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Telothelepodidae, Thelepodidae and Trichobranchidae (Annelida, Terebelliformia) from Lizard Island, Great Barrier Reef, Australia

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Abstract

In a survey of the polychaetes of the Lizard Island region, six species of polychaetes belonging to the families Telothelepodidae Nogueira, Fitzhugh & Hutchings, 2013, Thelepodidae Hessle, 1917 and Trichobranchidae Malmgren, 1866 were found, from material collected during the Lizard Island Polychaete Taxonomic Workshop, and material collected by previous projects undertaken by the Australian Museum. This material includes one new species of *Rhinothelampus* Hutchings, 1974 (Telothelepodidae); one new species of each of the genera, *Euthelampus* McIntosh, 1885, *Streblosoma* Sars, 1872, and *Thelepus* Leuckart, 1849 (Thelepodidae); and one new species of *Terebellides* Sars, 1835 and another of *Trichobranchus* Malmgren, 1866 (Trichobranchidae). Keys for identification of these species are provided, together with full descriptions for all species, as well as comparisons with the morphologically most similar congeners.

Key words: Polychaeta, taxonomy, morphology, new species, Queensland, Western Pacific Ocean

Introduction

In August 2013 the Australian Museum hosted the 11th International Polychaete Conference and immediately after the meeting a group of researchers attended a polychaete workshop held at Lizard Island Research Station (a facility of the Australian Museum), Great Barrier Reef, funded by the Lizard Island Reef Research Foundation. The purpose of the workshop was to document the polychaete fauna of Lizard Island. This is one of a series of papers describing the polychaete fauna which is being published as a special issue of *Zootaxa*.

Prior to this study, Hutchings and Glasby (1987) described some species of Thelepodinae from Lizard Island, but in this paper we describe six new species belonging to six genera within the newly erected families Telothelepodidae Nogueira, Fitzhugh & Hutchings, 2013, Thelepodidae Hessle, 1917 and Trichobranchidae Malmgren, 1866 (Nogueira *et al.* 2013). Polychaetes are abundant around Lizard Island and on the Great Barrier Reef but they have been poorly documented and no comprehensive surveys have been carried out. They occur in all reefal habitats as well in the inter-reefal areas in soft sediments.

Material and methods

During the workshop collections were made by snorkelling and SCUBA diving, from the intertidal zone to ~30 m depth covering a variety of habitats found in the Lizard Island and surrounding areas, including coral reefs, mangroves and sandy beaches, with sandy, muddy and coral rubble bottoms [see Ribas & Hutchings, (2015, this volume) for location of sampling sites (Fig. 1) and their co-ordinates (Table 1)]. Coral rubble and coral pieces were broken up by hand or using a hammer, polychaetes were sorted alive under a stereomicroscope, relaxed in magnesium chloride solution, and preserved in 4% formalin. Later, material was rinsed with fresh water and transferred to 70% ethanol solution.

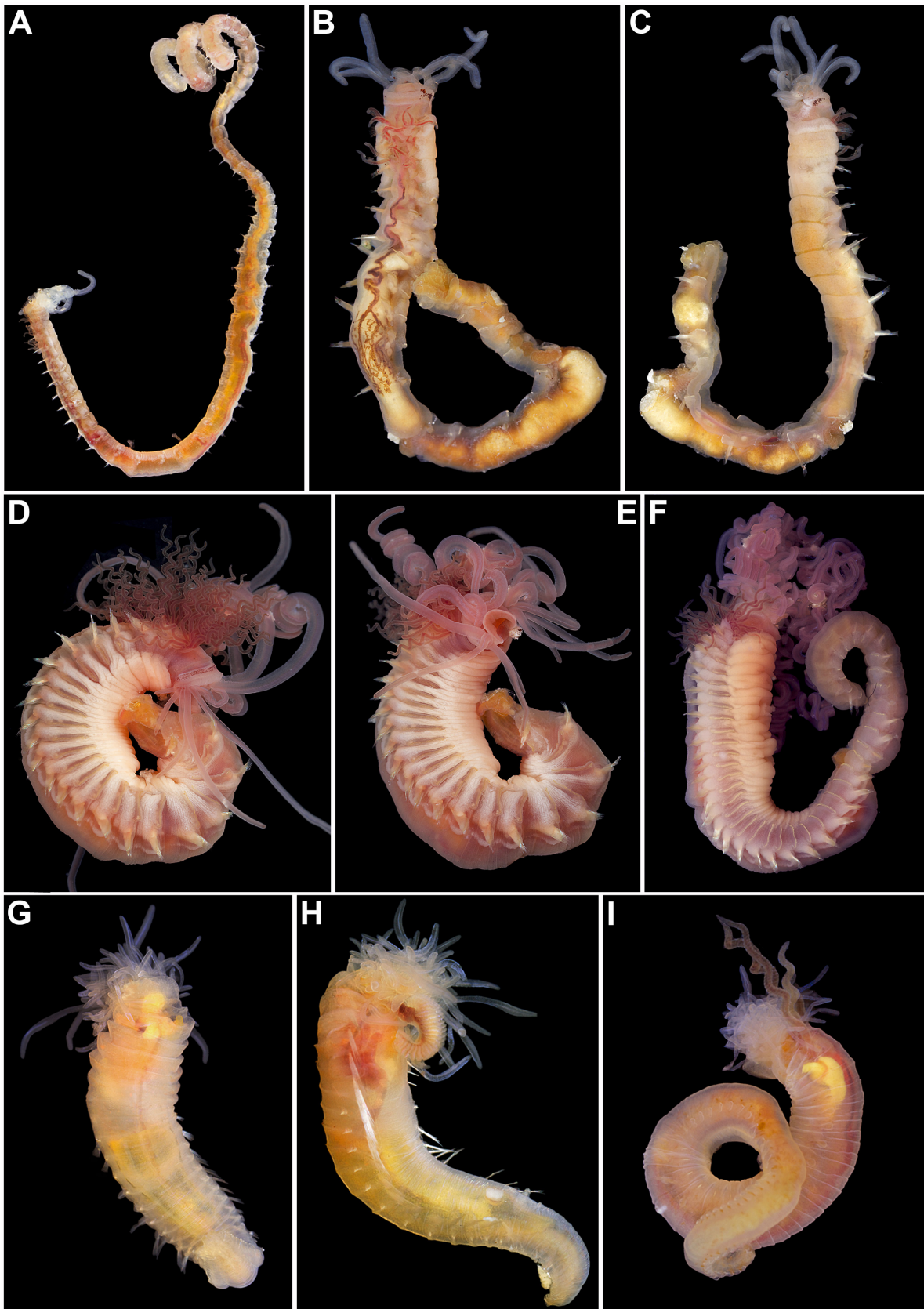


FIGURE 1. Live specimens. A, *Streblosoma curvus* n. sp., AM W.44276, MI QLD 2355; B–C. AM W.44287, MI QLD 2375; D–F. *Thelepus paiderotos* n. sp., AM W.44600, MI QLD 2397 (D–E), AM W.44283, MI QLD 2368 (F); G–H. *Terebellides akares* n. sp., AM W.45450, MI QLD 2445; I. *Trichobranchus hirsutus* n. sp., AM W.45444, MI QLD 2444. Photos: A–I – A. Semenov.

Selected representatives of some species were photographed alive (Fig. 1). In addition to the material collected during the Workshop, we have also included material collected during other projects carried out by Australian Museum staff in the Lizard Island region.

Specimens were studied using stereomicroscopes and representatives of all species were photographed. Notochaetae and neuropodia were removed, mounted on slides with Aquatex® and examined and photographed using compound microscopes. For SEM examination, 1–2 specimens of some species were dehydrated in a series of ethanol solutions in progressively stronger concentration, then critical-point dried, sputter-coated with gold, and examined at the SEM Laboratory, The Australian Museum (AM). Photos under stereo- and compound microscopes were also taken at the SEM Laboratory, AM, with a Spot Flex camera; under stereomicroscope, the specimens were kept in position with a glass coverslip and photographed from a Petri dish with a black bottom. Mounted images, integrating several focal planes, were produced with Helicon Focus version 5.3. All photos were edited with Adobe Photoshop CS6 software. Photos of live animals were taken by A. Semenov.

Material collected during the workshop was under Permit number G12/35718.1 issued by the Great Barrier Reef Marine Park Authority. All material has been deposited at the Australian Museum, Sydney. Number of specimens under each registration number is 1 unless otherwise indicated.

Taxonomic account

Family Telothelepodidae Nogueira, Fitzhugh & Hutchings, 2013

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part of prostomium frequently with eyespots; distal part of prostomium low, restricted to base of upper lip, mid-dorsal process frequently present, elongate, partially attached to the upper lip or completely free. Buccal tentacles of one or two types, short ones uniformly cylindrical, long ones slightly expanded distally, spatulate, if not all uniformly cylindrical. Peristomium forming lips, sometimes continuing dorsally as narrow annulation, with nuchal organs as thin ciliate row on anterior margin; upper lip large, distinctly longer than wide, frequently highly convoluted; lower lip also expanded, frequently extending across entire ventrum, cushion-like or segment-like, with deep corrugations. Either segment 1 or segment 2 not continuing ventrally, covered by expanded lower lip; segments 3–5 or 4–5 longer than remaining, anterior margins as protruding crests ventrally. Two pairs of branchiae on segments 2–3, each pair with numerous independent curled filaments, progressively tapering to tips. Anterior body highly glandular ventrally, swollen, smooth to slightly crenulate, ventro-lateral pads or mid-ventral shields absent. Notopodia beginning from segment 3, extending for at least 15 segments; conical and relatively short notopodia, chaetae emerging from retractile central core on apex. Winged notochaetae in both rows, those of anterior row frequently with wings terminating subdistally in a bulbous “head”, followed by tapered alimbate tip (bayonet-like chaetae); transition between types of notochaetae along body occurring frequently. Neuropodia poorly developed throughout, low, almost sessile until termination of notopodia, slightly more developed after notopodia terminate, as remarkably low ridges. Neurochaetae as short-handled avicular uncini in single, straight rows throughout, with dorsal button at anterior to middle third of the base and conspicuous prow. Nephridial and genital papillae usually present, posterior to bases of notopodia of segments 5–7. Pygidium smooth to slightly crenulate.

Remarks. The family Telothelepodidae was erected recently (Nogueira *et al.* 2013), including a group of genera which were previously considered as belonging to the Thelepodidae. The family is characterized by an upper lip distinctly longer than wide and very poorly developed neuropodia throughout.

Telothelepodidae contains six genera, defined by the segment on which neuropodia begin. In *Decathelepus* Hutchings, 1977, neuropodia begin on segment 12; in *Glossothelepus* Hutchings & Glasby, 1986a, these structures are present from segment 9; in *Kritzlerius* Londoño-Mesa, 2009, neuropodia begin on segment 10; in *Parathelepus* Caullery, 1915 they are found from segment 11; while in *Rhinothelepus* Hutchings, 1974, neuropodia begin on segment 8, and in *Telothelepus* Day, 1955 they are present from segment 18. Of those, *Decathelepus* and *Telothelepus* have two species each, *Rhinothelepus* has five species, including one new species described herein, and all the others are monotypic.

Genus *Rhinothelepus* Hutchings, 1974

Rhinothelepus Hutchings 1974: 192–193, figs 6A, B.

Type-species. *Rhinothelepus lobatus* Hutchings, 1974, by monotypy.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part with eyespots; distal part low, restricted to base of upper lip, mid-dorsal process frequently present, elongate, attached to the upper lip basally, distally free. Buccal tentacles all uniformly cylindrical. Peristomium forming lips, continuing dorsally in some species as narrow annulation, with nuchal organs as a thin ciliate row on anterior margin; upper lip large, distinctly longer than wide, frequently highly convoluted; lower lip also expanded, extending across entire ventrum, segment-like, with deep corrugations, to cushion-like. Two pairs of branchiae on segments 2–3, each pair with numerous independent curled filaments, progressively tapering to tips. Anterior body highly glandular ventrally, swollen. Notopodia beginning from segment 3, extending for 15 segments; winged or bayonet-like chaetae in anterior row, changing types from anterior (bayonet) to posterior (winged) segments with notopodia, posterior row with narrowly-winged chaetae throughout. Neuropodia beginning from segment 8; uncini with conspicuous prow, dorsal button closer to tip of uncini in relation to base of main fang (anterior to middle third of uncini), and crest with 2–3 rows of secondary teeth. Nephridial and genital papillae usually present, posterior to bases of notopodia of segments 5–7. Pygidium smooth to slightly crenulate.

Remarks. Except for *R. occabus* Hutchings, 1990, described from Hong Kong, this genus is known only from Australia. The type species, *R. lobatus* Hutchings, 1974, was described from Wallis Lake, New South Wales, *R. macer* Hutchings, 1977, from Moreton Bay, Queensland, and *R. buku* Hutchings, 1997a, from Melville Bay, Northern Territory.

The most important characters to distinguish among the species in this group are the presence of a mid-dorsal prostomial process, the extension and morphology of upper and lower lips, number of branchial filaments and the morphology of bayonet-like chaetae, either slender or with wings terminating by bulbous subdistal “head”. Uncini seem to be very conservative in this genus, with similar morphology in all species.

Rhinothelepus oculeus n. sp.

(Figs 2, 3)

Type material. Holotype: AM W.47507, MI QLD 2337, complete specimen, in excellent state of preservation, 6 mm long, 0.8 mm maximum width (segments 11–12). Paratype: AM W.44945, MI QLD 2337, 4 mm long, ~0.6 mm wide, 34 segments, incomplete, in relatively good state (broken in two pieces between segments 13–14 due to manipulation / dissection).

Comparative material examined. Holotype of *Rhinothelepus buku*, NTM W.009549. Holotype of *Rhinothelepus lobatus*, AM W.5234. Holotype of *Rhinothelepus macer*, AM W.6783. Holotype of *Rhinothelepus occabus* AM W.201903.

Description. Short bodied species. Transverse prostomium attached to dorsal surface of upper lip; basal part with small eyespots, densely packed in two horizontal rows at each side, terminating dorso-laterally by oblique row of three eyespots; distal part of prostomium low, restricted to base of upper lip, mid-dorsal process elongate, attached to the upper lip basally, distally free (Fig. 2A–B, F, J–K). Buccal tentacles all uniformly cylindrical, of two widths (Fig. 2A–H, J–M), thicker tentacles originating exclusively from both laterals of mid-dorsal process, basally. Peristomium forming lips, continuing dorsally as narrow annulation, with nuchal organs on anterior margin; upper lip large, distinctly longer than wide, slightly convoluted; lower lip expanded, cushion-like, extending across entire ventrum (Fig. 2B–E, G–H, K–M). Anterior body highly glandular ventrally, swollen and slightly corrugated; segment 1 conspicuous dorsally and laterally, ventrally covered by expanded lower lip; segment 2 forming complete ring, segments 4 and 5 longer than remaining anterior segments, especially segment 4 (Fig. 2A–H, J–M). Two pairs of branchiae on segments 2–3, filamentous, each pair with less than 10 filaments on either side, originating from swollen cushion-like areas of body wall and with narrow mid-dorsal gap inbetween; branchial filaments of segment 2 extending to same level or slightly laterally in relation to notopodia of segment 3, filaments of second pair anterior and dorsal to notopodia (Fig. 2A–H, J–M). Notopodia extending for 15 segments, until segment 17; notopodia of segments 3–5 inserted progressively more laterally, then longitudinally aligned;

anterior notopodia with slender bayonet-like chaetae in anterior row and narrowly-winged chaetae in posterior row (Fig. 3A); posterior notopodia bearing narrowly-winged chaetae in both rows, wings present from middle third of chaetae in posterior row; chaetae from anterior row about half length of chaetae from posterior row throughout (Fig. 3B–C). Neuropodia beginning from segment 8, uncini throughout with dorsal button at middle third of base and crest with 2 rows of secondary teeth (Fig. 3D–G). Elongate nephridial and genital papillae, posterior and longitudinally aligned to bases of notopodia of segments 5–7. Pygidium smooth (Fig. 2A–E, I).

Remarks. Five species of *Rhinothelepus* are known: *R. buku* Hutchings, 1997a, *R. lobatus* Hutchings, 1974, *R. macer* Hutchings, 1977, *R. occabus* Hutchings, 1990, and *R. oculus* n. sp. described above.

Both *R. lobatus* and *R. occabus* differ from *R. oculus* n. sp. in having a longer prostomial process; a longer and highly convoluted upper lip and shorter deeply corrugated lower lip; in both species segment 1 is forming complete annulation around the body and segment 2 is not continuing ventrally, and both species have many more branchial filaments, ~20–30 filaments on each side of pairs (Nogueira *et al.* 2010). In contrast, in *Rhinothelepus oculus* n. sp. the lower lip is cushion-like and almost smooth, segment 1 is incomplete and segment 2 forms a complete annulation, and there are less than 10 branchial filaments per pair.

Rhinothelepus macer is more similar to *R. oculus* n. sp. than to other described species. Both species share a similar morphology of the anterior end, including lips and segments 1 and 2, and number of branchial filaments, however a prostomial process is absent among members of *R. macer* and present in *R. oculus* n. sp., and in that species the segments are progressively longer until segments 7–8, while in *R. oculus* n. sp., segments 4–5 are longer than following ones. In addition, the bayonet-like chaetae of *R. macer* are much longer, about the same size as chaetae from posterior row, while in *R. oculus* n. sp., the bayonet-like chaetae are about half the length of chaetae from posterior row.

Rhinothelepus buku has a longer prostomial process and a longer convoluted upper lip than *R. oculus* n. sp. In addition, the lower lip of *R. buku* forms a convoluted tongue-like projection almost as long as upper lip margins, folded and corrugated, and nephridial and genital papillae are inconspicuous or absent (Hutchings 1997a), with segment 1 conspicuous only ventrally and segment 2 forming a complete ring, with the first pair of branchiae.

Etymology. The specific name “*oculus*” is Latin and refers to the presence of the prostomial eyespots (*oculus* = full of eyes).

Habitat. In amongst coral rubble of patch reefs in shallow waters, 9 m.

Type locality. Big Vicki's reef, 14°41'9"S, 145°26'31"E, Lizard Island, Great Barrier Reef, Queensland, Australia.

Distribution. Known only from type locality.

Family Thelepodidae Hesse, 1917

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part frequently with eyespots; distal part low, restricted to base of upper lip. Buccal tentacles all uniformly cylindrical. Peristomium forming lips, sometimes continuing dorsally as narrow annulation, with nuchal organs as thin ciliated row on anterior margin; short, hood-like upper lip, about as long as wide; lower lip also short, button-like, restricted to oral area. Short anterior segments, usually visible all around body, segment 1 frequently with ventral lobe posterior to lower lip, segment 2 typically with anterior margin as protruding crest ventrally, lobes on following anterior segments sometimes present. Branchiae usually present, 2–3 pairs beginning from segment 2, each pair with numerous independent curled filaments, progressively tapering to tips, mid-dorsal gap between filaments of each side within pairs either present or absent. Anterior body highly glandular ventrally, swollen, smooth to strongly tessellated, ventro-lateral pads or mid-ventral shields absent. Notopodia beginning from segments 2 or 3, extending for variable number of segments; conical and relatively short notopodia, distally bilobed, chaetae emerging between lobes. Winged or serrated notochaetae, transition between types of notochaetae along body occurring sometimes. Neuropodia as fleshy ridges anteriorly, as raised pinnules after termination of notopodia. Neurochaetae throughout as short-handled avicular uncini, with dorsal button at anterior third of the base or terminal, prow, if conspicuous, usually distinctly short, and strongly curved, convex base in most taxa; uncini usually in single, straight rows, a few species with uncini arranged in curved, C-shaped to looped rows. Nephridial and genital papillae usually present, posterior to bases of notopodia of segments 4–7. Pygidium smooth to slightly crenulate.

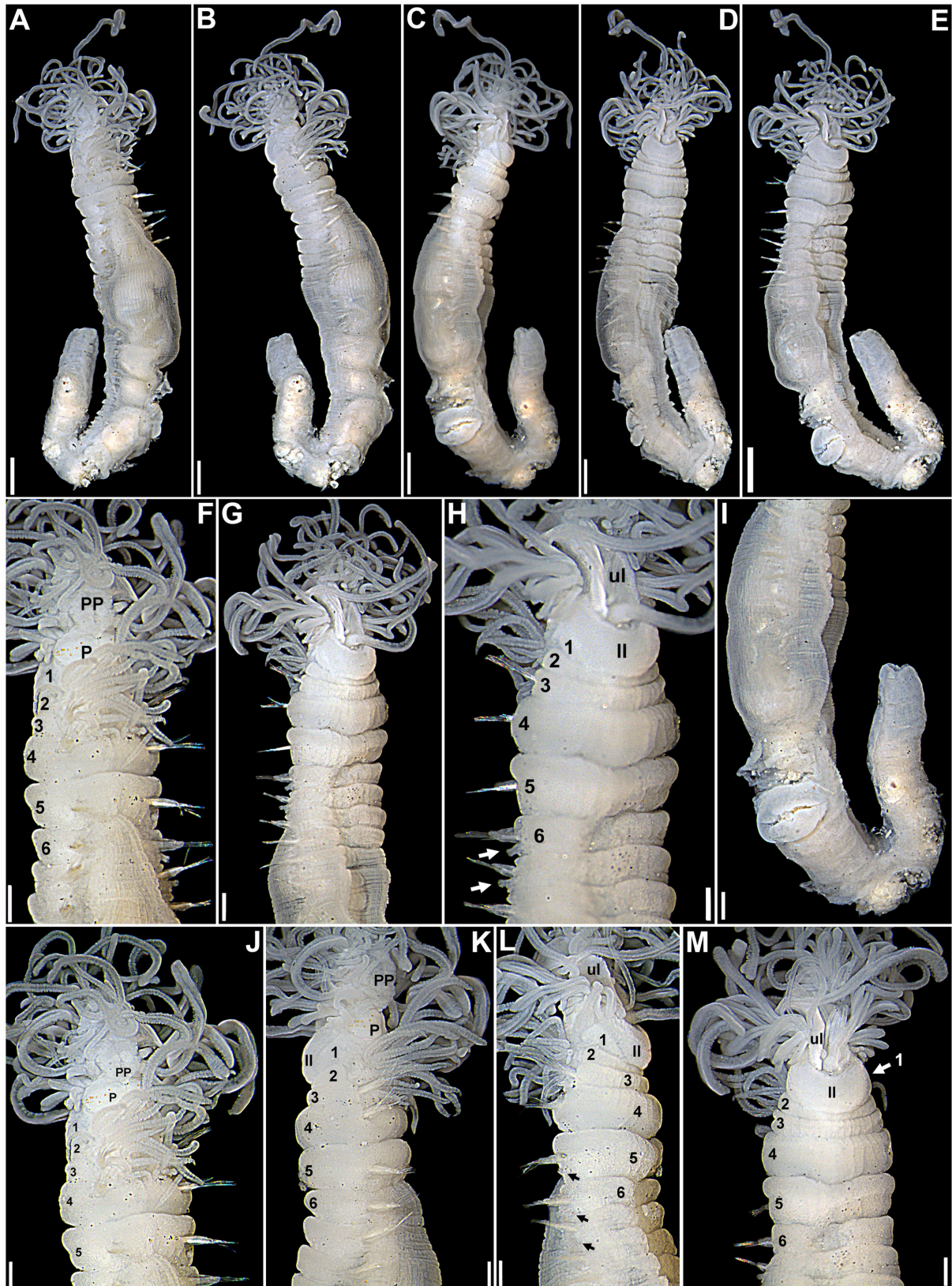


FIGURE 2. *Rhinothelepus oculus* n. sp., holotype AM W.47507. A–E. Entire worm, left dorso-lateral, left lateral and three progressively more ventral views, from right ventro-lateral to ventral, respectively; F–H. Close ups of the anterior end, left dorso-lateral and two progressively closer right ventro-lateral views, respectively; I. Posterior body, right lateral view; J–M. Close ups of anterior end, left dorso-lateral, left lateral, right ventro-lateral and ventral views, respectively. Abbreviations: numbers refer to segments, unspecified arrows point to genital papillae, II = lower lip, P = basal part of prostomium, PP = prostomial process, ul = upper lip. Scale bars: A–E = 0.4 mm, F–G, I = 0.2 mm, H, J–M = 0.15 mm.

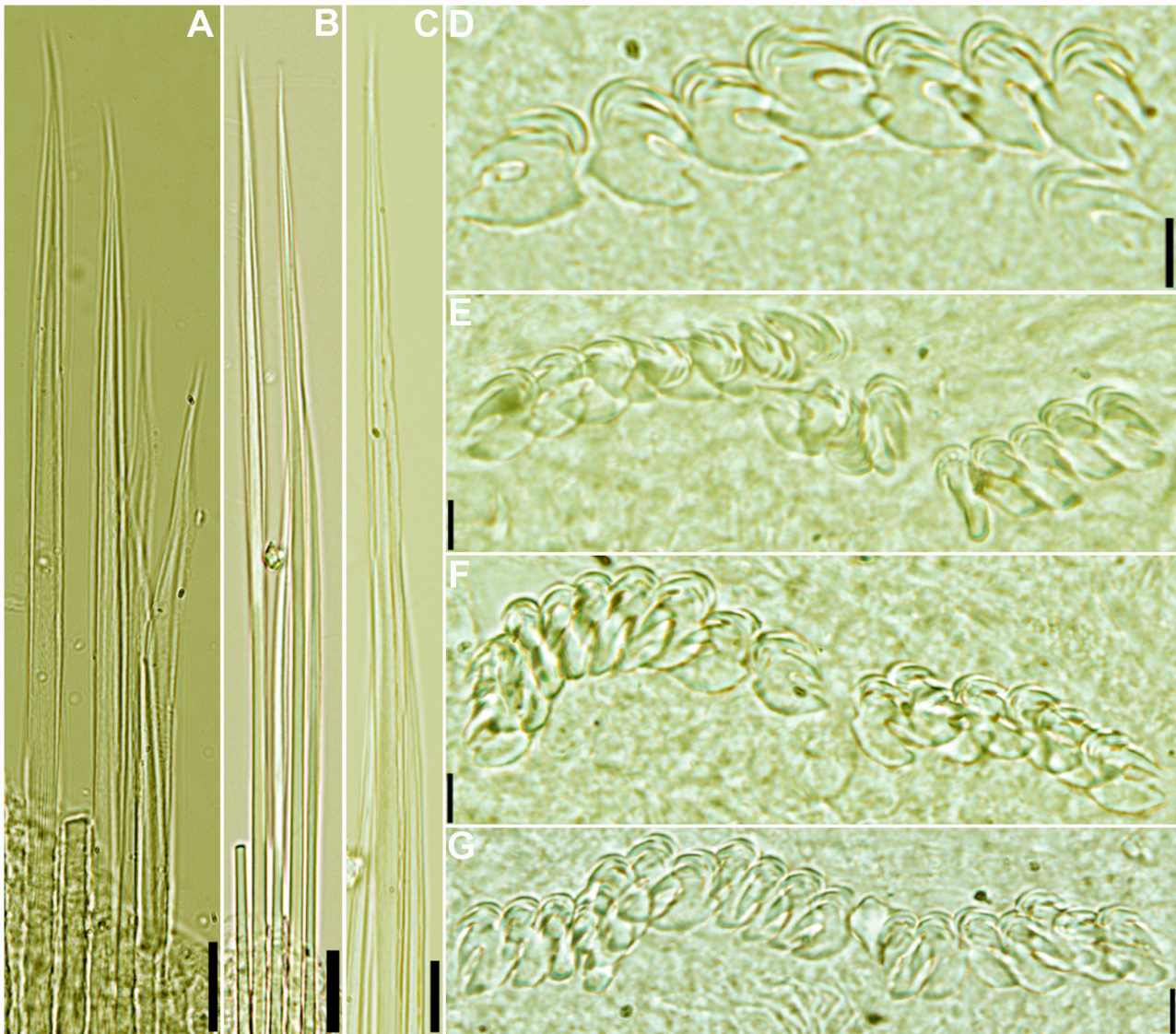


FIGURE 3. *Rhinothelepus oculeus* n. sp., holotype AM W.47507. A–B. Notochaetae, segments 7 and 14, respectively; C. Tips of notochaetae from posterior row, segment 14; D–G. Uncini, segment 8 and three last neuropodia, respectively. Scale bars: A–C = 15 μ m, D–G = 5 μ m.

Remarks. The family Thelepodidae was initially described as a subfamily of Terebellidae (Hessle 1917) and that classification was followed by subsequent authors (Fauvel 1927; Day 1967; Hutchings & Glasby 1987). Recently, the group was redefined to exclude those species with elongate upper lip and sessile neuropodia (Family Telothelepodidae), and raised to familial level by Nogueira *et al.* (2013), after a comprehensive phylogenetic study based on morphological characters. The family is characterized by having short, hood-like upper lip, anterior neuropodia as fleshy ridges, and by the uncinal morphology.

Thelepodidae contains five genera, defined by the presence or absence of lobes on anterior segments, segments on which noto- and neuropodia begin, and the morphology of notochaetae. In *Euthelepus* McIntosh, 1885, anterior segments present relatively large, flaring lobes, notopodia begin from segment 3, bearing winged and, sometimes, serrated notochaetae, and neuropodia begin from segments 4 or 5 (Hutchings & Glasby 1986b). In *Pseudostreblosoma* Hutchings & Murray, 1984, lobes may be present on anterior segments, notopodia begin from segment 2 and they bear winged and serrated notochaetae, the latter only present on posterior segments with notopodia (Hutchings & Glasby 1987; Nogueira & Alves 2006). In *Pseudothelepus binara* Hutchings, 1997b, the only species in this genus, lobes are present on segments 6–7, notopodia begin from segment 3 and neuropodia from segment 6 (Hutchings 1997b, Nogueira *et al.* 2010), while in both *Streblosoma* Sars, 1872 and *Thelepus* Leuckart, 1849, lobes on anterior segments

are absent, all notochaetae are winged and neuropodia begin from segment 5, notopodia beginning on segment 2 in the former genus and on segment 3 in the latter (Hutchings & Glasby 1987).

Key to the genera of Thelepodidae found in Lizard Island

1. Notopodia beginning on segment 3, second segment with branchiae. 2
- Notopodia beginning on segment 2, first segment with branchiae. *Streblosoma*
2. (1) Lobes on anterior segments present *Euthelepus*
- Paired lobes on anterior segments absent; segment 1 frequently with single ventral lobe marginal to mouth. *Thelepus*

Genus *Streblosoma* Sars, 1872

Streblosoma. – Hutchings & Glasby 1987: 222.

Type-species. *Grymaea bairdi* Malmgren, 1866, by original designation.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part usually with eyespots; distal part low, restricted to base of upper lip. Buccal tentacles all uniformly cylindrical. Peristomium forming lips, sometimes continuing dorsally as narrow annulation, with nuchal organs as thin ciliated row on anterior margin; short, hood-like upper lip, about as long as wide; lower lip also short, button-like, restricted to oral area. Short anterior segments, usually visible all around body, segment 1 frequently with ventral lobe posterior to lower lip, lobes on following anterior segments absent. Branchiae usually present, 2–3 pairs beginning from segment 2, each pair with numerous independent curled filaments, progressively tapering to tips, mid-dorsal gap between filaments of each side within pairs either present or absent. Anterior body highly glandular ventrally, swollen, smooth to strongly tessellated. Notopodia beginning from segment 2, extending for variable number of segments; conical and relatively short notopodia, distally bilobed, chaetae emerging between lobes. Winged notochaetae in both rows, those from anterior row broadly-winged in several species, with wings somewhat twisted. Neuropodia beginning from segment 5 as fleshy ridges anteriorly and as raised pinnules after termination of notopodia. Neurochaetae throughout as short-handled avicular uncini, with dorsal button at anterior third of base or terminal, prow, if conspicuous, usually distinctly short, and strongly curved, convex base in most taxa; uncini usually in single, straight rows, a few species with uncini arranged in curved, C-shaped to looped rows. Nephridial and genital papillae usually present, posterior to bases of notopodia of segments 4–7. Pygidium smooth to slightly crenulate.

Remarks. This is a large genus distributed worldwide, currently there are over 40 known species, of which eight occur in Australia. Prior to this study none was known from the Great Barrier Reef.

Streblosoma curvus n. sp.

(Figs 1A–C, 4, 5)

Type material. Holotype: AM W.47508, off Crystal Beach, Lizard Island, 14°40'S, 145°28'E, reef rock encrusted with brown algae and alcyonarians, 18 m, coll. P.B. Berents & P.A. Hutchings, 15 Jan 1975: incomplete specimen, in good state, 8 mm long, ~1.1 mm wide, 37 segments. Paratypes: AM W.44287, MI Qld. 2375, 18 mm in length, 1 mm in width, incomplete with 19 pairs of notopodia; AM W.47522, Lizard Island, channel bommies, 14°41'19"S, 145°27'50"E, 15 m, by SCUBA, incomplete specimen, in poor condition with 20 segments; AM W.47523, North Direction Island, 14°45'04"S, 145°30'45"E, coral rubble, 28 m, incomplete specimen, in relatively good state, with 24 segments, ~5 mm long, ~0.9 mm wide.

Other material examined. AM W.47524 (2), Lizard Island, north of Crystal Beach, 14°40'S, 145°28'E, live coral, 11 m, 14 Jan 1975, coll. Hutchings & Weate; AM W.47525 (4), between bommies inside lagoon entrance, 14°40'S, 145°28'E, sand, 18 m, 9 Oct 1978, coll. Jones & Short.

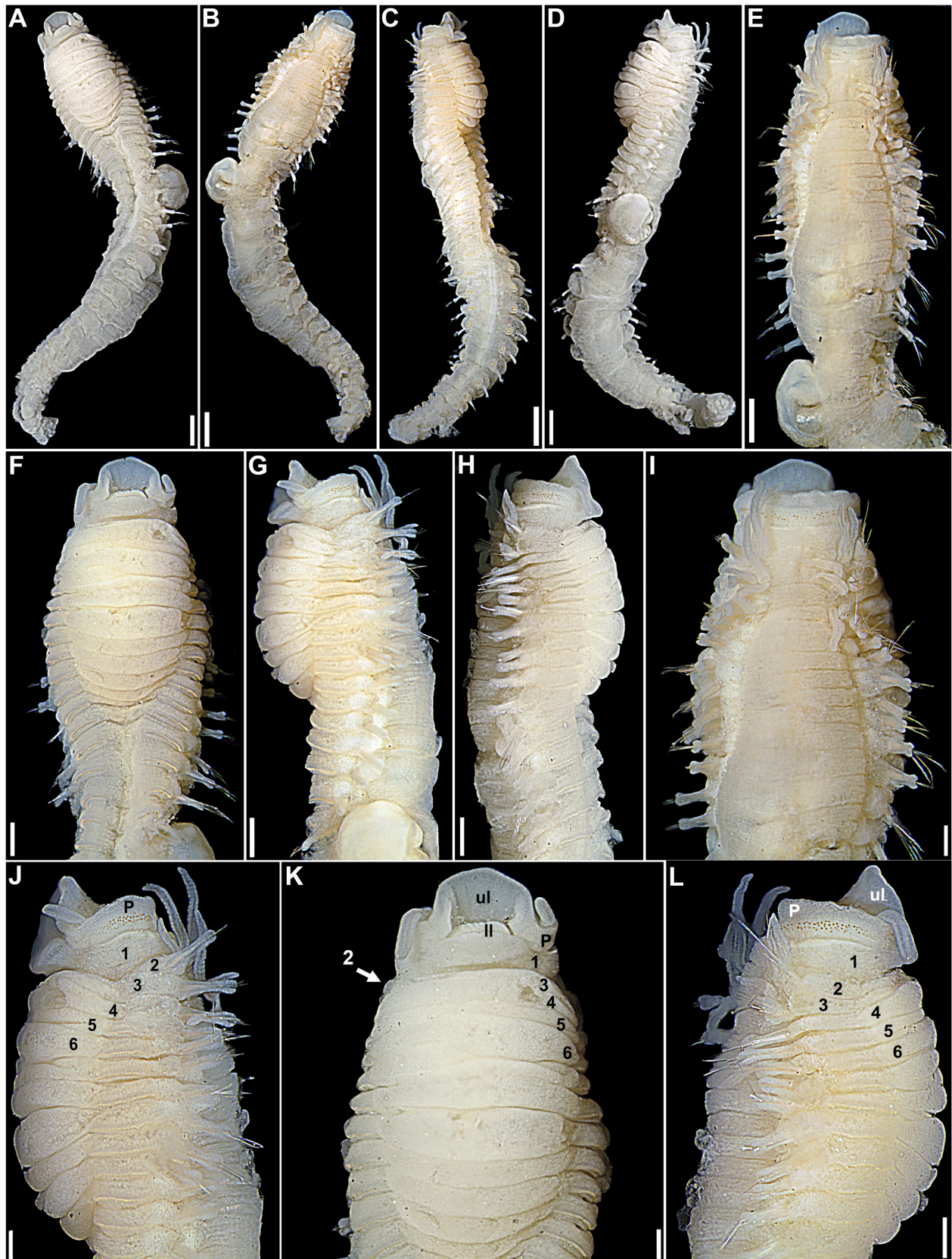


FIGURE 4. *Streblosoma curvus* n. sp., holotype AM W.47508. A–D. Entire incomplete worm, ventral, dorsal, right and left lateral views, respectively; E–H. Anterior end, dorsal, ventral, left and right lateral views, respectively; I–L. Close ups of anterior end, dorsal, left lateral, ventral and right lateral views, respectively. Abbreviations: numbers refer to segments, II = lower lip, P = prostomium, ul = upper lip. Scale bars: A–D = 0.5 mm, E–H = 0.3 mm, I = 0.2 mm, J–L = 0.15 mm.

Description. Holotype incomplete, but well preserved. In life, uniformly reddish brown with pale tentacles and with conspicuous blood vessels visible through body wall (Fig. 1A–C). Transverse prostomium attached to dorsal surface of upper lip; basal part with eyespots irregularly arranged in thick, continuous row, thicker laterally, a fine line mid-dorsally (Figs 1B–C; 4B–E, G–J, L; 5A); distal part of prostomium low, restricted to base of upper lip. Long and relatively thick buccal tentacles. Peristomium forming lips and continuing dorsally; upper lip short, hood-like, about as long as wide; lower lip short, just around mouth, partially hidden by ventral lobe of segment 1 (Fig. 4A, C–D, F–H, J–L). Segment 1 narrow, with ventral lobe marginal to mouth; segment 2 with thickened anterior margin ventrally, as low crest across venter; segment 3 ventrally oblique, extending anteriorly and almost completely covering segment 2, with ventral crest higher than segment 2 (Figs 4A–L; 5A). Three pairs of branchiae, on segments 2–4, segment 2 with 3–4 filaments on either side, segments 3–4 with 2–3 filaments at each side; branchial filaments thin, originating anterior and dorsally to notopodia, progressively longer dorsally, longest filaments about 1/2–1/3 of corresponding body width (Figs 1B; 4B–E, G–J, L; 5A). Entire anterior ventral surface glandular, smooth between neuropodia; glandular surfaces progressively more swollen until segments 8–9, then progressively less inflated through segment 13, mid-ventral stripe visible from segment 13 to end of specimen (Figs 4A, C–D, F–H, J–L; 5D). Notopodia starting from segment 2 and extending until segment 32; cylindrical and bilobed notopodia, with rounded lobes of equal size; first pair about same size as following pairs and longitudinally aligned to them (Figs 4A–J, L; 5A–B). Narrowly-winged notochaetae throughout, wings broader on one margin, rounded; chaetae from posterior row with wings only on distal third to distal half of chaetae; anterior notopodia with chaetae of anterior row about 1/3 as long as those from posterior row, posterior notopodia with chaetae from anterior row only slightly shorter than those from posterior row (Fig. 5E–H). Neuropodia as swollen, fleshy pinnules slightly raised from the surface of the body throughout (Figs 4A, C–D, F–H, J–L; 5B–D). Uncini in straight rows until segment 19, segment 20 with dorsal edge slightly curved, with some uncini in the lower part of C-shaped line, more conspicuously curved from segment 21 until end of fragment, with more uncini in anterior end of tori (segment 21: 25 uncini at anterior end, 4 at curve and 11 at posterior end); on mid-body segments, uncini in roughly S-shaped arrangement, with second curve at ventral margin of posterior end of tori, and few uncini in a lower row (Fig. 5D, K); uncini with dorsal button at anterior third of base, short, conspicuous prow, curved base and crest with 2 rows of secondary teeth, 2 teeth in basal row and single, minute tooth in distal row, between teeth of basal row (Fig. 5I–K). Rounded and small, almost inconspicuous nephridial papillae on segments 4–7, opening dorsal and posteriorly to notopodia. Pygidium unknown.

Remarks. Only five previously known species of *Streblosoma* have neuropodia with uncini arranged in curved or looped rows, rather than in straight rows. These species are *S. duplicata* Hutchings, 1990, *S. hesslei* Day, 1955, *S. porchatensis* Nogueira, Garraffoni & Alves, 2004, *S. toddae* Hutchings & Smith, 1997, and *S. uncinatus* Kudenov, 1975. The eight previously recorded species of *Streblosoma* from Australia all lack such an arrangement of uncini.

A comparative table for all these species was provided by Nogueira *et al.* (2004) and only one of them, *S. duplicata*, described from Hong Kong, shares with *S. curvus* n. sp. the branchial filaments of segment 2 not extending laterally to notopodia (Hutchings 1990).

Streblosoma duplicata differs from *S. curvus* n. sp., as members of that species lack eyespots, uncini are arranged in completely closed loops from segment 14 onwards, and nephridial and genital papillae are inconspicuous or absent (Hutchings 1990; Nogueira *et al.* 2004). In contrast, in *S. curvus* n. sp. eyespots are present across entire prostomium, uncini are arranged in curved rows, open on ventral edge of tori, from segments 20–21, and nephridial and genital papillae are small but conspicuous, present on segments 4–7.

Etymology. The specific name “*curvus*” is Latin for “bent” referring to the arrangement of the neuropodial uncini.

Habitat. Collected in amongst coral rubble in depths of 15–28 m.

Type locality. Off Crystal Beach, 14°40'S, 145°28'E, Lizard Island, Great Barrier Reef, Queensland, Australia.

Distribution. Known only from Lizard Island and nearby North Direction Island.

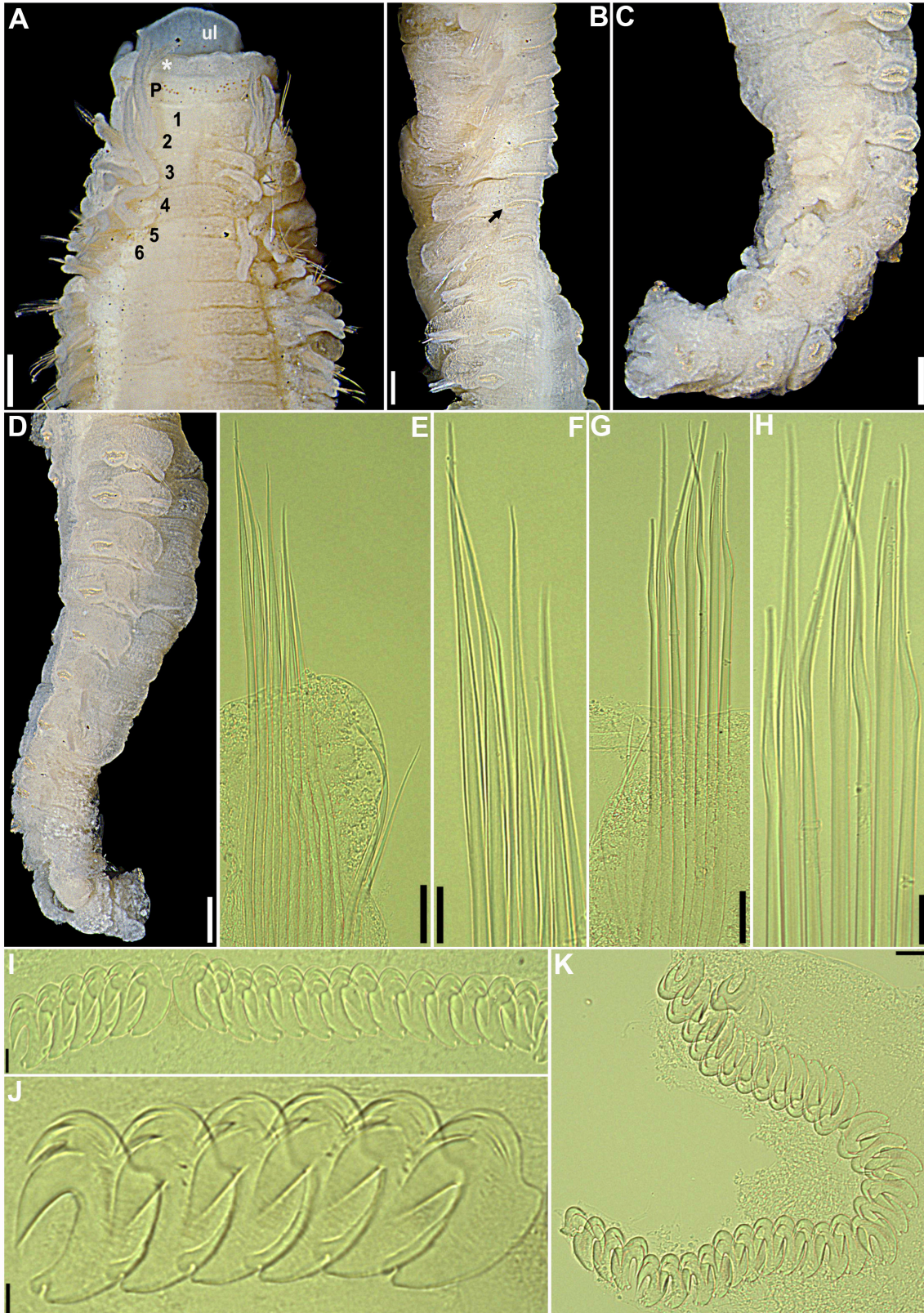


FIGURE 5. *Streblosoma curvus* n. sp., holotype AM W.47508 (A–D), paratype AM W.47522 (E–K). A. Close up of the anterior end, dorsal view; B. Mid-body segments; arrow begins to first neuropodium with uncini in curved row, on segment 21; C–D. Posterior end of fragment, right and left lateral views, respectively; E–F, Notochaetae from segment 4 under progressively higher magnifications; G–H, Notochaetae, segment 23, in progressively higher magnifications; I–K, Uncini from segment 7 under progressively higher magnifications and from segment 23, respectively. Abbreviations: numbers refer to segments, P = basal part of prostomium, ul = upper lip, * = distal part of prostomium. Scale bars: A–C = 0.2 mm, D = 0.3 mm, E, G = 40 μ m, F, H = 20 μ m, I, K = 10 μ m, J = 5 μ m.

Genus *Euthelepus* McIntosh, 1885

Euthelepus.—Hutchings & Glasby 1986b: 105.

Type-species. *Euthelepus setubalensis* McIntosh, 1885, by original designation.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part usually with eyespots; distal part low, restricted to base of upper lip. Buccal tentacles all uniformly cylindrical. Peristomium forming lips, continuing dorsally as narrow annulation, with nuchal organs on anterior margin; short, hood-like upper lip, about as long as wide or wider than long; lower lip also short, button-like, restricted to oral area. Short anterior segments, usually visible all around body, segment 1 with ventral lobe marginal to mouth, segments 2–3 or 2–4 with lateral or ventro-lateral lobes. Three pairs of branchiae, beginning from segment 2, each pair with relatively few, thick and elongate branchial filaments progressively tapering to tips, mid-dorsal gap between filaments of each side within pairs absent or very narrow, at least on segment 2. Anterior body highly glandular ventrally, swollen, smooth to corrugated between neuropodia. Notopodia beginning from segment 3, extending for variable number of segments; distally bilobed notopodia, post-chaetal lobe sometimes longer, chaetae emerging between lobes. Winged notochaetae in anterior row, posterior row with winged or serrated notochaetae, sometimes changing types from anterior to posterior segments with notopodia. Neuropodia beginning from segments 4 or 5, as fleshy ridges anteriorly, as raised pinnules after termination of notopodia. Neurochaetae throughout as short-handled avicular uncini, with dorsal button at anterior third of base, short, conspicuous prow, and strongly curved, convex base; uncini in single, straight rows. Nephridial and genital papillae frequently absent. Pygidium unknown (Hutchings & Glasby 1986b).

Remarks. Hutchings & Glasby (1986b) revised this genus and considered that only three species belong to this group. The remaining species previously allocated in *Euthelepus* were transferred to *Streblsoma* (2 species) and *Thelepus* (4 species) (Hutchings & Glasby 1986b). Two additional species were later described (Hutchings 1997a; Londoño-Mesa 2009) and a sixth one is described herein.

The most important characters to distinguish the species of *Euthelepus* are the morphology of the lobes of anterior segments and branchiae, the number of pairs of notopodia, the segment on which neuropodia begin, and the morphology of notochaetae and uncini.

Euthelepus aserrula n. sp.

(Figs 6–7)

Type material. Holotype: AM W.47509, Martin Reef, back reef, 14°45'22"S, 145°21'46"E, coarse coral rubble, 3–15 m, 30 Aug 2010: incomplete specimen, with 30 segments, notopodia until segment 23 on left side of the body and 25 on right side; 9 mm long, 1.0 mm maximum width (segment 6).

Description. Holotype incomplete. Transverse prostomium attached to dorsal surface of upper lip; basal part with eyespots in two groups, one broad band of large, dark red, rounded eyespots at each lateral near anterior margin of basal part of prostomium, few eyespots continuing dorso-laterally and conspicuous mid-dorsal gap, and another group of minute light red spots forming continuing row across dorsum, at posterior margin of basal part of prostomium; distal part low, restricted to base of upper lip (Fig. 6A–B, D–I). Few buccal tentacles remaining, short and thick, stout, deeply grooved, reaching to about segments 6–7 (Fig. 6A–J). Peristomium forming lips and continuing dorsally; upper lip short, hood-like, slightly wider than long; lower lip short, just around mouth, partially hidden by ventral lobe of segment 1 (Fig. 6A–B, D–I). Segment 1 narrow, with ventral lobe marginal to mouth; short lateral lobes on segments 2–3; lobes triangular, about same size, those on segment 2 wider, ventro-lateral, lobes on segment 3 placed laterally; lobes connected to each other across venter by thickened, protruding crest on anterior margin, more prominent on segment 2; segment 4 with much shorter rounded pair of lateral lobes (Fig. 6A–B, D–I). Three pairs of branchiae on segments 2–4, with thick independent filaments progressively tapering to tips, in continuous transverse rows, without medial gap; 8 filaments on segments 2 and 3, 7 on segment 4; filaments progressively longer dorsalwards, and progressively shorter from one segment to another, more marked from segments 3 to 4 (Fig. 6A, C, G, J). Entire anterior ventral surface glandular and corrugated until segment 14, more conspicuous until segment 11 (Fig. 6A–B, D–I), then continuing as mid-ventral stripe, with distinctly narrow and proportionally elongate mid-ventral rectangles. Notopodia extending until segment 23 on left

side of body, 25 on right side; bilobed notopodia, with globular bases and lobes of equal size, progressively longer posteriorwards, first pair slightly shorter than following pairs, notopodia of segments 3–7 placed progressively more laterally, then longitudinally aligned (Fig. 6A–J). Winged notochoetae in both rows, wings broader on one margin, twisted, those from anterior row 1/3–1/2 as long as those from posterior row, chaetae of posterior row with wings on distal third only (Fig. 7B–D). Neuropodia as fleshy ridges raised from body wall; at least until segment 16, neuropodia bordered by dark pigmentation, becoming paler posteriorly (Figs 6A–B, D–I; 7A). Uncini in single, straight rows; uncini with dorsal button at anterior third of base, conspicuous, short, curved base and crest with 3 rows of secondary teeth (Fig. 7E–I). Nephridial papillae not visible. Pygidium unknown.

Remarks. Of the currently accepted species of *Euthelepus*, only the type species, *E. setubalensis* McIntosh, 1885, *E. marchinbar* Hutchings, 1997a, and *E. kritzleri* Londoño-Mesa, 2009 have winged notochoetae in both rows throughout, not presenting serrated chaetae in any region of the body. Of these, only *E. marchinbar* Hutchings, 1997a is known from Australian waters. *Euthelepus setubalensis* differs from *E. aserrula* n. sp. as the former has poorly developed lobes on segments 2–4 and branchiae with single filament on either side of pairs (Hutchings & Glasby 1986b).

Euthelepus marchinbar described from Northern Australia also has shorter lobes on anterior segments, notopodia extending for 34 segments, until segment 36, and neuropodia beginning from segment 4 (Hutchings 1997a), while the holotype of *E. aserrula* n. sp. has notopodia extending until segment 23 on left side of the body, and 25 on the right side, and neuropodia beginning from segment 5, as occurs in all other species of the genus.

Euthelepus kritzleri has lobes of anterior segments with a different morphology from those of *E. aserrula* n. sp., thicker, not flaring (Londoño-Mesa 2009). In addition, *E. kritzleri* has at least 36 pairs of notopodia, extending until the end of the incomplete holotype, and ~15 branchial filaments on segment 2, while in *E. aserrula* n. sp. there are 8 filaments on segment 2.

Etymology. The specific name “*aserrula*” is Latin and refers to the lack of serrated chaetae.

Habitat. Collected from dead coral substrate from back reef, protected from SE trades in depth of 3–15 m.

Type locality. Martin Reef, 14°45'22"S, 145°21'46"E, Lizard Island, Great Barrier Reef, Queensland, Australia.

Distribution. Known only from the Lizard Island region.

Genus *Thelepus* Leuckart, 1849

Thelepus.—Hutchings & Glasby 1987: 226.

Type-species. *Amphitrite cincinnata* Fabricius, 1780, by original designation.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part usually with eyespots; distal part low, restricted to base of upper lip. Buccal tentacles all uniformly cylindrical. Peristomium forming lips, sometimes continuing dorsally as narrow annulation, with nuchal organs as a thin ciliated row on anterior margin; short, hood-like upper lip, about as long as wide; lower lip also short, button-like, restricted to oral area. Short anterior segments, usually visible all around body, segment 1 frequently with ventral lobe posterior to lower lip, lobes on following anterior segments absent. Branchiae usually present, 2–3 pairs beginning from segment 2, each pair with numerous independent curled filaments, progressively tapering to tips, mid-dorsal gap between filaments of each side either present or absent. Anterior body highly glandular ventrally, swollen, smooth to strongly tessellated. Notopodia beginning from segment 3, extending for variable number of segments; conical and relatively short notopodia, distally bilobed, chaetae emerging between lobes. Winged notochoetae in both rows, those from anterior row broadly-winged in several species, with wings slightly twisted. Neuropodia beginning from segment 5, as fleshy ridges anteriorly, as raised pinnules after termination of notopodia. Neurochaetae throughout as short-handled avicular uncini, with dorsal button at anterior third of base or terminal, prow, if conspicuous, usually distinctly short, and strongly curved, convex base in most taxa; uncini usually arranged in single, straight rows, a few species with uncini arranged in curved, C-shaped to looped rows. Nephridial and genital papillae usually present, posterior to bases of notopodia of segments 4–7. Pygidium smooth to slightly crenulate.

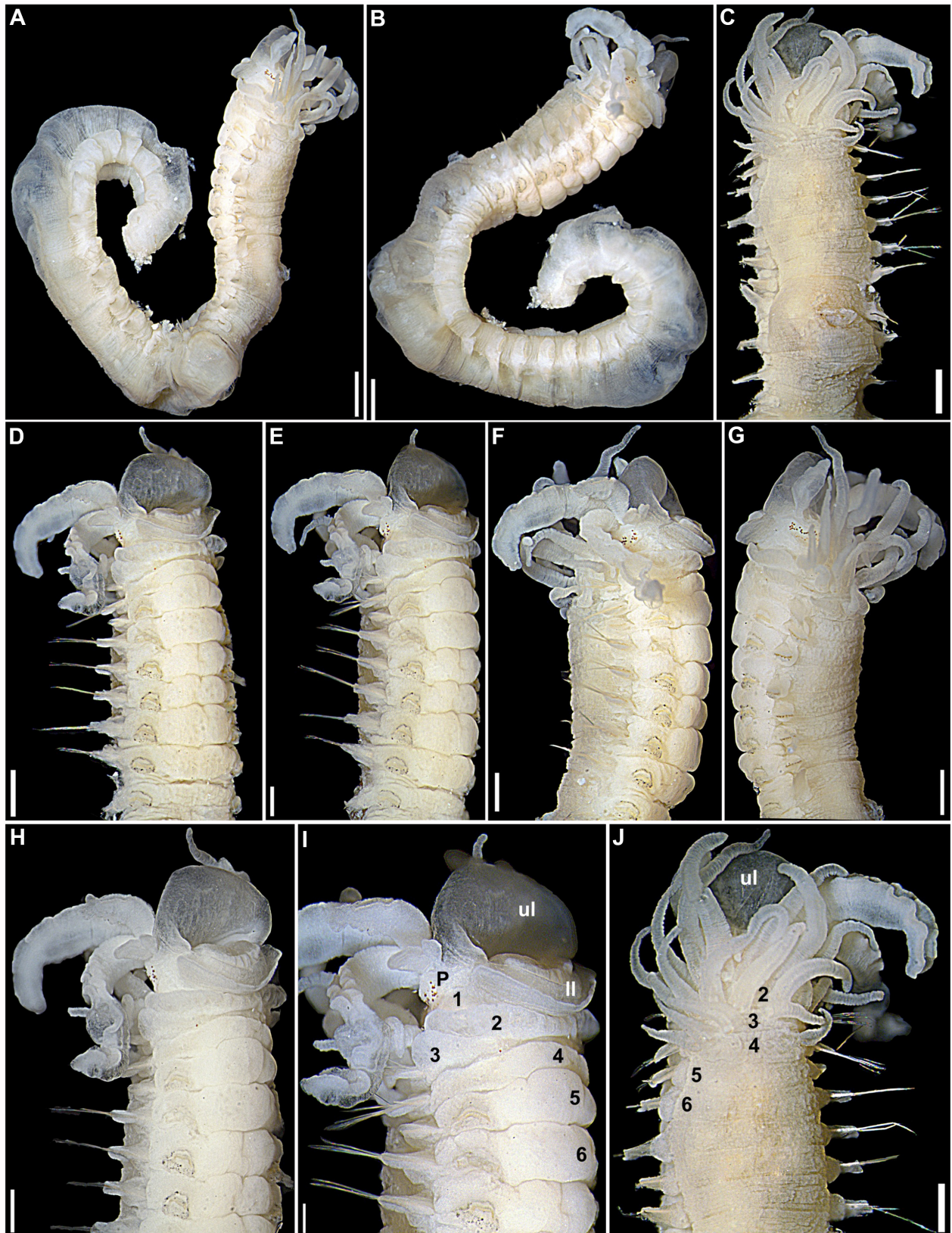


FIGURE 6. *Euthelepus aserrula* n. sp., holotype AM W.47509. A–B. Entire incomplete worm, left and right lateral views, respectively; C–G. Anterior end, dorsal, three right ventro-lateral views, progressively more lateral, and left lateral views, respectively; H–J. Close ups of anterior end, progressively closer right ventro-lateral and dorsal views. Abbreviations: numbers refer to segments, ll = lower lip, P = prostomium, ul = upper lip. Scale bars: A–D = 0.5 mm, E–G = 0.3 mm, H, J = 0.2 mm, I = 0.15 mm.

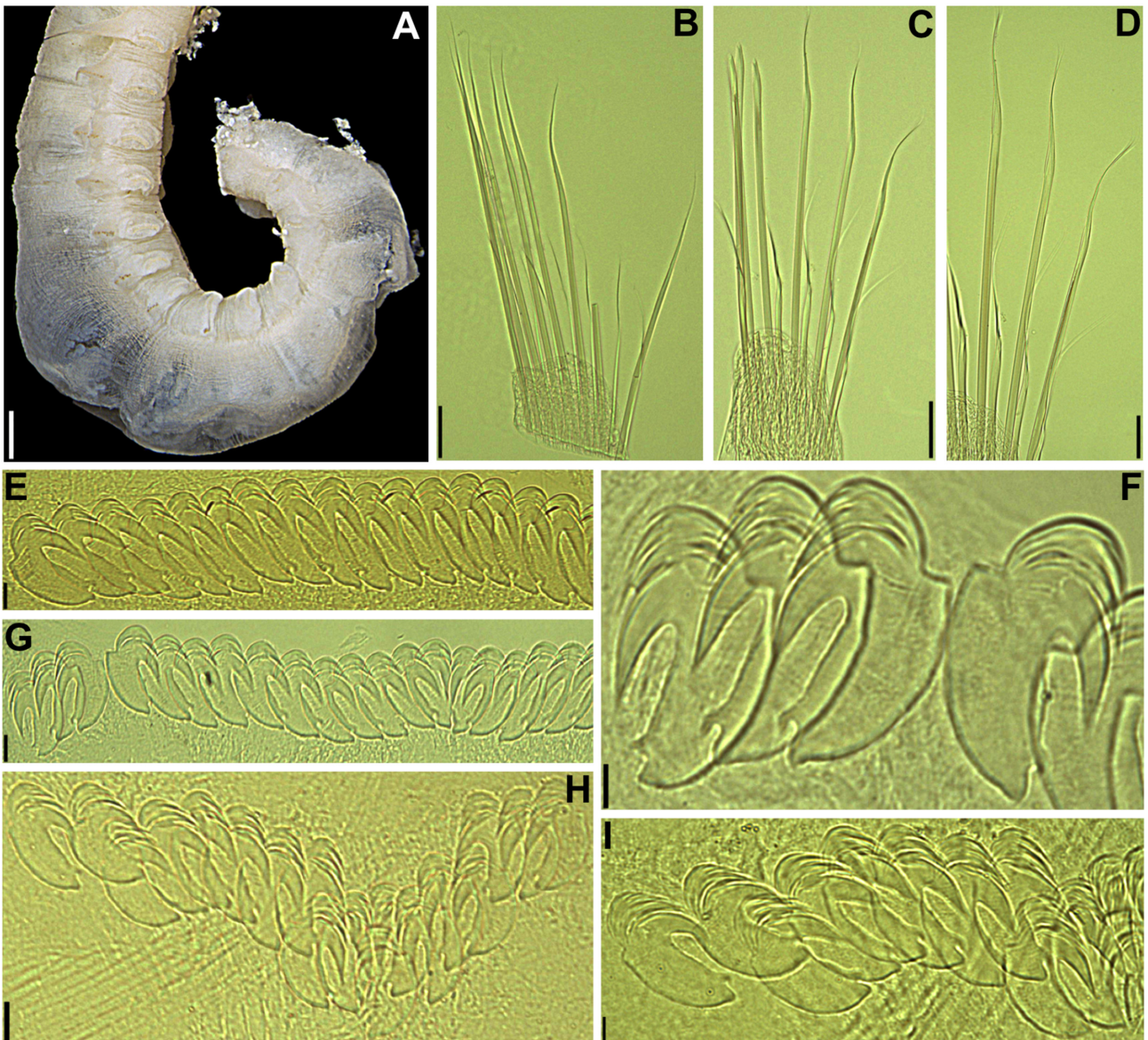


FIGURE 7. *Euthelepus aserrula* n. sp., holotype AM W.47509. A. Posterior end, right lateral view; B. Notochaetae, segment 5; C–D. Notochaetae, segment 17 under progressively higher magnifications; E–I. Uncini, segments 6, 17 and 30, the latter two under lower and higher magnifications. Scale bars: A = 300 μ m, B–C= 80 μ m, D = 50 μ m, E, G–H = 10 μ m, F, I = 5 μ m.

Remarks. *Thelepus* is very similar to *Streblosoma*, the only difference between these genera being the segment from which notopodia begin, segment 2 in *Streblosoma*, segment 3 in *Thelepus*. Like *Streblosoma*, this is a large genus, present worldwide, currently containing more than 40 species, of which seven are recorded from Australia. Of these seven species, one was originally described from Lizard Island, *T. alatus* Hutchings & Glasby, 1987, but this species was not found among the material examined for the present study.

Key to the species of *Thelepus* found in Lizard Island

1. Notopodia present for 50–52 chaetigers; anterior uncinal tori as lamellar pinnules *T. alatus*¹
- Notopodia present for 31–35 chaetigers; anterior uncinal tori as glandular ridges *T. paiderotus* n. sp.

-
1. not found in the present study.

***Thelepus paiderotos* n. sp.**

(Figs 1D–F, 8–11)

Type material. Holotype: AM W.44968, MI QLD 2437, complete, in excellent state of preservation, but small and with colourless tentacles, ~18 mm long, 1.8 mm maximum width, notopodia extending to segment 35. Paratypes: AM W.44282, MI QLD 2368, mounted on SEM pin; AM W.47526, Lizard Island north east face, 14°40'S, 145°28'E, dead *Acropora*, 1 m, 6 Jan 1975, complete, in good condition, 65 segments, ~7 mm long, 1.5 mm wide, notopodia extending to segment 34; AM W.45452, MI QLD 2446, complete, in good state, 8 mm long, 1 mm maximum width, notopodia extending to segment 34.

Other material examined. AM W.44283, MI QLD 2368, photographed; AM W.44944, MI QLD 2410, juvenile; AM W.44950, MI QLD 2418, juvenile.

Description. Holotype with colourless buccal tentacles, several specimens with dark pink tentacles; preserved body uniformly beige to yellowish, without distinct patterns of pigmentation (Fig. 8A–J). In life, reddish grey body with white glandular surfaces and pink tentacles (Fig. 1D–F). Transverse prostomium attached to dorsal surface of upper lip; basal part with two well separated irregular rows of eyespots, both continuous throughout, eyespots more separated from each other mid-dorsally; distal part of prostomium low, restricted to base of upper lip (Figs 1D; 8A–B, E–H; 10A–B, E–J; 11A). Few buccal tentacles remaining in holotype, thick and deeply grooved, reaching around segments 15–20 (Figs 1A; 8A–I; 10A–J). Peristomium forming lips and continuing dorsally, with nuchal organs as a ciliated row on anterior margin (Fig. 10F–H, J); upper lip short, thick, hood-like, about as long as wide, or slightly longer than wide; lower lip short, swollen, rectangular (Figs 8A, C–G, I; 10A–J; 11A–B). Segment 1 narrow, with ventral lobe marginal to mouth; segment 2 with thickened, raised anterior margins laterally and ventrally, forming continuous crest across ventrum (Figs 8A–I; 10A–J; 11A). Three pairs of branchiae, on segments 2–4, each with relatively few independent filaments with blunt tips, with wide medial gap; short filaments, longest ones reaching half of body width at corresponding segments, or slightly longer, longer in live specimens (Fig. 1D–F); branchial filaments of segment 2 extending laterally beyond level of notopodia, those of segments 3 and 4 arranged in oblique rows anterior and dorsal to notopodia (Figs 1D–F; 8A–B, E–H; 10A–D, F–H, J; 11B–C); branchial filaments originating from swollen, strongly ciliated patches (Fig. 11B–C). Ventral surface markedly glandular between neuropodia, swollen, smooth, until around segment 16 (Figs 1D–F; 8A–D, F, H–I; 10A–B, E–J) with deep intersegmental grooves. Notopodia extending until segments 31–35 (35 in holotype); rectangular and bilobed notopodia, lobes of equal size, notopodia progressively longer and inserted more laterally on segments 3–6, then longitudinally aligned (Figs 8A–C, E–H; 10A–D, F–H, J–K). Winged notochaetae in both rows, wings broader on one margin, rounded, with thin marginal blade under SEM, those from anterior row half length of those from posterior row, chaetae of posterior row with wings on distal 1/2–1/3 only (Figs 9A, D; 11D–K). Neuropodia as low, fleshy ridges on anterior segments, progressively more raised from body wall, as raised pinnules after notopodia terminate. Uncini with elongate base, terminal dorsal button, prow absent and crest with two rows of secondary teeth, two teeth in basal row and shorter, irregularly-sized teeth in distal row, between teeth of basal row (Figs 9B–C, E–I; 11L–M). Nephridial and genital papillae on segments 5–7, between parapodial lobes (Fig. 10F–H, J). Pygidium crenulate (Fig. 8A–B, J).

Variation. Amongst the type series the buccal tentacles vary from colourless to dark pink. We believe that they all represent the same species with the pigmentation varying between individuals and the length of time preserved. No other differences could be found. Live material has been seen with (Fig. 1D–F) and without coloured tentacles.

Remarks. *Thelepus paiderotos* n. sp. is characterized by relatively few branchial filaments which arise from ciliated thickened pads, and a limited number of pairs of notopodia (31–35). To date seven species of *Thelepus* occur in Australia, of these only one, *T. alatus* Hutchings & Glasby, 1987, is known from the Great Barrier Reef and has many more pairs of notopodia, 50–52 pairs, and abdominal uncinal tori as lamellae-like pinnules, whereas *T. paiderotos* n. sp. lacks such enlarged pinnules. The remaining six species, except for *T. praecox* Hutchings & Glasby, 1987, have three pairs of branchiae like *T. paiderotos* n. sp. *Thelepus boja* Hutchings & Glasby, 1987 has membranous collars on segments 6 and 7 which are lacking in *T. paiderotos* n. sp. Of the others only *T. extensus* Hutchings & Glasby, 1987 has a similar number of notopodia, in contrast *T. australiensis* Hutchings & Smith, 1997 has 66 pairs of notopodia, the others, *T. robustus* (Grube, 1878) and *T. plagiostoma* (Schmarda, 1861), have notopodia continuing almost to the pygidium; although *T. paiderotos* n. sp. does share with *T. robustus* the branchiae arising from raised pads. *Thelepus extensus* differs from *T. paiderotos* n. sp. in having far more short branchial filaments on segments 2–4, and while the ventrum of anterior segments is glandular in both species, there are no deep intersegmental grooves separating the glandular areas in *T. extensus*.

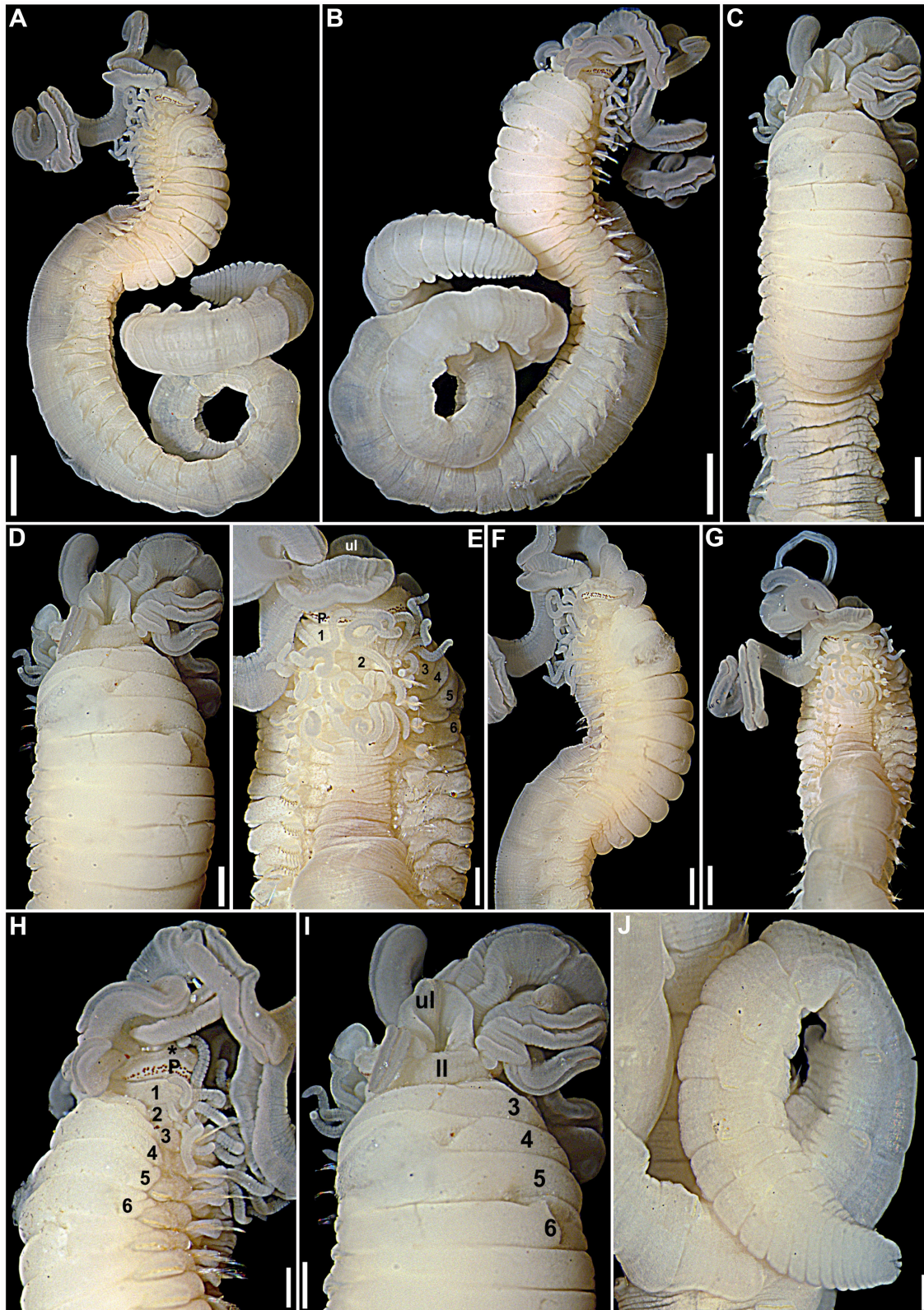


FIGURE 8. *Thelepus paiderotos* n. sp., holotype AM W.44968. A–B. Entire worm, right and left lateral views, respectively; C–D, F–G. Anterior end, ventral (2), right lateral and dorsal views, respectively; E, H–I. Close ups of anterior end, dorsal, left lateral and ventral views, respectively; J. Posterior end, right lateral view. Abbreviations: numbers refer to segments, ll = lower lip, P = basal part of prostomium, ul = upper lip, * = distal part of prostomium. Scale bars: A–B = 0.7 mm, C, G = 0.5 mm, D = 0.3 mm, E–F, H–J = 0.2 mm.

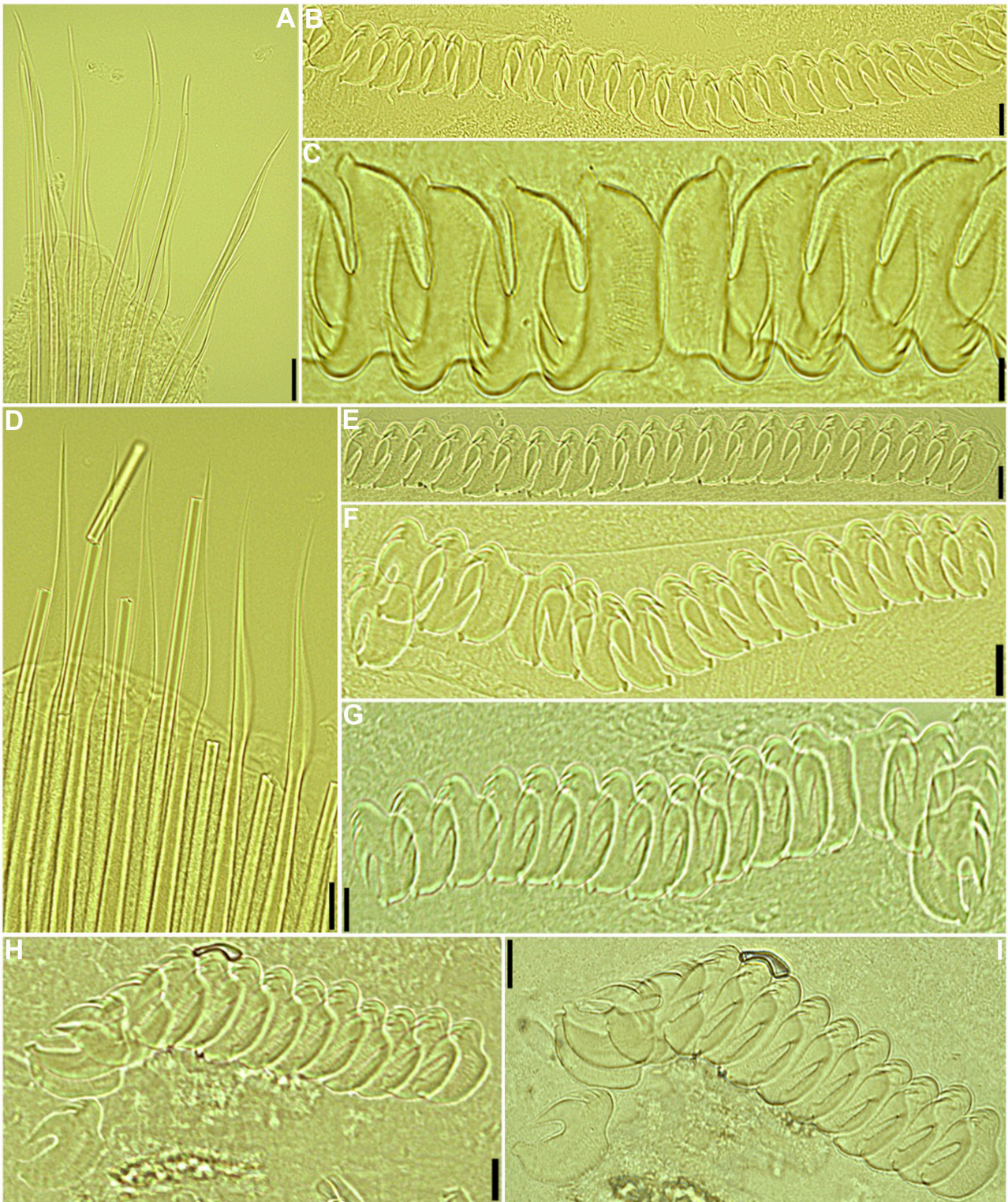


FIGURE 9. *Thelepus paiderotos* n. sp., paratype AM W.45452. A. Notochaetae, segment 7; B–C. Uncini, segment 7 under progressively higher magnifications; D. Notochaetae, segment 12; E–I. Uncini, segments 16, 34, 35 and 46, respectively, latter under two magnifications. Scale bars: A = 30 μ m, B = 15 μ m, C = 6 μ m, D = 20 μ m, E–F = 15 μ m, G–I = 10 μ m.

Etymology. The epithet “*paiderotos*”, Greek word for rosy flowers, refers to the pink tentacles often present in large specimens when alive, sometimes preserved after fixation.

Habitat. In amongst coral rubble in back-reef situation in depths of 3–15 m.

Type locality. Casuarina Beach, near water intake pipes, 14°40'46"S, 145°26'49"E, Lizard Island, Great Barrier Reef, Queensland, Australia.

Distribution. Known only from Lizard Island.

Family Trichobranchidae Malmgren, 1866

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part sometimes with eyespots; distal part restricted to base of upper lip, or extending until near anterior margin of lip. Buccal tentacles of one or two types, uniformly cylindrical and/or distally expanded, spatulate. Peristomium forming lips, sometimes continuing dorsally as narrow annulation; circular, straight to convoluted upper lip, about as long as wide; lower lip short or expanded; peristomial lobes present or not. Short anterior segments, segment 1 frequently not visible dorsally; anterior margin of anterior segments with lobes as low even-length collars covering posterior margins of preceding segments, at least ventrally. Branchiae present, 2–3 pairs beginning from segment 2, each pair with single, thick and elongate, tapered or foliaceous filament on either side of pairs, or all fused in single 4–5 lobed structure originating mid-dorsally between segments 2–3. Anterior body slightly glandular ventrally, smooth and not swollen, ventro-lateral pads or mid-ventral shields absent. Notopodia beginning from segments 3–6, typically terminating at segment 20; short, conical, not bilobed notopodia, chaetae emerging on top. Narrowly-winged notochaetae in both rows throughout. Neuropodia beginning on same segment as notopodia or slightly posteriorly; sessile neuropodia until termination of notopodia, neurochaetae emerging directly from body wall, as foliaceous pinnules after termination of notopodia. Anterior neurochaetae as long handled, acicular uncini, arranged in single, straight rows, sometimes with irregular alignment between uncini; neurochaetae as avicular uncini after termination of notopodia, with secondary teeth originating on top and laterally to main fang; first 1–2 pairs of neuropodia with acicular spines instead of uncini in one genus. Nephridial papillae on segment 3 usually present, other papillae usually inconspicuous. Pygidium smooth to slightly crenulate, sometimes bilobed.

Remarks. Trichobranchidae is characterized by the presence of lobes as low ventral collars and neuropodia bearing acicular uncini on thoracic segments. There has been speculation over time as to whether this group should be considered as a family of its own, or a subfamily of Terebellidae (Malmgren 1866; Hesse 1917; Fauvel 1927; Day 1967; Rouse & Pleijel 2001; Garraffoni & Lana 2008). Following Nogueira *et al.* (2013), the group is treated here as a separate family.

Trichobranchidae is a small family, of three genera only, differentiated by the morphology and number of pairs of branchiae. *Octobranchus* Marion & Bobretzky, 1875 has four pairs of branchiae with variable morphology, *Terebellides* Sars, 1835 has a single mid-dorsal 1–5 lobed lamellate branchia (Muir 2011) inserted on a branchial stem between segments 2 and 3, while *Trichobranchus* Malmgren, 1866 has 2–3 pairs of branchiae, each as a single elongate and distally tapered filament on each side.

The family has not previously been found on the Great Barrier Reef.

Key to the Genera of Trichobranchidae found in Lizard Island

1. Branchiae as single mid-dorsal five-lobed lamellate structure; first 1–2 pairs of neuropodia bearing acicular spines *Terebellides*
- Two or three pairs of branchiae, each as single stout and elongate filament at either side; all thoracic neuropodia bearing acicular uncini *Trichobranchus*

Genus *Terebellides* Sars, 1835, emended

Terebellides.—Hutchings & Peart 2000: 238–239; Muir 2011: 144.

Type-species. *Terebellides stroemii* Sars, 1835, by monotypy.

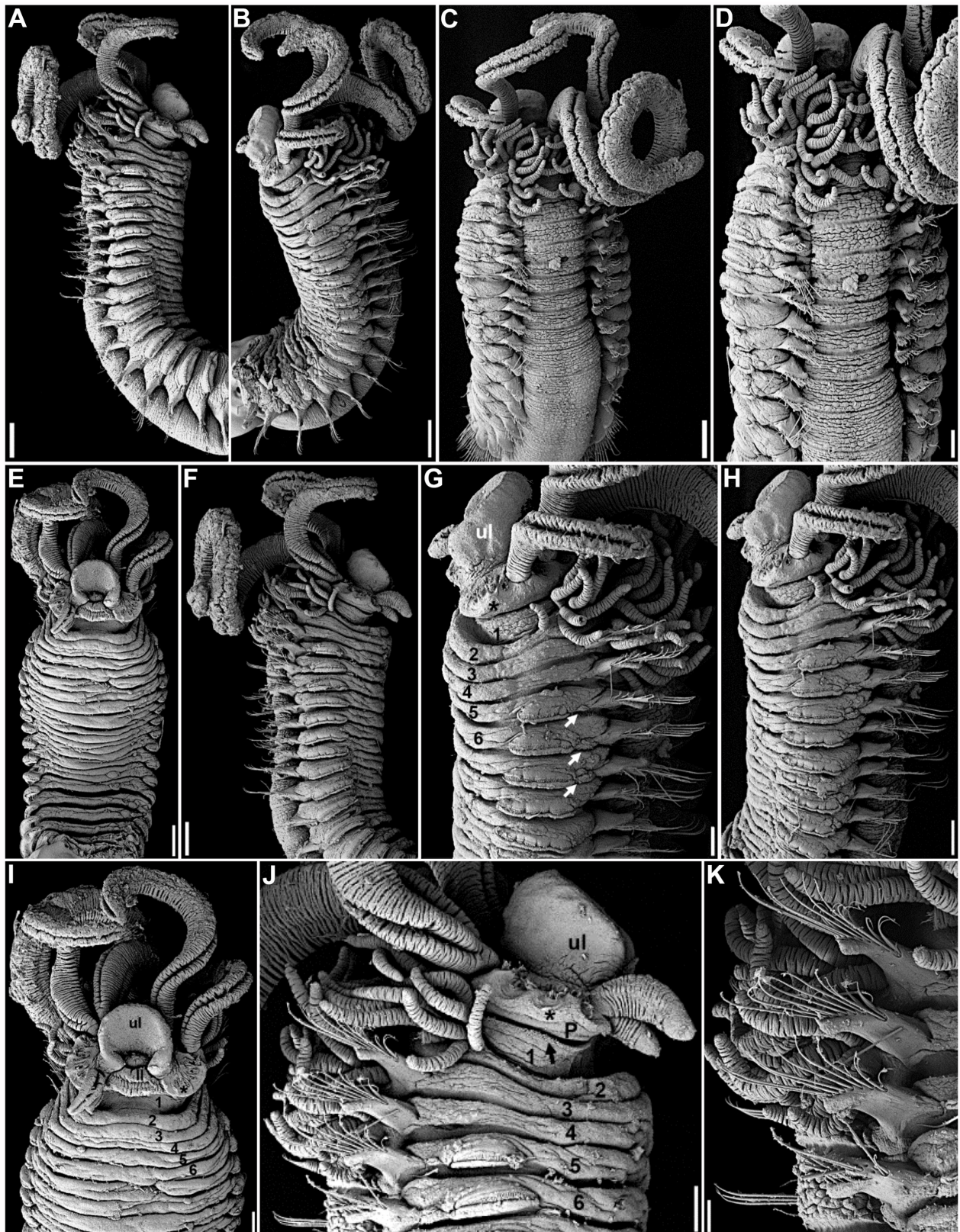


FIGURE 10. *Thelepus paiderotus* n. sp., AM W.44282. A–F. Anterior end, right and left laterals, dorsal in progressively closer views, ventral and right lateral views, respectively; G–J. Close ups of anterior end, left lateral in progressively closer views, ventral and right lateral views, respectively, arrows in G point to nephridial/genital papillae, arrow in J points to nuchal organ; K. Notopodia of segments 3–6. Abbreviations: numbers refer to segments, ll = lower lip, P = basal part of prostomium, ul = upper lip, * = distal part of prostomium. Scale bars: A–B, E = 0.5 mm, C, F = 0.4 mm, D, H–J = 0.2 mm, G = 0.3 mm, K = 0.1 mm.

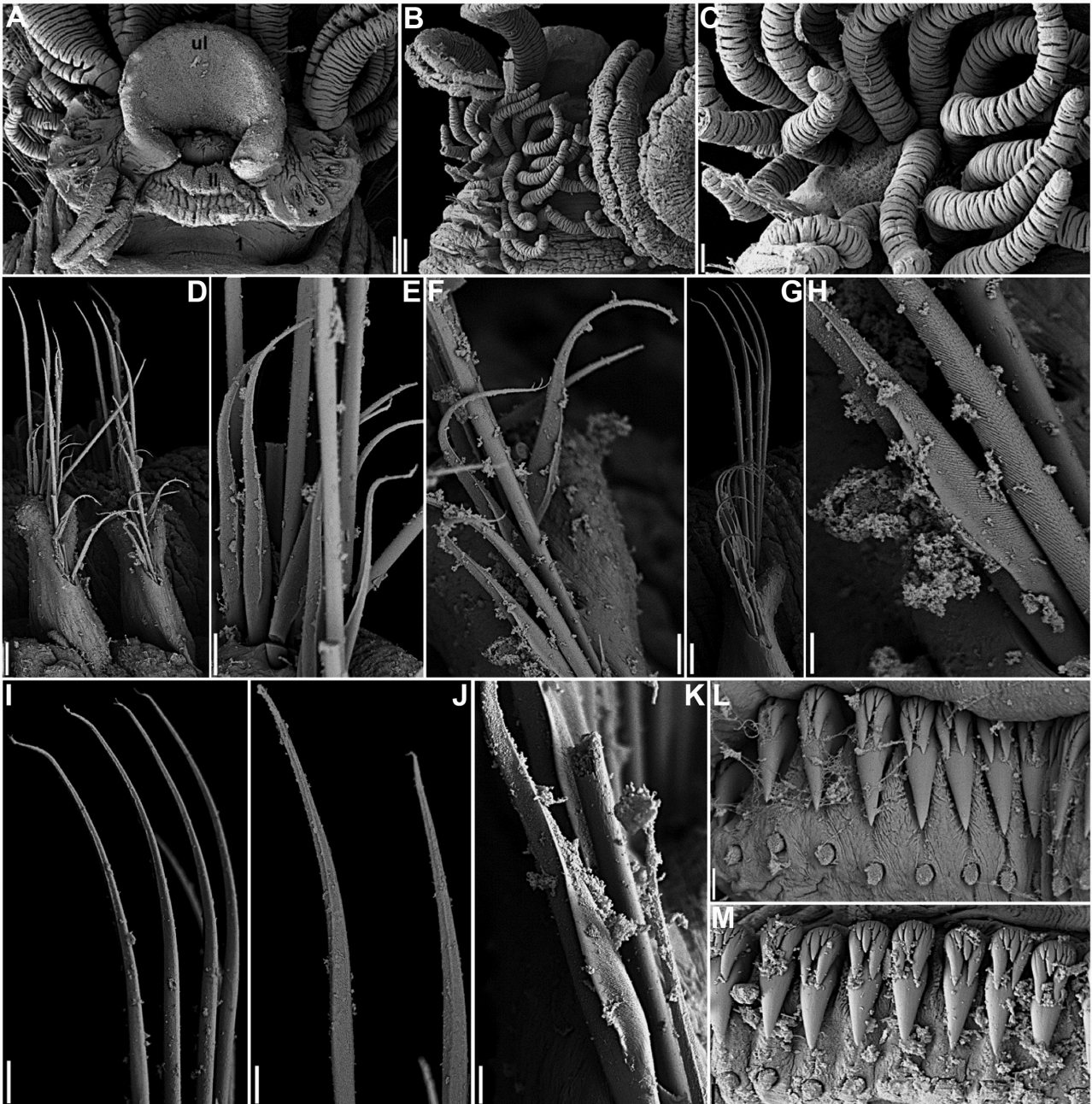


FIGURE 11. *Thelepus paiderotos* n. sp., AM W.44282. A. Close up of oral area; B–C. Close ups of anterior end, dorsal view, showing origin of branchiae under progressively higher magnifications; D–E. Notopodia, segments 7–8 and 17, respectively; F–H, K. Notochaetae from anterior row, segments 7 and 8, respectively, latter under three progressively higher magnifications; I–J. Notochaetae from posterior row, segment 17, under progressively higher magnifications; L–M. Uncini, segments 7 and 26. Abbreviations: ll = lower lip, ul = upper lip, 1 = segment 1, * = distal part of prostomium. Scale bars: A = 150 μ m, B = 200 μ m, C = 60 μ m, D = 70 μ m, E = 40 μ m, F–J = 20 μ m, K = 10 μ m, L = 7 μ m, M = 5 μ m.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part without eyespots; distal part extending along dorsal margin of upper lip until near anterior margin. Buccal tentacles usually of two types, uniformly cylindrical and expanded at tips. Peristomium forming lips, continuing dorsally as narrow annulation; relatively large upper lip, circular and slightly convoluted; lower lip expanded, forming scoop-like process. Short anterior segments, segment 1 visible ventrally, posterior to lower lip, sometimes also conspicuous dorsally; following anterior segments with lobes as low ventral collars. Single 1–5 lobed lamellate branchia inserted by thick branchial stem between segments 2–3 or 2–4. Anterior body poorly glandular ventrally, smooth. Notopodia

beginning from segments 3 or 4, terminating on segment 20; if beginning from segment 3, first pair shorter than following ones; short, conical notopodia, not bilobed. Narrowly-winged notochaetae in both rows, wings inconspicuous under light microscopy, visible as short and fine hairs under SEM. Neuropodia beginning from segments 7 or 8, uncini emerging directly from body wall. Neurochaetae of first 1–2 segments as thin, distally tapered acicular spines, following neuropodia with acicular uncini until end of notopodia; abdominal neuropodia as foliaceous pinnules, bearing avicular uncini. Nephridial papillae only on segment 3, genital papillae, if present, on segments 6–7, at bases of notopodia, posterior and dorsal. Pygidium smooth to slightly crenulate.

Remarks. *Terebellides* is a well known genus, characterized by the highly unusual branchia. The type species, *T. stroemii* Sars, 1835, has been reported worldwide and is clearly a case of a complex of sibling species. In a recent redescription of *T. stroemii*, Parapar & Hutchings (2014) designated a neotype, redefined this species and suggested it is restricted to Northern Atlantic waters. Work in progress utilising both molecular and morphological tools is revealing many other species currently undescribed in this region of the North Atlantic (Parapar, Hutchings & others, in prep.), all closely resembling *T. stroemii* morphologically, but differing genetically.

Hutchings & Peart (2000) reviewed this genus in Australia and described four new species, but we suspect additional species occur. This is confirmed by the present study, in which we describe a new species from Lizard Island.

***Terebellides akares* n. sp.**

(Figs 1G–H, 12–16)

Type material. Holotype: NTM W.023143, Lizard Island, S end of Coconut Beach, reef flat, 14°41'42.120"S, 145°28'11.280"E, coll. C. Glasby, 5 Apr 2008, CReefs, complete, 7 mm long, 1 mm wide, with 45 segments. Paratypes: NTM W.025894 (2, 1 mounted on SEM pin), both complete, 10 mm long, 1.5 mm wide, 45 segments, gravid; 5 mm long, 1.0 mm wide, 37 segments; AM W.45831, MI QLD 2441 (1 mounted on 2 SEM pins); AM W.47596, CReefs, intertidal, mounted on SEM pin.

Other material examined. AM W.47624, MI QLD 2205, South of Mermaid Cove, 14°38'53"S, 145°27'E, coarse coral rubble, 14.5 m, 1 Sep 2010, CReefs, LI-10-047, complete, small, 34 segments; AM W.47625, Lizard Island, MacGillivray Reef, 14°38'51"S, 145°29'16"E, coral rubble, 7–16 m, 3 Sep 2010, CReefs, LI-10-062, complete, 40–41 segments, 7 mm long, ~1.5 mm maximum width (segs 11–12); AM W.47626, MI QLD 2244, High Rock, 14°49'34"S, 145°33'08"E, coral rubble, 20 m, 11 Sep 2010, CReefs, LI-10-134, very small specimen, in poor state of preservation, with ~40 segments; AM W.44168, MI QLD 2359; AM W.44573, MI QLD 2406.

Description. In life with reddish body and dark red branchiae, with well developed vascular system, buccal tentacles colourless (Fig. 1G–H). Transverse prostomium attached to dorsal surface of upper lip; basal part without eyespots; distal part extending along dorsal margin of upper lip until near anterior margin. Buccal tentacles of two types, short tentacles uniformly cylindrical, slightly expanded at tips, long tentacles more expanded at tips, foliaceous (Figs 12A–M; 14A–G, K; 15A–B; 16A–E, H). Peristomium forming lips, continuing dorsally as narrow annulation; upper lip large, longer than wide, convoluted; lower lip developed, projecting forwards, with laterally rounded nearly straight distally marginal lobe (Figs 12B–G, I–M; 14K; 15A–B; 16B–C, E). Anterior segments, until segment 10, with thickened anterior margins lateral and ventrally, forming low lobes as short collars across ventrum covering posterior part of preceeding segment, lobes progressively shorter from segment 3; segment 1 short, conspicuous dorsally, much shorter than following segments, more developed laterally and ventrally, below expanded lower lip, with almost inconspicuous ventral collar; segment 2 dorsally thin, with main stem of branchiae, more developed laterally and ventrally; segment 3 dorsally fused to segment 2, more developed ventrally, as protruding crest, at an angle with anterior segments; following segments aligned with segment 4 (Figs 1G–H; 12A–M; 12A–M; 14A–B, K–L; 15A–B; 16B–C, E). Single 5-lobed lamellate branchia, lamellae on both sides with several rows of cilia and distal row of scattered papillae ciliated at tips; posterior pair of lobes much shorter, completely free (Figs 1H; 12A–M; 14A, C–D, G–J; 15A–B; 16A–B, D, F, H–J). Notopodia beginning from segment 3, first two pairs shorter than following ones, especially first one (Figs 12A–M; 14A–D, G, K–L; 15A–B, D–E, H–I; 16A–E); narrowly-winged notochaetae in both rows, wings barely visible under light microscopy, visible as short and fine hairs under SEM, those of chaetae of posterior row only present on distal half of chaetae; chaetae of anterior row about 2/3 length of those of posterior row (Figs 13A–D; 15D–I). Neuropodia beginning from segment 7, sessile, chaetae emerging directly from body wall. Neurochaetae of first 1–2 segments as thin,



FIGURE 12. *Terebellides akares* n. sp., holotype NTM W.023143. A–D. Entire worm, right dorso-lateral, right and left laterals, and ventral view, respectively; E–H. Anterior end, ventral, left and right laterals, and right dorso-lateral views; I–M. Close ups of anterior end, left and right lateral, each in two progressively closer views, and ventral view, respectively, unspecified arrow in J points to nephridial papilla, arrows in M point to neuropodia; N–O. Posterior end, right and left lateral views, respectively. Abbreviations: numbers refer to segments, ll = lower lip, ul = upper lip. Scale bars: A–D = 0.7 mm, E–F, H–I, K, N–O = 0.3 mm, G = 0.5 mm, J, L–M = 0.2 mm.

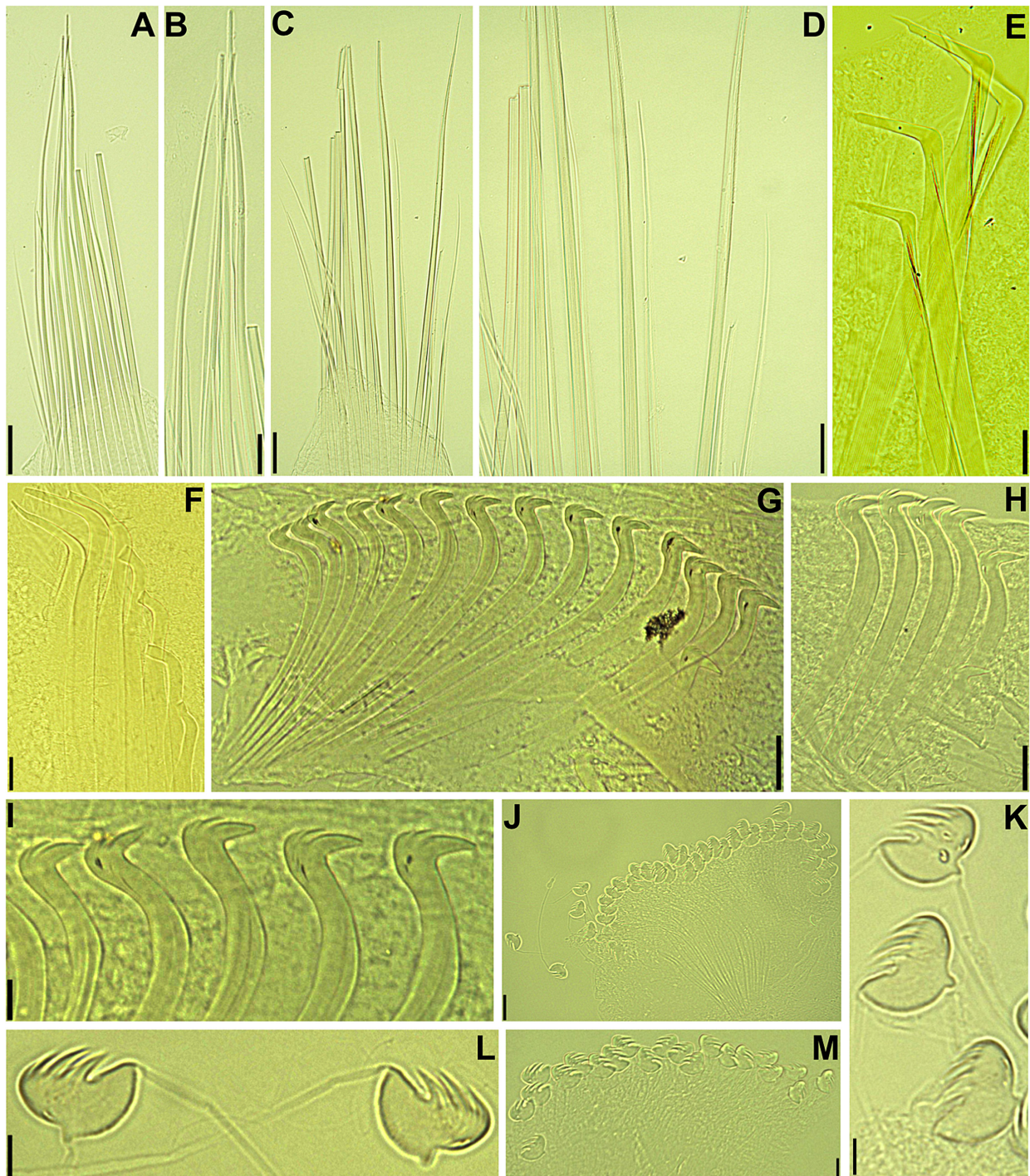


FIGURE 13. *Terebellides akares* n. sp., AM W.44168. A–D. Notochaetae, segments 8 and 16, respectively, both under progressively higher magnifications; E–F. Neuropodial spines, segments 7 and 8, respectively; G–I. Uncini, segment 15, under progressively higher magnifications; J–L. Uncini, segment 22, under lower and higher magnifications; M. Uncini, segment 33. Scale bars: A, C = 50 μm , B, E–F, H, J = 20 μm , D, G = 30 μm , I, M = 10 μm , K–L = 5 μm .

distally tapered acicular spines subdistally bent at right angle, those of first pair (segment 7) shorter and with bayonet-like tip (Figs 13E–F; 15H–I, L); following neuropodia with acicular uncini with 4 rows of secondary teeth until end of notopodia; abdominal neuropodia as foliaceous pinnules, bearing avicular uncini with 3–4 rows of secondary teeth; relatively few uncini per torus throughout (Figs 13G–M; 14A–B, K–L; 15A–C, H–N; 16B, G). Remarkably short abdomen, with compact segments, about 1/3–1/4 of extension of region with notopodia (Figs 12A–D, N–O; 14A–B; 15C). Nephridial papillae on segment 3, genital papillae on segments 6–7, not always conspicuous (Figs 15D; 16C). Pygidium smooth to slightly crenulate (Figs 12A–D, N–O; 15C).

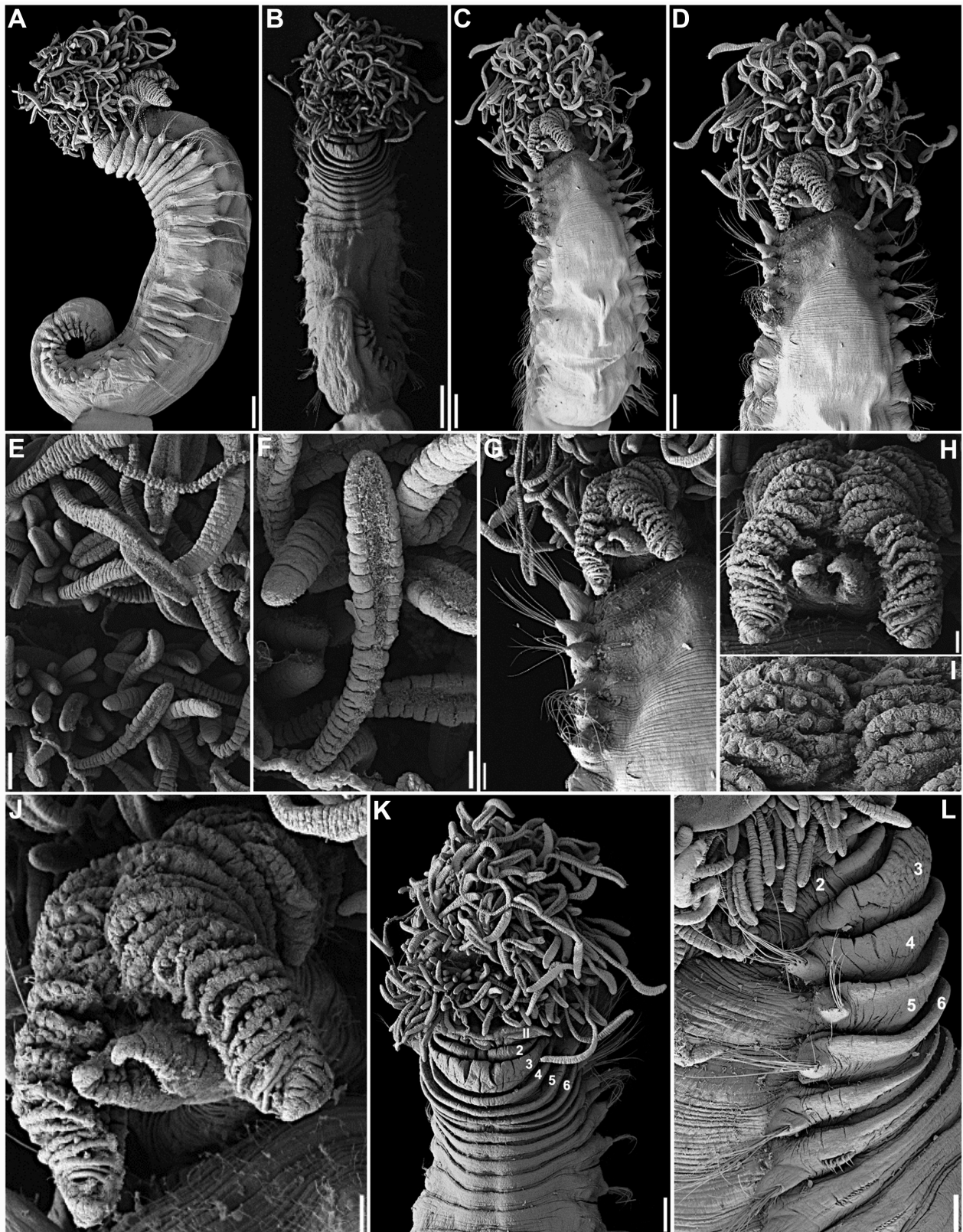


FIGURE 14. *Terebellides akares* n. sp., paratype NTM W.025894. A–B. Entire worm, left lateral and ventral views, respectively; C–D. Progressively closer views of anterior end, dorsal view; E–F. Close ups of buccal tentacles; G. Notopodia, segments 5–10; H–J. Close ups of branchia; K–L. Close ups of anterior end, left lateral view in progressively higher magnifications, ventral and right ventro-lateral views, respectively. Abbreviations: numbers refer to segments, II = lower lip. Scale bars: A = 500 μ m, B = 700 μ m, C = 400 μ m, D, K = 300 μ m, E = 100 μ m, F, I = 20 μ m, G = 150 μ m, H, J = 70 μ m, L = 200 μ m.

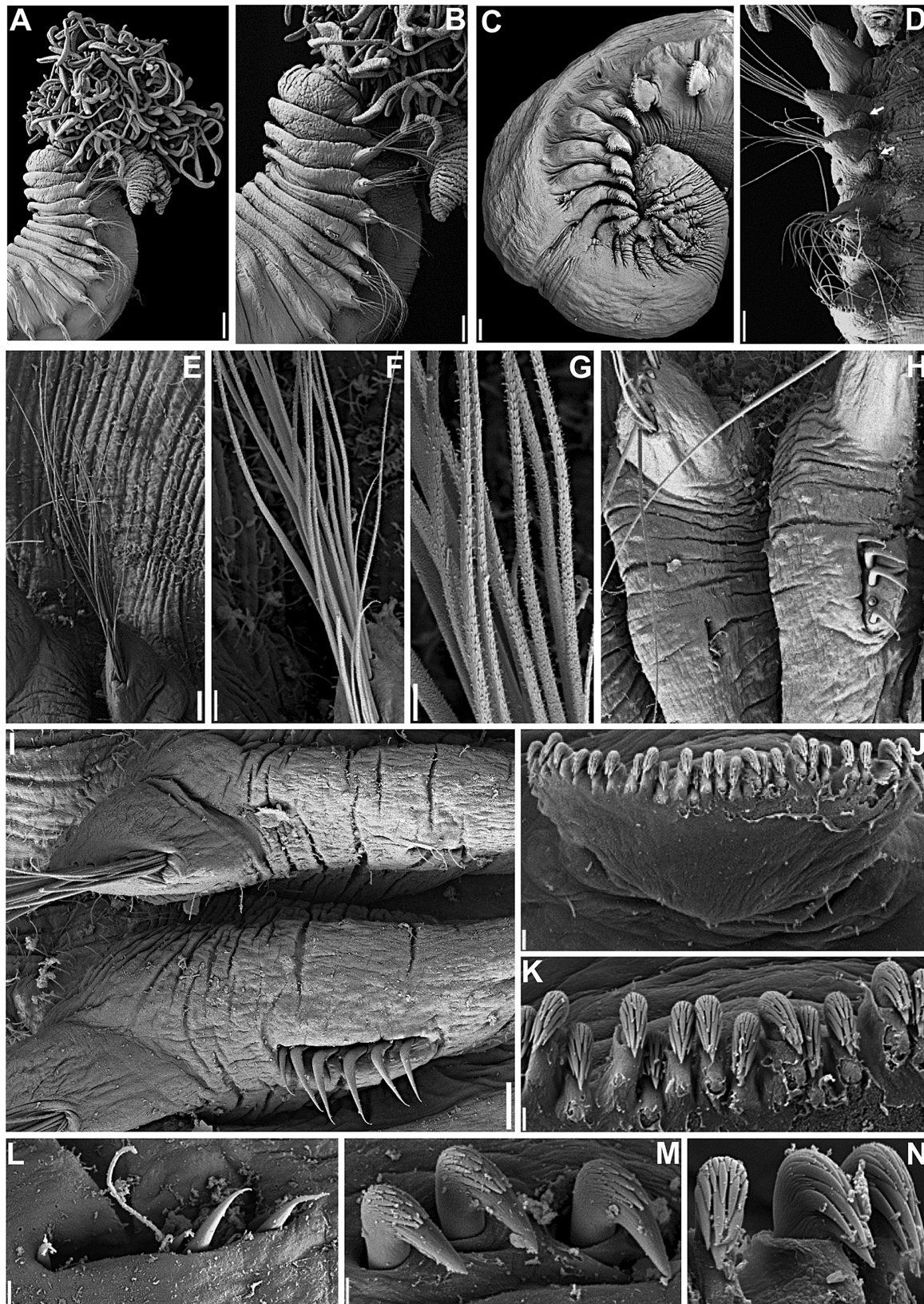


FIGURE 15. *Terebellides akares* n. sp., paratype NTM W.025894. A–B. Progressively closer views of anterior end, left lateral view; C. Posterior end, right lateral view; D. Notopodia, segments 5–10, arrows point to genital papillae of segments 6–7; E–G. Notochaetae, segment 7, in progressively closer views; H–I. Neuropodia, segments 7–8, from right and left sides of body; J. Neuropodium, segment 22; K. Uncini, segment 22; L. Neuropodial spines, segment 7; M. Uncini, segment 13; N. Uncini, segment 22. Scale bars: A = 300 μ m, B = 200 μ m, C–D = 100 μ m, E, H = 50 μ m, F = 20 μ m, G, J = 10 μ m, I = 40 μ m, K, M = 5 μ m, L = 6 μ m, N = 2 μ m.

Variation. Some specimens, such as paratype AM W.45831, examined under SEM, have a single pair of neuropodia bearing acicular spines, on segment 8, instead of two pairs, on segments 7 and 8. Those specimens are otherwise similar to animals with acicular spines on segments 7 and 8, and so we consider this as a variable character in *T. akares* n. sp. In addition, in specimens with two pairs of neuropodia with acicular spines, those of the first pair are always much shorter than spines from the second pair, indicating that they may be so small as to be difficult to see under the SEM, as they do not protrude from the body wall.

Remarks. According to Parapar & Hutchings (2014), there is another species of *Terebellides* having two pairs of neuropodia with spines, on segments 7 and 8, *T. bigeniculatus* Parapar, Moreira & Helgason, 2013. *Terebellides bigeniculatus* differs from *T. akares* n. sp. by having branchial lamellae distally smooth, lacking papillae (visible under light microscopy); neuropodial spines of segments 7 and 8 similar to each other, bent at right angle and gently tapering; abdominal neuropodia as rounded pinnules, with uncini originating all around and separated from each other by deep grooves; and smaller nephridial and genital papillae of segments 6–7. In contrast, branchial lamellae of *T. akares* n. sp. have a distal row of scattered papillae on both sides; neuropodial spines of segment 7 are bayonet-like chaetae and those of segment 8 are bent at right angle and gently tapering; and abdominal neuropodia are wider than long, with uncini only on top, with shallower grooves in between.

Currently five species are recorded from Australia and none from the Great Barrier Reef. Of these, only *T. narribri* Hutchings & Peart, 2000 and *T. woolawa* Hutchings & Peart, 2000 have five branchial lobes, all the others have four pairs. *Terebellides akares* n. sp. can be distinguished from *T. woolawa* that has all branchial lobes similar in size in contrast to our new species where the posterior pair is much shorter. *Terebellides narribri* has only the first pair of notopodia reduced, in contrast, our new species has the first two pairs much shorter and with short chaetae, whereas in *T. narribri* it is only the podia which are reduced, not the length of the chaetae. Both these previously described Australian species only have the first pair of neuropodia with acicular chaetae, whereas *T. akares* n. sp. has the first two pairs of neuropodia with such chaetae.

Etymology. The specific name “*akares*” refers to the distinctly short abdomen, with compacted segments, from the Greek word “*akares*”, meaning short.

Habitat. In amongst coral rubble in the intertidal zone.

Type locality. Reef flat at south end of Coconut Beach, 14°41'42"S, 145°28'11"E, Lizard Island, Great Barrier Reef, Queensland, Australia.

Distribution. Known only from Lizard Island and North Direction Island.

Genus *Trichobranthus* Malmgren, 1866

Trichobranthus.—Holthe 1986a: 117; 1986b: 164; Hutchings & Peart 2000: 260–261.

Type-species. *Trichobranthus glacialis* Malmgren, 1866, by monotypy.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part sometimes without eyespots; distal part at base of upper lip. Buccal tentacles all uniformly cylindrical, of two sizes in terms of thickness. Peristomium forming lips, with pair of flaring lobes; relatively short, circular upper lip; short lower lip. Short anterior segments, segment 1 dorsally inconspicuous, with large retractile mid-ventral process; following anterior segments with lobes as low ventral collars. Two or three pairs of branchiae, each with single thick and elongate filament at either side. Anterior body poorly glandular ventrally, smooth. Notopodia beginning from segments 5 or 6, terminating on segment 20; short, conical notopodia, not bilobed. Narrowly-winged notochoetae in both rows, wings inconspicuous under light microscopy, visible as short and fine hairs under SEM. Neuropodia beginning from segments 5 or 6, sessile thoracic neuropodia, uncini emerging directly from body wall; neurochaetae as acicular uncini until end of notopodia, frequently with subrostral beard; abdominal neuropodia as foliaceous pinnules, bearing avicular uncini. Nephridial and genital papillae usually inconspicuous. Pygidium smooth to slightly crenulate.

Remarks. *Trichobranthus* is characterized by the presence of peristomial lobes originating laterally to the lower lip and terminating dorso-laterally, and by a large, eversible mid-ventral process on segment 1, which, when retracted, is folded between segments 1 and 2. As discussed by Nogueira *et al.* (2010, 2013), species of this genus were considered as belonging to *Artacamella* Hartman, 1955 when the process of segment 1 is everted, and to *Trichobranthus* when it is retracted, until Garraffoni & Lana (2004) synonymised *Artacamella* with *Trichobranthus*.

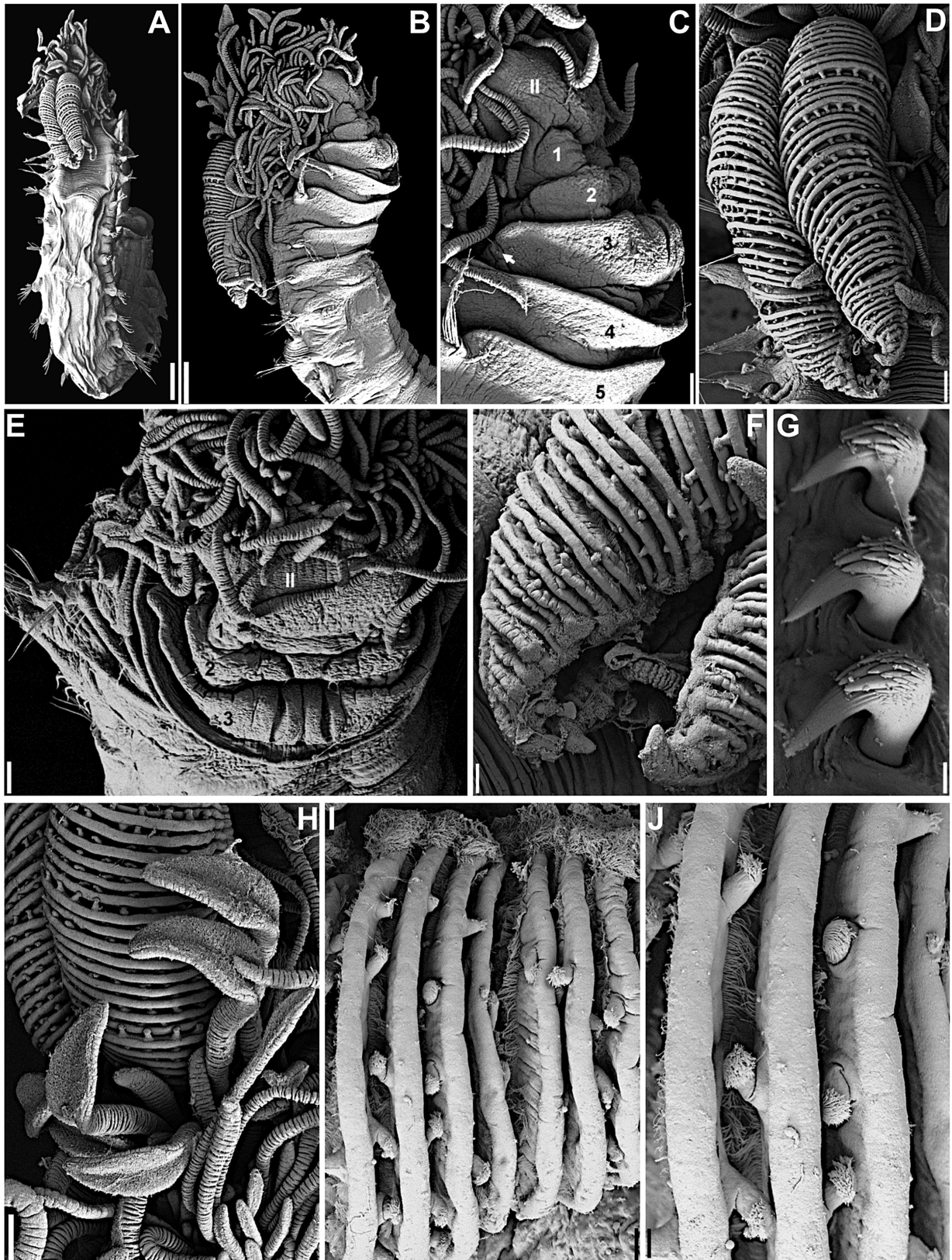


FIGURE 16. *Terebellides akares* n. sp., paratype AM W.45831. A. Anterior end, dorsal view; B–C. Anterior end, right lateral view, under progressively higher magnifications, arrow points to nephridial papilla; D, F, I–J. Close ups of branchia; E. Close up of anterior end, ventral view; G. Uncini, segment 14; H. Close up of tips of some buccal tentacles. Abbreviations: numbers refer to segments, ll = lower lip. Scale bars: A = 400 μ m, B = 300 μ m, C–E, H = 100 μ m, F = 40 μ m, G = 4 μ m, I = 20 μ m, J = 10 μ m.

The genus is currently includes eight species (Hutchings & Peart 2000), two of which described from Australia, *T. bunnabus* Hutchings & Peart, 2000 and *T. gooreekis* Hutchings & Peart, 2000, the latter species having been described from the southern Great Barrier Reef.

***Trichobranthus hirsutus* n. sp.**

(Figs 11, 17–20)

Type material. Holotype: AM W.44608, MI QLD 2399, complete, in excellent state, 6 mm long, 0.6 mm maximum width. Paratypes: AM W.47510, MI QLD 2441, mounted on SEM pin; AM W.44610, MI QLD 2399; AM W.44624, MI QLD 2413; AM W.44946, MI QLD 2410 (13, plus 1 mounted on microscope slide); AM W.45142, MI QLD 2440 (7); AM W.45143, MI QLD 2440 (3); AM W.45147, MI QLD 2441 (2); AM W.45439, MI QLD 2441; AM W.45444, MI QLD 2444.

Description. Minute worms. In life with transparent body wall, base of branchiae bright red with well developed vascular system, buccal tentacles colourless (Fig. 11). Transverse prostomium attached to dorsal surface of upper lip; basal part with large eyespots laterally; distal part low, poorly developed, at base of upper lip (Figs 17B, D–E, G, I–J; 18A, C). Deeply grooved buccal tentacles, in two thicknesses; under SEM, buccal tentacles highly ciliated on inner surface, annulated on outer side, with longitudinal track of cilia on each side (Figs 17A–B, D–E, G–J; 18A–C; 19A–K). Peristomium forming lips; short, circular upper lip, as long as wide; short lower lip, continuing to form a pair of large flaring lobes terminating dorso-laterally (Figs 17A–B, D–E, G–J; 18A–C; 19A–B, D–G, I, K). Segments 1–5 with progressively shorter lateral lobes, lobes triangular, distally rounded; anterior segments, until termination of notopodia, with thickened anterior margins laterally and ventrally, forming low lobes as short collars across ventrum covering posterior part of preceding segment; segment 1 inconspicuous dorsally, with large eversible ventral process; anterior margins of segments 2–5 thickened dorsally, as raised crests, more developed on segments 2–3 (Figs 17A–B, D–E, G–J; 18A–C; 19A–I, L). Two pairs of branchiae, on segments 2–3, each pair with single long and thick filament on either side; filaments annulated and heavily ciliated, second pair originating slightly laterally to first pair (Figs 17B, D–E, G, I–J; 18A, C; 19B–D, F–H, K). Notopodia beginning from segment 6; narrowly-winged notochaetae on both rows, wings as short and fine hairs under SEM, chaetae in anterior row ~1/3 as long as those from posterior row (Figs 18D–G; 19M; 20A–C). Neuropodia beginning from segment 6, totally sessile on thorax, uncini emerging directly from body wall, as foliaceous pinnules with well separated uncini on abdomen; few uncini per torus, ~10 until termination of notopodia, 10–15 on anterior abdominal segments, 6–8 posteriorly; neurochaetae as acicular uncini with four rows of minute secondary teeth and subrostral beard until end of notopodia (Figs 18H; 20F–I); abdominal uncini avicular, with four rows of secondary teeth (Figs 18I–J; 20J–L). Nephridial papilla absent; from segment 3, all segments with tuft of cilia between noto- and neuropodia, or corresponding position on segments 3–5 and after notopodia terminate, cilia longer on abdomen (Figs 19B, D, F–G, M; 20A, D, J). Bilobed pygidium, heavily ciliated (Figs 17A–F; 19B, D; 20D–E).

Remarks. Prior to this study ten species of *Trichobranthus* were known, of which five have two pairs of branchiae, a character shared with our new species, *T. hirsutus* n. sp. The major diagnostic characters are given in Table 4 of Hutchings & Peart (2000) and previously two species, *T. bunnabus* Hutchings & Peart, 2000 and *T. gooreekis* Hutchings & Peart, 2000, were known from Australia. Of these Australian species only *T. bunnabus*, which is only known from southern Australia, has two pairs of branchiae. *Trichobranthus hirsutus* n. sp. is a tiny species, much smaller than most species in this genus, including both previously known species from Australia, and it can easily be distinguished from *T. bunnabus* by the well developed triangular lateral lobes on segments 1–5, while in the latter species only the distal margins of the segments 2–4 are thickened. However, several species of *Trichobranthus* are poorly described as evident in Table 4 (Hutchings & Peart 2000), with some characters not being scored. This is the first record of the genus from the Lizard Island region.

Etymology. The specific name “*hirsutus*” is Latin and refers to the hairy buccal tentacles, branchiae and pygidium, and scattered tufts of cilia throughout body.

Habitat. Occurs in amongst coral rubble on intertidal reef flat.

Type locality. Coconut Beach, 14°40'52"S, 145°28'12"E, Lizard Island, Great Barrier Reef, Queensland, Australia.

Distribution. Known only from Lizard Island.



FIGURE 17. *Trichobranchus hirsutus* n. sp., holotype AM W.44608. A–B, D–E. Entire worm, ventral, left lateral and two right lateral views, respectively; C, F. Posterior end, right dorso-lateral and ventral views, respectively; G–I. Anterior end, left lateral, ventral and right lateral views, respectively; J. Close up of anterior end, right dorso-lateral view, numbers refer to segments. Scale bars: A–G, I = 0.2 mm, H, J = 0.15 mm.

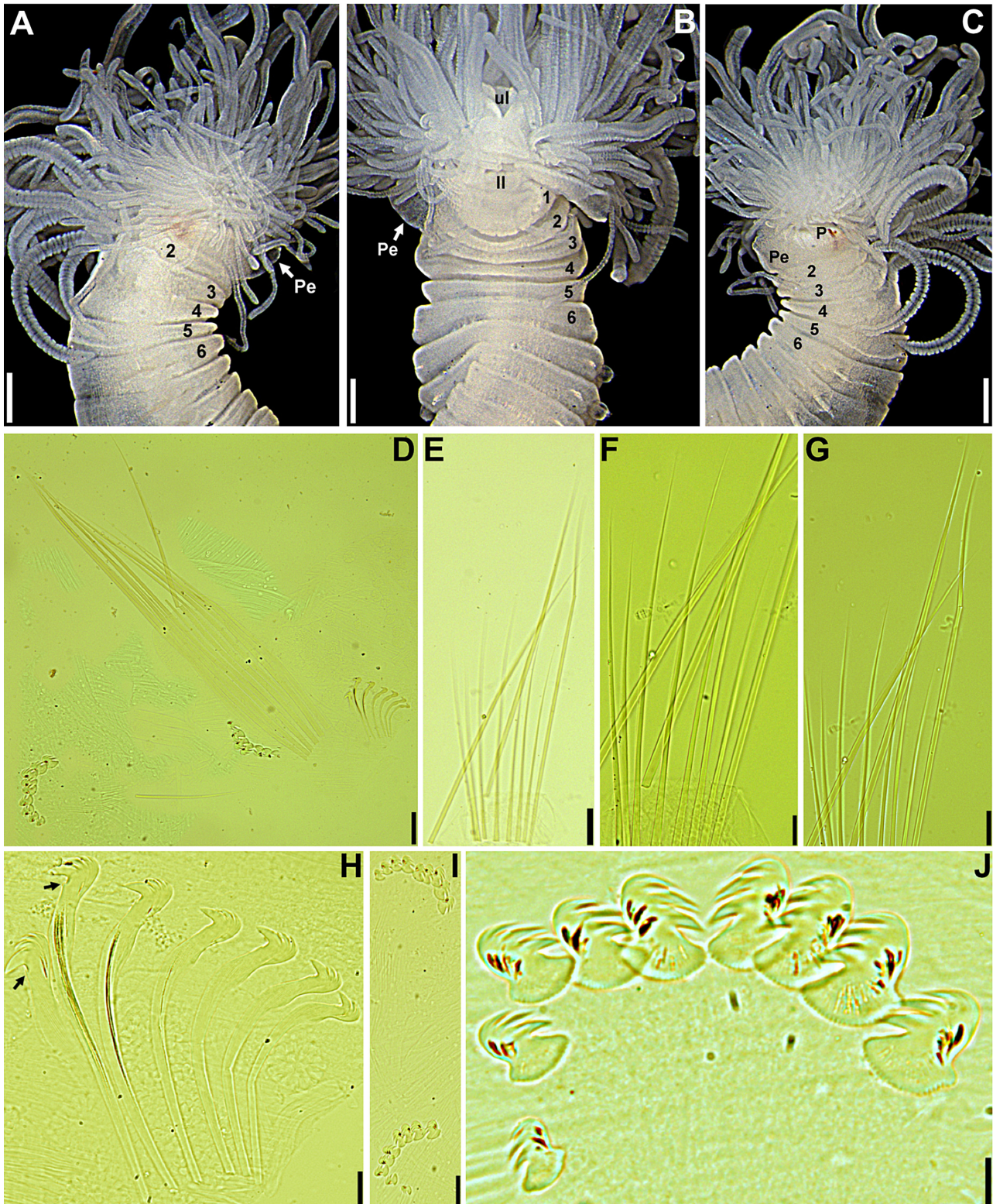


FIGURE 18. *Trichobranchus hirsutus* n. sp., holotype AM W.44608 (A–C), paratype AM W.44946 (D–J). A–C. Close ups of anterior end, right dorso-lateral, ventral and left lateral views, respectively; D. Parapodia, segments 20–22; E–G. Notochaetae, segment 17, general and chaetae from anterior and posterior rows, under higher magnifications; H–J. Uncini, segments 16, 24–25 and 25 under higher magnification, respectively. Abbreviations: numbers refer to segments, ll = lower lip, P = prostomium, Pe = peristomial lobe, ul = upper lip. Scale bars: A–C = 200 μ m, D = 50 μ m, E = 40 μ m, F = 30 μ m, G, I = 20 μ m, H = 10 μ m, J = 5 μ m.

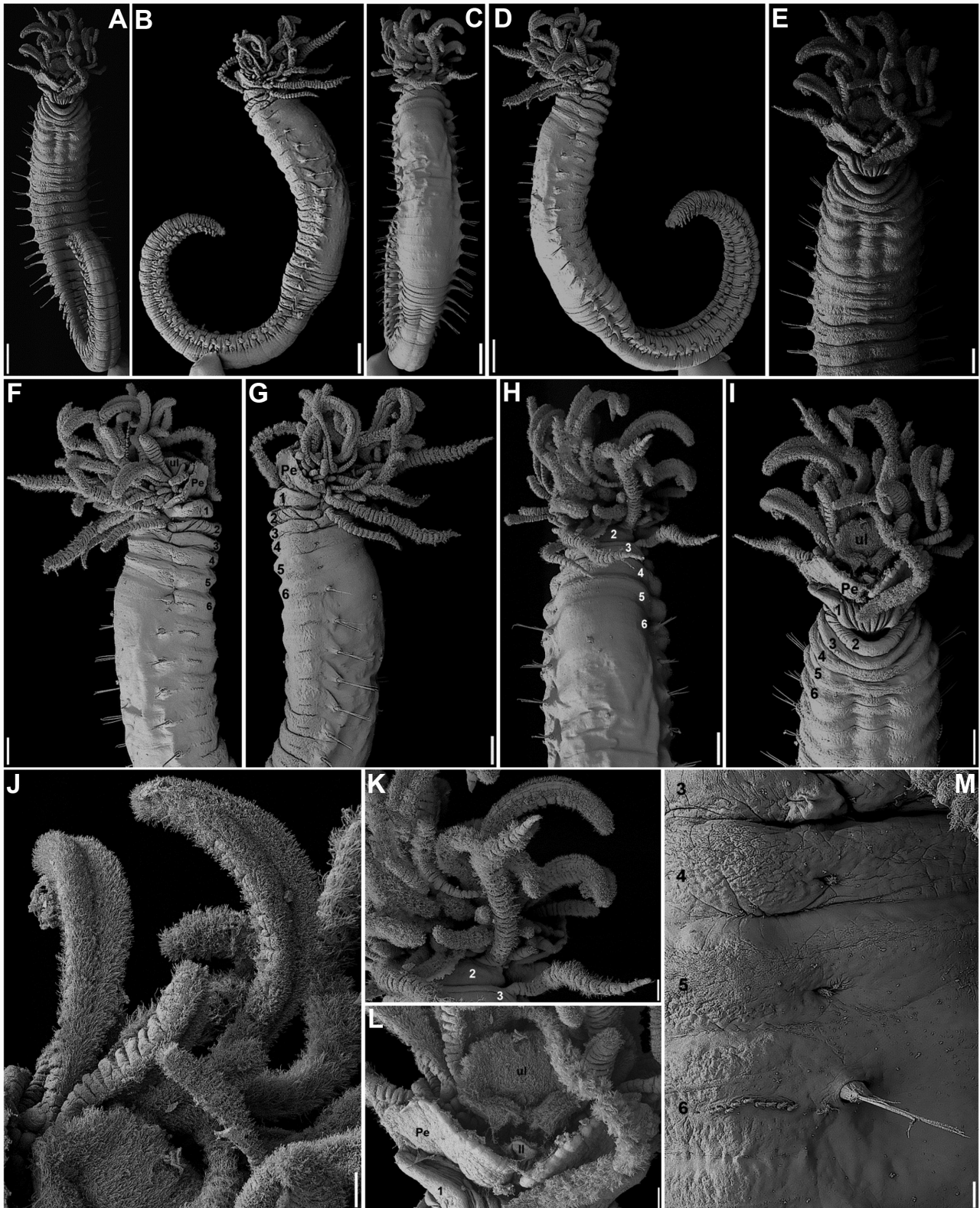


FIGURE 19. *Trichobranchus hirsutus* n. sp., paratype AM W.47510. A–D. Entire worm, ventral, left lateral, dorsal and right lateral views, respectively; E–H. Anterior end, ventral, right and left lateral, and dorsal views, respectively; I. Close up of anterior end, ventral view; J–M. Close ups of some tentacles, origin of branchiae, oral area, and segments 3–6, left lateral view, respectively. Abbreviations: numbers refer to segments, ll = lower lip, Pe = peristomial lobe, ul = upper lip. Scale bars: A–D = 200 μ m, E–I = 100 μ m, J–K = 30 μ m, L = 40 μ m, M = 20 μ m.

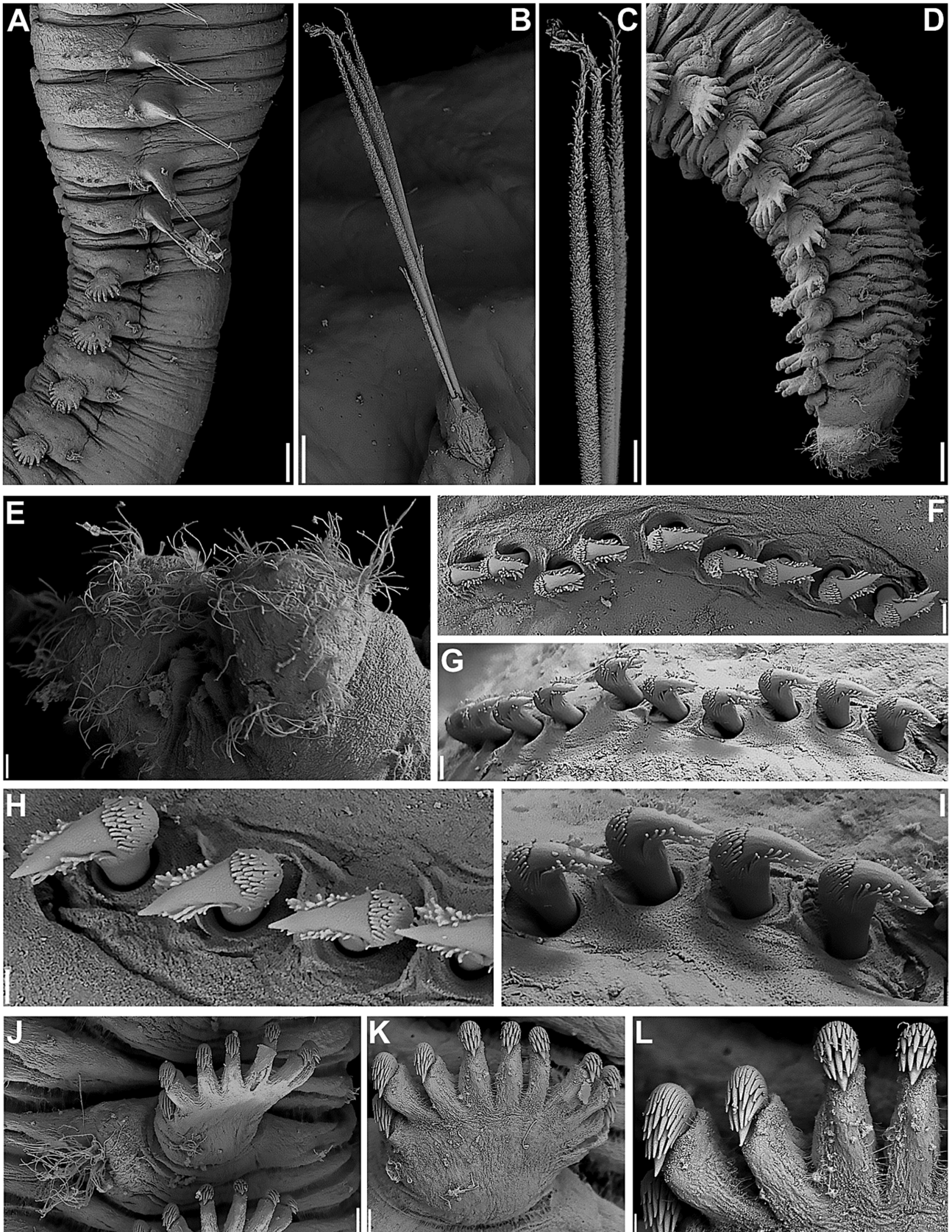


FIGURE 20. *Trichobranthus hirsutus* n. sp., paratype AM W.47510. A. Transition between thorax and abdomen, left lateral view; B–C. Progressively closer views of the notochaetae of segment 10; D. Posterior end, left lateral view; E. Pygidium, frontal view; F–I. Uncini, segment 6, from both sides of body, in progressively closer views; J. Posterior neuropodium; K–L. Progressively closer views of uncini of segment 21. Scale bars: A = 50 μ m, B = 15 μ m, C = 10 μ m, D = 30 μ m, E = 6 μ m, F = 4 μ m, G = 3 μ m, H–I, L = 2 μ m, J = 7 μ m, K = 5 μ m.

Discussion

This paper illustrates the previously hidden polychaete diversity in the Lizard Island region. Neither Telothelepodidae nor Trichobranchidae have previously been recorded from the Great Barrier Reef and their findings in the present study highlight the value of dedicated workshops to documenting the fauna. It should also be noted that soft sediments between reefs were poorly sampled, including the Great Barrier Reef lagoon, which would be expected to yield more diversity of these families, as all of them have species which live in soft sediments. Such sampling would almost certainly increase the number of species known from this region.

Acknowledgements

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