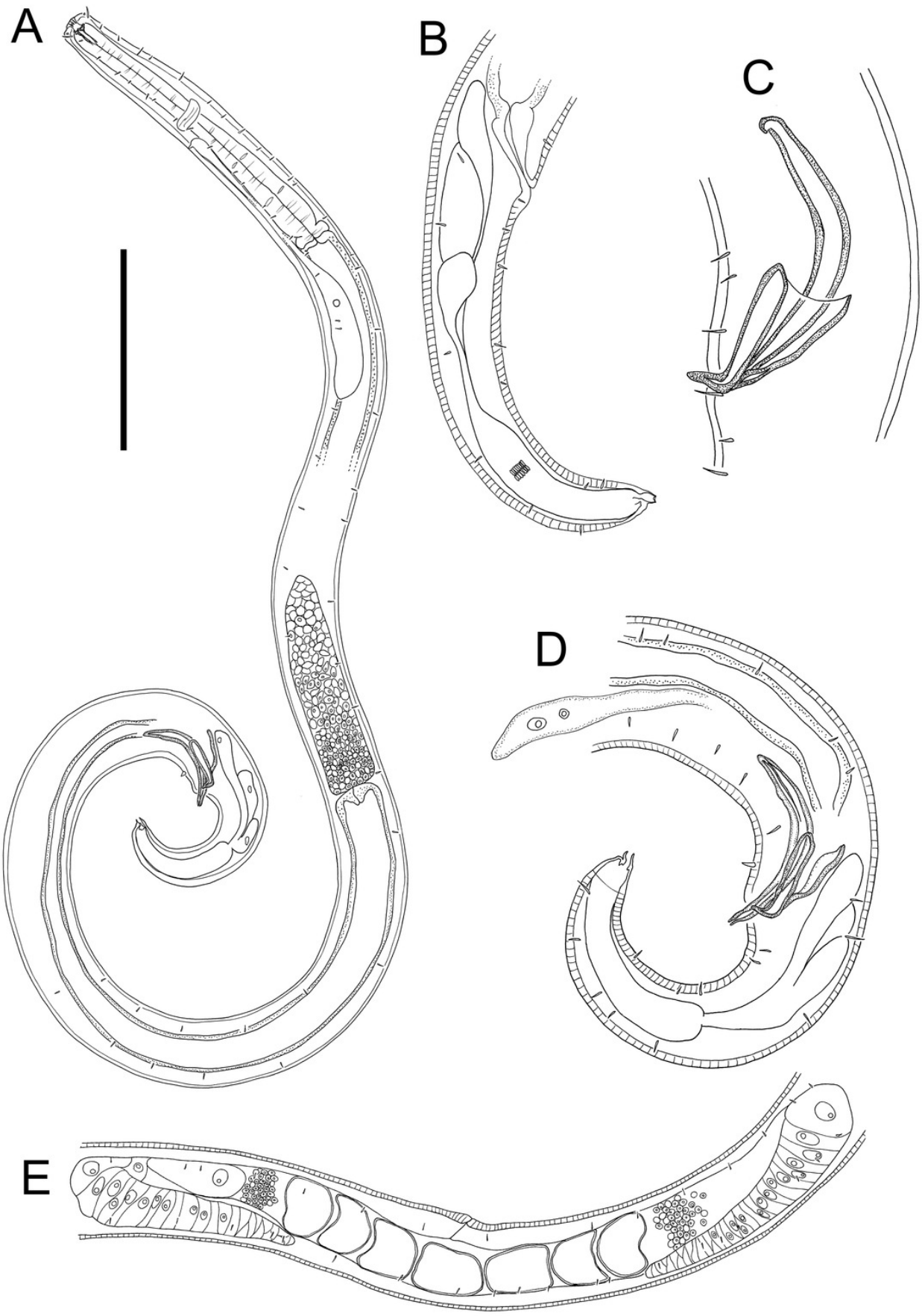
A
B
C
D
E

Figure 8

Euchromaodra rebeccae sp. nov. *l* ight micrographs

A., B., C., & D. Optical cross sections and surface view of anterior body region of male paratype (NIWA 182673); E. posterior body region of female paratype (NIWA 182673). Scale bar: A-D = 20 microns ; E = 44 microns .

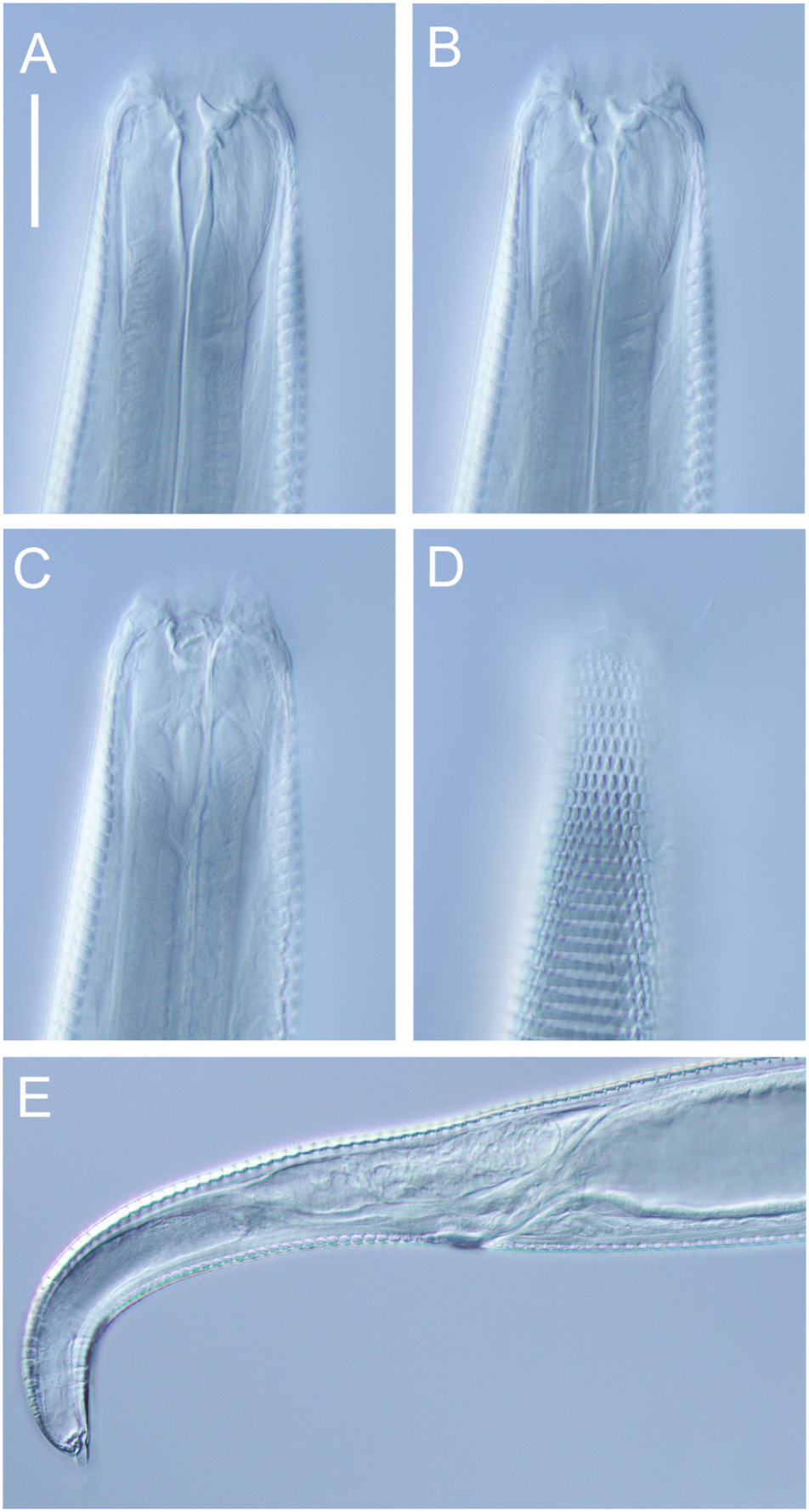
A
B
C
D
E

Figure 9

Halomonhystera refringens (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov. drawings

A. Pharyngeal body region of male; B. female cephalic region; C. female posterior body region; D. male posterior body region. Figure 1. Scale bar: A = 35 microns , B = 20 microns , C = 40 microns , D = 30 microns .

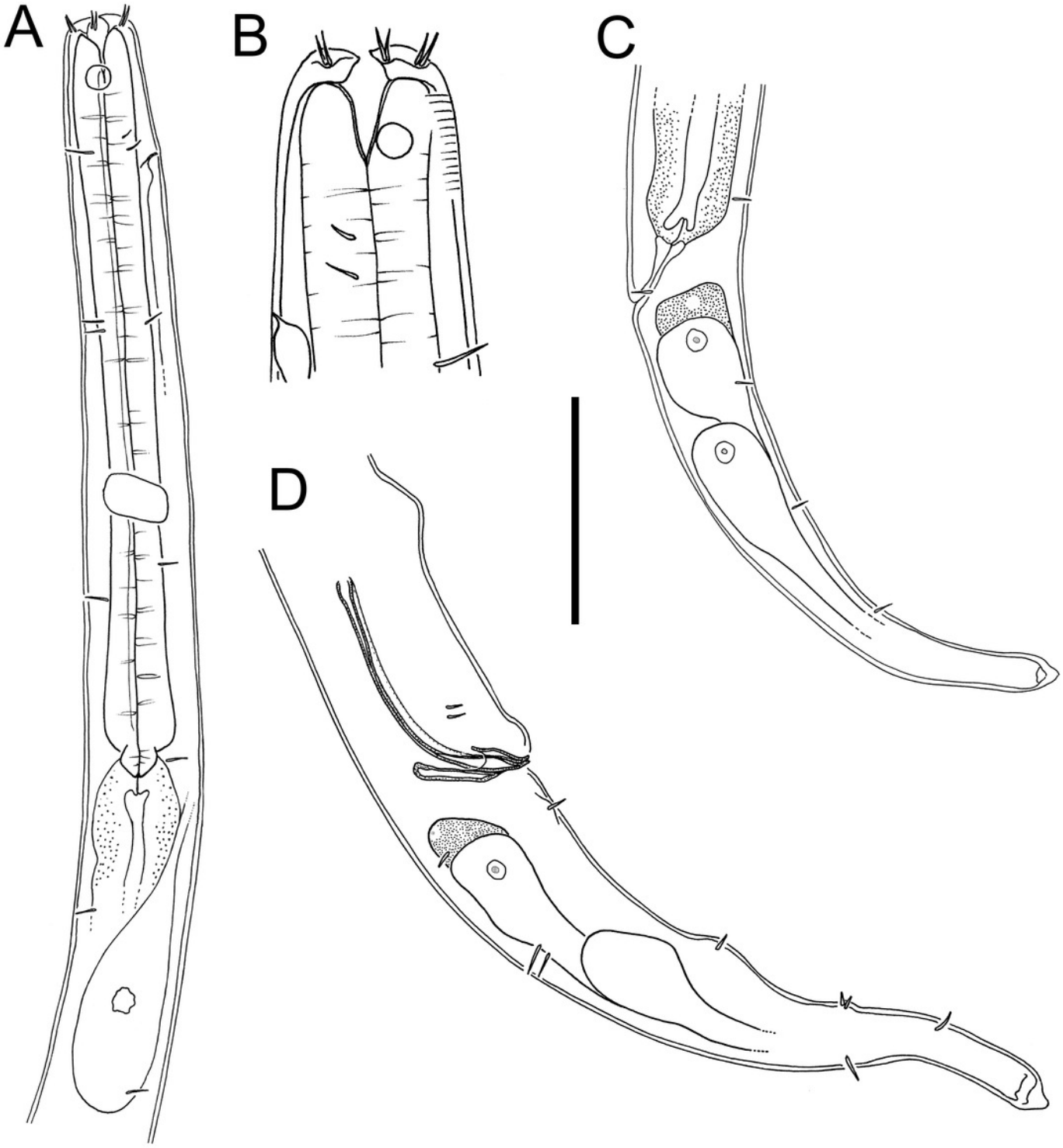
A
B
C
D

Figure 10

Halomonhystera refringens (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov. drawings

A. Entire male; B. entire female. Scale bar = 100 microns .

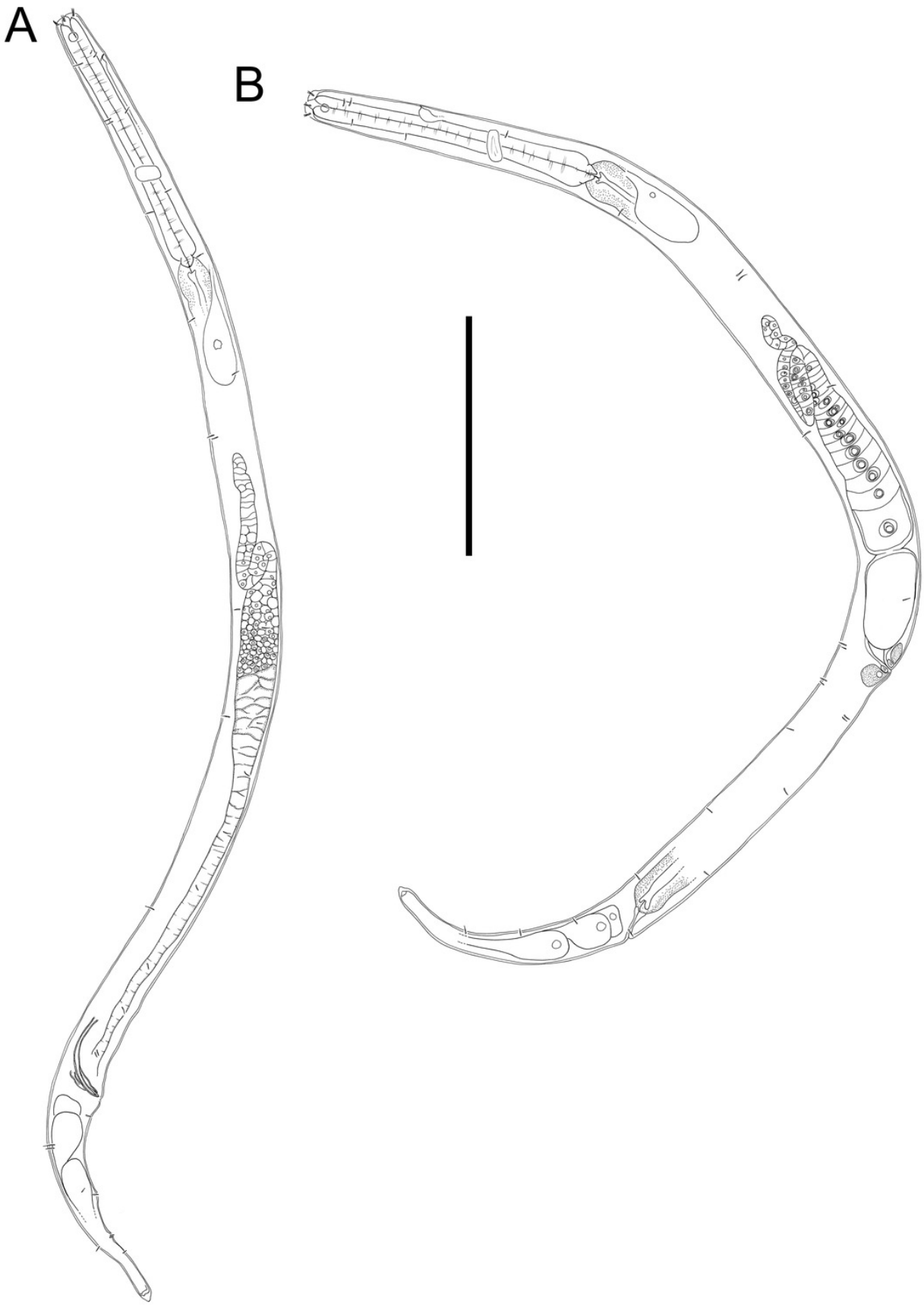
A
B

Figure 11

Halomonhystera refringens (Bresslau & Schuurmans-Stekhoven, 1933) comb. nov. Light micrographs.

A. Entire male; B. male anterior body region; C. male intestine with several diatoms; D. female anal body region. Scale bar: A = 100 microns , B = 13 microns , C & D = 18 microns .

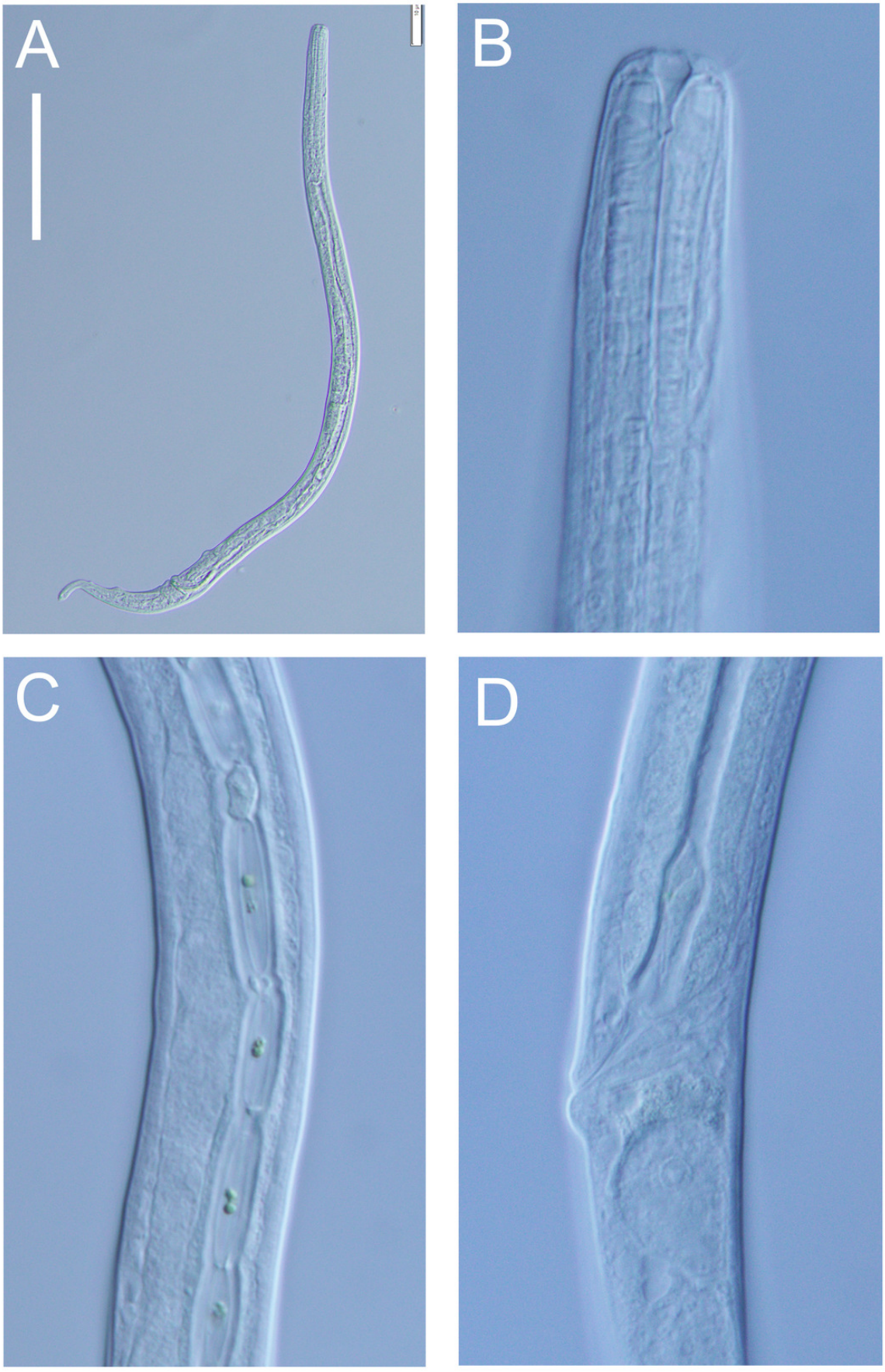
A
B
C
D

Table 1(on next page)

Details of the Deep ocean Assessment and Reporting of Tsunami (DART) buoys sampled in the present study.

1 **Table 1.** Details of the Deep ocean Assessment and Reporting of Tsunami (DART) buoys sampled in the present study.

Voyage	Station	Buoy	Latitude	Longitude	Water depth	Region	Buoy deployment date	Buoy collection date	Nematode species	Buoy epibiota
TAN2114	DART 1	C	-38.2002	-179.7690	3600	East Cape	12/2019	10/12/2021	*Euchromadora rebeccae* sp. nov. *Halomohystera refringens* comb. nov.	Filamentous algae, goose barnacles
TAN2209	DART 12	F	-29.6782	-175.0127	5100	Kermadec	08/2021	10/08/2022	*Atrochromadora tereroa* sp. nov.	Filamentous green algae

2

3

Table 2(on next page)

Morphometrics (microns) of *Atrochromadora tereroa* sp . nov.

a, body length/maximum body diameter; b, body length/pharynx length; c, body length/tail length; c', tail length/anal or cloacal body diameter; cbd, corresponding body diameter; L, total body length; V, vulva distance from anterior end of body; %V, V/total body length × 100

Table 2. Morphometrics (μm) of *Atrochromadora tereroa* sp. nov. a, body length/maximum body diameter; b, body length/pharynx length; c, body length/tail length; c', tail length/anal or cloacal body diameter; cbd, corresponding body diameter; L, total body length; V, vulva distance from anterior end of body; %V, V/total body length × 100

	Males			Females			
	Holotype	Paratypes		Paratypes			
Label	M1	M2	M3	F1	F2	F3	F4
L	749	741	758	769	728	748	810
a	29	27	28	26	24	28	29
b	6	6	6	6	6	6	6
c	9	9	8	9	8	7	8
c'	4.1	3.6	4.0	4.1	4.7	5.1	5.1
Head diam. at cephalic setae	14	14	14	14	14	15	15
Head diam. at amphids	14	14	14	14	14	15	15
Length of sub-cephalic setae	3-4	2-4	4-5	4-5	3	3	3-4
Length of cephalic setae	7-8	7-8	7-8	8	6-7	6-7	6-7
Amphid height	2	2	2	2	3	2	2
Amphid width	4	5	4	4	4	5	4
Amphid width/cbd (%)	29	36	29	29	29	33	27
Amphid from anterior end	2	2	2	3	4	4	3
SE pore from anterior	36	36	38	44	42	31	39
Nerve ring from anterior end	81	70	68	83	84	65	75
Nerve ring cbd	23	23	24	25	25	24	24
Pharynx length	131	125	130	137	130	125	132
Pharyngeal bulb diam.	22	23	22	23	23	23	24
Pharyngeal bulb length	34	36	36	36	34	36	37
Pharynx cbd	26	27	26	27	27	27	28
Max. body diam.	26	27	27	30	30	27	28
Spicule length	22	21	26	-	-	-	-
Gubernacular apophyses length	14	19	23	-	-	-	-
Cloacal/anal body diam.	21	22	23	21	20	20	19
Tail length	87	80	91	86	94	101	97
V	-	-	-	402	367	377	391
%V	-	-	-	52	50	50	48
Vulval body diam.	-	-	-	30	30	27	29

Table 3(on next page)

Morphometrics (microns) of *Euchromadora rebeccae* sp . nov.

a, body length/maximum body diameter; b, body length/pharynx length; c, body length/tail length; c', tail length/anal or cloacal body diameter; cbd, corresponding body diameter; L, total body length; V, vulva distance from anterior end of body; %V, V/total body length × 100

morphometrics

Table 3. Morphometrics (µm) of *Euchromadora rebeccae* sp. nov. a, body length/maximum body diameter; b, body length/pharynx length; c, body length/tail length; c', tail length/anal or cloacal body diameter; cbd, corresponding body diameter; L, total body length; V, vulva distance from anterior end of body; %V, V/total body length × 100 morphometrics

	Males			Females					
	Holotype	Paratypes		Paratypes					
Label	M1	M2	M3	F1	F2	F3a	F3b	F4a	F4b
L	1748	1532	1237	2136	1932	1764	1919	1797	2137
a	30	28	25	27	23	22	25	24	27
b	7	6	5	6	6	6	6	6	7
c	10	9	8	10	9	9	10	10	10
c'	3.5	3.3	3.1	4.5	4.1	4.2	3.9	4.2	4.6
Head diam. at cephalic setae	28	29	28	33	33	33	32	34	32
Length of cephalic setae	8-9	10-11	9-11	11	11	9-10	12-13	12-13	10-12
Excretory pore from anterior	132	150	128	174	151	146	ND	151	168
Nerve ring from anterior end	110	122	113	149	130	127	144	135	137
Nerve ring cbd	45	45	44	46	48	47	52	49	48
Pharynx length	260	266	231	342	325	299	309	306	327
Pharyngeal diam. at base	31	32	31	42	40	38	41	37	37
Pharynx cbd at base	50	49	46	58	60	56	61	55	56
Max. body diam.	59	54	49	79	85	81	76	75	78
Spicule length (µm; %cbd)	97 (1.8)	104 (2.0)	84 (1.8)	-	-	-	-	-	-
Gubernaculum length	61	58	51	-	-	-	-	-	-
Telamon length	49	44	48	-	-	-	-	-	-
Cloacal/anal body diam.	53	51	47	48	50	46	48	45	46
Tail length	183	169	147	216	206	193	188	189	212
V	-	-	-	1098	939	870	981	917	1100
%V	-	-	-	51	49	49	51	51	51
Vulval body diam.	-	-	-	76	85	81	76	75	75

Table 4(on next page)

Morphometrics (microns) of *Halamonohystera refringens* (Breslau & Schuurmans-Stekhoven, 1935) comb. nov.

a, body length/maximum body diameter; b, body length/pharynx length; c, body length/tail length; c', tail length/anal or cloacal body diameter; cbd, corresponding body diameter; L, total body length; V, vulva distance from anterior end of body; %V, V/total body length × 100

morphometrics

Table 4. Morphometrics (µm) of *Halamonohystera refringens* (Breslau & Schuurmans-Stekhoven, 1935) comb. nov. a, body length/maximum body diameter; b, body length/pharynx length; c, body length/tail length; c', tail length/anal or cloacal body diameter; cbd, corresponding body diameter; L, total body length; V, vulva distance from anterior end of body; %V, V/total body length × 100 moprhometrics.

	Males			Females		
Label	M1	M2	M3	F1	F2	F3
L	536	568	544	614	610	603
a	24	27	26	22	23	24
b	6	5	5	5	5	6
c	6	6	6	6	6	6
c'	4.6	4.7	4.6	5.1	5.0	5.2
Head diam. at cephalic setae	10	10	10	11	11	12
Head diam. at amphids	13	13	13	14	14	15
Length of sub-cephalic setae	6	5	5	5	5	5-6
Length of cephalic setae	3	3	3	3	3	3
Amphid height	3	3	3	3	3	3
Amphid width	3	3	3	3	3	3
Amphid width/cbd (%)	25	25	26	22	21	19
Amphid from anterior end	6	7	6	6	6	8
Secretory-excretory pore from anterior	16	22	19	16	22	24
Nerve ring from anterior end	62	71	69	76	76	70
Nerve ring cbd	17	17	17	20	20	20
Pharynx length	96	109	105	114	118	108
Pharyngeal diam. at base	11	11	10	15	13	14
Pharynx cbd at base	18	18	17	22	21	21
Max. body diam.	22	21	21	28	26	25
Spicule length	40	39	39	-	-	-
Gubernaculum length	5	6	6	-	-	-
Cloacal/anal body diam.	20	21	20	20	20	18
Tail length	91	98	91	102	100	93
V	-	-	-	364	362	355
%V	-	-	-	59	59	59
Vulval body diam.	-	-	-	27	26	23