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Terebellidae (Annelida, Terebelliformia) from Lizard Island, Great Barrier Reef, Australia

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Table of contents

Abstract 485
Key words 485
Introduction 485
Material and methods 485
Taxonomy account 489
Key to the genera of Terebellidae found in Lizard Island 490
Genus *Nicolea* Malmgren, 1866 490
Key to the species of *Nicolea* found in Lizard Island 491
Nicolea murrayae n. sp. 491
Nicolea vaili n. sp. 495
Genus *Terebella* Linnaeus, 1767 498
Terebella tantabiddycreekensis Hartmann-Schröder, 1980 501
Genus *Reteterebella* Hartman, 1963 501
Key to the known species of *Reteterebella* 504
Reteterebella queenslandia Hartman, 1963 504
Reteterebella lirrf n. sp. 506
Genus *Pista* Malmgren, 1866 509
Key to the species of *Pista* found in Lizard Island 510
Pista anneae n. sp. 510
Pista chloroplokamia n. sp. 516
Pista kristiani n. sp. 522
Genus *Lanicides* Hessle, 1917 525
Key to the Australian species of *Lanicides* 526
Lanicides rubra n. sp. 527
Genus *Lizardia* n. gen. 529
Lizardia quasimodo n. sp. 531
Genus *Pistella* Hartmann-Schröder, 1996 531
Key to the Australian species of *Pistella* 534
Pistella franciscana n. sp. 534
Genus *Eupolymnia* Verrill, 1900 539
Key to the Australian species of *Eupolymnia* 540
Eupolymnia chlorobranchiata n. sp. 540
Genus *Lanicola* Hartmann-Schröder, 1986 544
Key to the Australian species of *Lanicola* 545
Lanicola rectangulata n. sp. 545
Genus *Loimia* Malmgren, 1866 545
Key to the species of *Loimia* found in Lizard Island 548
Loimia tuberculata n. sp. 548
Loimia keablei n. sp. 554
Loimia juani n. sp. 558
Loimia pseudotriloba n. sp. 561
Genus *Lanice* Malmgren, 1866 567

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Key to the Australian species of *Lanice* 567
Lanice viridis n. sp. 568
Discussion 472
Acknowledgements 472
References 574

Abstract

In a survey of the polychaetes of the Lizard Island region, sixteen new species of terebellids, plus one previously described species, were found from material collected during the two week long Lizard Island Taxonomic Workshop in 2013, along with material collected from previous projects carried out at Lizard Island. This included the CReefs Project (http://www.aims.gov.au/creefs/field-program.html), of which Lizard was one of the nodes. Those species are distributed as follows: one species of each of the following genera *Eupolymnia* Verrill, 1900, *Lanice* Malmgren, 1866; *Lanicides* Hessle, 1917, *Lanicola* Hartmann-Schröder, 1986, *Pistella* Hartmann-Schröder, 1996, *Reteterebella* Hartman, 1963, and *Terebella* Linnaeus, 1767; two species of *Nicolea* Malmgren, 1866; three species of *Pista* Malmgren, 1866 and four of *Loimia* Malmgren, 1866, together with another new species, belonging to the new genus *Lizardia* n. gen. Keys for identification of these genera and species are provided, together with generic diagnoses and full descriptions for all species; for each new species, comparisons with the morphologically most similar congeners are provided. A redescription of *Reteterebella queenslandia* Hartman, 1963 is also included.

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 workshop funded by the Lizard Island Reef Research Foundation, held at the Lizard Island Research Station, a facility of the Australian Museum. The purpose of the workshop was to document some of the polychaete fauna of Lizard Island, on the northern Great Barrier Reef.

Prior to this study, Hutchings & Glasby (1986, 1987, 1988) had described eleven species of Terebellidae *sensu latu* from Lizard Island, but in this paper we describe 16 new species belonging to 11 genera, including one new genus, within the family Terebellidae Grube, 1850, as recently redefined by Nogueira *et al*. (2013). The species belonging to the other families of Terebellidae *sensu latu* are described in two other papers in this volume (Hutchings *et al.* 2015; Nogueira *et al.* 2015a), and also in another paper (Nogueira *et al.* 2015b).

While polychaetes are abundant around Lizard Island and on the Great Barrier Reef, they have been poorly documented and no comprehensive surveys have been carried out in this region (Hutchings 2008). They occur within coral substrates, but also are abundant in the soft sediments between reefs. Some of our new species are described from a single specimen each and hopefully future studies will provide information on intraspecific variation within these species.

The details of the morphology of Terebellidae *sensu latu* were thoroughly discussed by Nogueira *et al*. (2010), and the internal relationships within this group were recently studied by Nogueira *et al*. (2013) and Fitzhugh *et al.* (2015), among others.

Material and methods

During the workshop (12–23 August, 2013), collections were made daily by snorkelling and SCUBA diving, from the intertidal zone to ~30 m deep, covering most types of habitats found in the Lizard Island and surrounding areas, including coral reefs, mangroves and sandy beaches, with sandy and coral rubble bottoms (see Ribas & Hutchings, 2015, *Zootaxa* 4019, for location of sampling sites and their co-ordinates). Coral rubble and coral pieces were broken up by using a hammer, polychaetes were sorted alive under a stereomicroscope, relaxed in magnesium chloride solution and selected specimens of some species were photographed alive by Alexander Semenov; those photos are included in Figs 1–3. We provide herein photos of the holotypes of several of our new species alive and after preservation, under stereomicroscope. This allowed us to include colour notes for many species, which have not been included in previously described terebellid species from Australia.



FIGURE 1. Live specimens. A–B. *Nicolea murrayae* n. sp. AM W.44603, MI QLD 2397; C. *Nicolea vaili* n. sp. AM W.44487, MI QLD 2335; D. *Pista anneae* n. sp. AM W.44513, MI QLD 2370; E–H. *Reteterebella lirrf* n. sp. AM W.44545, MI QLD 2416; I–J. *Pista chloroplokamia* n. sp., AM W.44613, MI QLD 2400. Photos: A–J—Alexander Semenov.

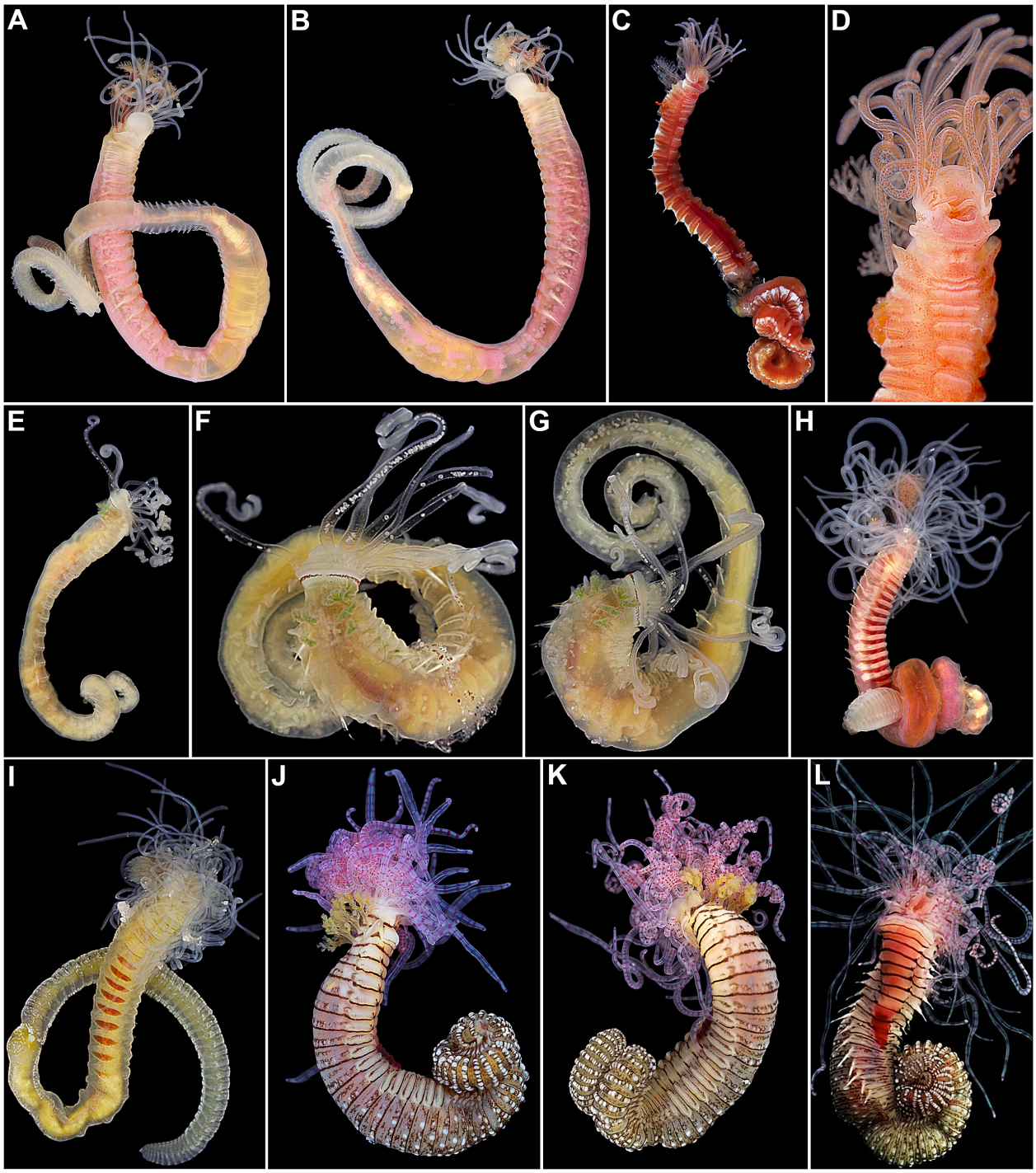


FIGURE 2. Live specimens. A–B. *Pista kristiani* n. sp. AM W.45451, MI QLD 2445; C–D. *Lanicides rubra* n. sp. AM W.44272, MI QLD 2344; E–G. *Eupolymnia chlorobranchiata* n. sp. AM W.45455, MI QLD 2446; H–I. *Pistella franciscana* n. sp. H. Discarded specimen; I. AM W.44593, MI QLD 2394; J–L. *Loimia tuberculata* n. sp; J–K. Spec. AM W.44280, MI QLD 2359; L. Discarded specimen. Photos: A–K—Alexander Semenov, L—Gary Cranitch.

Material was preserved in 4% formalin, then rinsed with fresh water and transferred to 70% ethanol solution. Some material was also fixed in absolute alcohol for subsequent molecular studies, beyond the scope of this paper. In addition to the material collected during the Lizard Island Taxonomic Workshop, we have also included material collected during other projects carried out by the Australian Museum (AM) staff in the Lizard Island region, such as the Bioerosion of Coral Reefs and during the CReefs expeditions, which involved specialized polychaete workers (abbreviated in material examined as CReefs), and this material was deposited in the AM and the Museum and Art Gallery of Northern Territory (NTM).



FIGURE 3. Live specimens. A–C. *Loimia pseudotriloba* n. sp. AM W.47810, MI QLD 2336; D–F. *Loimia juani* n. sp.; D. AM W.44261, MI QLD 2335; E. AM W.44518, MI QLD 2381; F. AM W.44263, MI QLD 2336; G–I. *Lanice viridis* n. sp. AM W.44611, MI QLD 2400. Photos: A–I—Alexander Semenov.

Specimens were studied using stereomicroscopes and representatives of all species were photographed. Notochaetae and neuropodia were removed from different regions of the body, 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 of progressively stronger concentration, then critical-point dried, sputter-coated with gold, and examined at the SEM Laboratory of 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 in a Petri dish with a black bottom. Images were produced with Helicon Focus version 5.3, from multiple images, each focused on different planes. All photos were edited with Adobe Photoshop CS6 software.

All material collected during the workshop has been deposited at the Australian Museum, and the material collected during the workshop was under Permit number G12/35718.1, issued by the Great Barrier Reef Marine Park Authority.

Abbreviations used: AM—Australian Museum; MNHU—Museum für Naturkunde der Humbolt Universität, Berlin, Germany; MV—Museum Victoria, Melbourne, Australia; NMT—Museum and Art Gallery of Northern Territory, Darwin, Northern Territory, Australia; MPW—Muzeum Przyrodnicze, Wroclaw, Poland; HZM—Zoologisches Insitut und Zoologisches Museum der Universität, Hamburg, Germany; ZB—Natural History Museum, London, England; ZMUC—Zoological Museum, University of Copenhagen, Denmark. We have abbreviated the Australian states as follows: Queensland, QLD; New South Wales, NSW; Northern Territory, NT; Victoria, VIC; South Australia, SA; Western Australia, WA. Also, the Great Barrier Reef is abbreviated to GBR. Number of specimens under each registration number is 1 unless otherwise specified.

Taxonomic account

Family Terebellidae Grube, 1850

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part frequently with eyespots; distal part poorly developed, shelf-like, restricted to base of upper lip, mid-dorsal process absent. Buccal tentacles all similar, except in length. Peristomium forming lips; hood-like upper lip, usually as wide as long; small, swollen lower lip, usually restricted to oral area. Segment 1 reduced dorsally, frequently developed ventrally, with ventral lobe marginal to mouth, or with longer paired lobes. Lobes on following anterior segments frequently present. Paired dorso-lateral branchiae present in most genera, 1–3 pairs, typically beginning from segment 2; branchial filaments originating all together from single point dorso-laterally, or branching from a basal stalk on either side of pairs. Anterior segments with glandular, rectangular to trapezoidal, smooth to highly corrugated mid-ventral shields; shields extending until termination of notopodia or shortly before that point; mid-ventral groove extending posteriorly from termination of mid-ventral shields. Short and conical notopodia beginning from segments 2–5, usually extending for limited number of segments. Notochaetae distally winged or serrated, both types with several sub-types, frequently with transition of types of notochaetae along body. Neuropodia typically present from 1–2 segments after beginning of notopodia, sometimes more posteriorly. Neurochaetae as avicular uncini, sometimes with long handles on some anterior segments; uncini arranged in double rows at least on some segments of the region with notopodia, frequently from segment 11 to termination of notopodia. Nephridial and genital papillae usually present on some anterior segments. Pygidium smooth to crenulate, or with marginal rim of papillae (Nogueira *et al.* 2013).

Remarks. Australian terebellids have been studied over the last decades mostly by Hutchings (Hartman 1963; Hutchings 1977; Hutchings & Murray 1984; Hartmann-Schröder 1986; Hutchings & Glasby 1988, 1990; Hutchings 1993,1997a, b; Hutchings & Smith 1997; Hutchings & Avery 2003; Nogueira & Hutchings 2007), and 22 genera and 53 species of terebellids were reported from Australia prior to the present study, all listed on the Australian Faunal Directory (AFD) website, http://www.environment.gov.au/biodiversity/abrs.

Terebellidae *sensu stricto*, as defined by Nogueira *et al.* (2013), is the largest family of the former Terebellidae *sensu latu*. The group currently has 47 valid genera, including one described herein. These genera are defined by the presence or absence of branchiae and lobes on anterior segments, number of pairs of notopodia, segments on which noto- and neuropodia begin, and the types of chaetae they bear.

Key to the genera of Terebellidae found in Lizard Island

1.	Lobes on anterior segments absent, except sometimes for a ventral lobe on segment 1, around the mouth	2
-	Lobes on anterior segments present	3
2. (1)	Distally winged notochaetae	*Nicolea*
-	Distally serrated notochaetae	*Terebella*
3. (1)	Notopodia beginning from segment 4	4
-	Notopodia beginning from segment 5	*Reteterebella*
4. (3)	Long-handled uncini present at least in first pairs of neuropodia	5
-	Short-handled uncini throughout	6
5. (4)	Only winged, laterally smooth notochaetae present	*Pista*
-	Medially winged and distally serrated notochaetae also present	*Lanicides*
6. (4)	Branchiae present, 1–3 pairs, beginning from segment 2	7
-	Branchiae absent	*Lizardia* n. gen.
7. (6)	Two or three pairs of arborescent branchiae	8
-	Single pair of plumous branchiae, on segment 2	*Pistella*
8. (7)	Double rows of uncini in an intercalated arrangement	9
-	Double rows of uncini in a back to back arrangement	10
9. (8)	Three pairs of branchiae, on segments 2–4; lobes on segments 1–4, ventral on segment 1, ventro-lateral on segment 2 and progressively more laterally placed on segments 3 and 4	*Eupolymnia*
-	Two pairs of branchiae, on segments 2–3; ventral lobe on segment 1 and lateral lobes on segment 3, inserted dorsally on segment 3 and ventrally on segment 2	*Lanicola*
10. (8)	Pectinate uncini	*Loimia*
-	Uncini with several transverse rows of secondary teeth	*Lanice*

Genus *Nicolea* Malmgren, 1866

Nicolea.—Hutchings & Glasby 1988: 35; Nogueira 2008: 221.

Type-species. *Terebella zostericola* Örsted, 1844, designated by Hartman (1959).

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part frequently with eyespots; distal part shelf-like. Buccal tentacles all similar, longer tentacles shorter than body. Peristomium forming lips; hood-like upper lip, usually as wide as long; small, swollen lower lip, usually restricted to oral area. Segment 1 reduced dorsally, frequently developed ventrally, with ventral lobe marginal to mouth. Lobes on anterior segments absent, except for ventral lobe of segment 1. Paired dorso-lateral arborescent branchiae present on segments 2–3, 2 pairs. Anterior segments with glandular, rectangular to trapezoidal, usually smooth mid-ventral shields; shields extending until termination of notopodia or shortly before that point; mid-ventral groove extending posteriorly from termination of mid-ventral shields. Short and conical notopodia beginning from segment 4, extending for variable number of segments. Notochaetae in both rows distally narrowly-winged. Neuropodia present from segment 5, as low ridges until termination of notopodia, as short pinnules thereafter. Neurochaetae throughout as short-handled avicular uncini, arranged in completely intercalated double rows from segments 9–11 to termination of notopodia. Nephridial and genital papillae usually present on segments 3 and 6–7, in line and posterior to notopodia; genital papillae with sexual dimorphism in several species, females with rounded papillae, males with elongate, digitiform papillae. Pygidium smooth to crenulate (Nogueira 2008; Santos *et al*. 2010).

Remarks. As discussed by Santos *et al.* (2010), *Nicolea* is a large genus with a worldwide distribution, in which the 30 described species are similar morphologically with regard to the number of pairs of branchiae, segments from which noto- and neuropodia begin, arrangement of the double rows of uncini and general morphology of chaetae, and differ on the number of pairs of notopodia present, the segment where the double rows of uncini begin, and the morphology of genital papillae, as in several species these may vary between males and females.

One species of *Nicolea, N. amnis* Hutchings & Murray, 1984, was known to occur in Australian waters prior to the present study and has been recorded from Lizard Island (Hutchings & Glasby 1988), although the type locality is Botany Bay, in NSW. We found two new species among the Lizard Island material, both described herein, and we also consider that *N. amnis* does not occur in the Lizard region; previous records of this species from Lizard Island (Hutchings & Glasby 1988) were examined and they belong to *N. murrayae* n. sp., described below.

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

1. Fourteen pairs of notopodia, on segments 4–17 . . . . . *Nicolea murrayae* n. sp.
- Seventeen pairs of notopodia, on segments 4–20 . . . . . *Nicolea vaili* n. sp.

***Nicolea murrayae* n. sp.**
(Figs 1A–B, 4–6)

Nicolea amnis.—Hutchings & Glasby 1988: 35, in part. *Non* Hutchings & Murray 1984.

Type material. Holotype: NTM W.203126, off SW Palfrey Island, 14°41'39"S, 145°26'29"E, 4 m, coll. Glasby & Watson, Apr 2008, complete, female, 5 mm long, 1.2 mm wide. Paratypes, AM W.44603, MI QLD 2397, Coconut Beach, photographed; AM W.44607, MI QLD 2309, 2 plus 1 mounted on SEM pin; AM W.47702, CReefs, LI–10–72, MI QLD 2209, North Direction Island, lagoon patch reef, 14°44'43"S, 145°30'18"E, incomplete specimen, in excellent state of preservation, but very small, ~3.5 mm long, ~0.9 mm wide, with 33 segments, gravid; AM W.200948, near Bird Islet, Lizard Island, 14°40'S, 145°28'E, 8 Apr 1977, originally described as *N. amnis* (*non* Hutchings & Murray, 1984).

Comparative material examined. Holotype of *Nicolea amnis* Hutchings & Murray, 1984, AM W.196218.

Description. In life, greenish brown body, speckled with white iridescent spots; photographed specimen with mass of bright white internal contents, probably sperm (Fig. 1A–B). Transverse prostomium attached to dorsal surface of upper lip; basal part with numerous eyespots laterally, continuing mid-dorsally as thin line, mid-dorsal gap absent (Figs 4A–H, J–M; 5B–C, E–F, J, L–M). Buccal tentacles deeply grooved, longer tentacles about same length as region with notopodia (Figs 4A–H, J–M; 5A–G, J–M). Peristomium forming lips, hood-like upper lip, longer than wide; small, swollen lower lip, restricted to oral area (Figs 4A–H, J–M; 5C, E, L–M). Segment 1 reduced dorsally, developed ventrally, with ventral lobe marginal to mouth; other lobes on anterior segments absent, but segment 2 with thickened anterior margin, protruding as a ventral crest; segments 2–4 very narrow ventrally, especially segment 3 (Figs 4A–H, J–M; 5B–C, E–F, J, L–M). Anterior segments inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–3, branchial filaments with few dichotomous branches; first pair longer, about half body width of segment 2 (Figs 4B–G, J–L; 5B, F, J–K), dorsally aligned to second pair. Ventral shields on segments 2–13, all smooth, trapezoidal, wider anteriorly, last two pairs slightly shorter and narrower (Figs 4A, C, G–H, K–M; 5C, E–G, J, L–M). Fourteen pairs of short and conical notopodia with progressively broader bases, beginning on segment 4 and extending to segment 17; notopodia of first pair about same size as following pairs and originating slightly dorsally to them (Figs 4A–H, J–M; 5A–H, J–L; 6A–B, D, F). Notochaetae in both rows narrowly-winged distally (Fig. 6A–F). Neuropodia present from segment 5, as low, almost sessile ridges until segment 19, 2 segments after termination of notopodia, and slightly raised pinnules from segment 20 (Figs 4A–M; 5A–C, E–J, L). Neurochaetae throughout as short-handled avicular uncini, arranged in completely intercalated double rows from segments 10–19, two segments after termination of notopodia (Fig. 5H, O–Q), in single rows on anterior neuropodia and from segment 20 onwards (Fig. 6G–N); in holotype, double rows of uncini extending to segment 18 on right side of body and segment 19 on left side. Uncini throughout with ~3 rows of progressively shorter secondary teeth (Figs 5O–Q; 6G–N). Nephridial and genital papillae usually present on segments 3 and 6–7, in line and posterior to notopodia; genital papillae with sexual dimorphism, females with rounded papillae, males with elongate, digitiform papillae (Figs 4F–G, J–L; 5J–K). Pygidium smooth to crenulate (Figs 4A–D, I; 5A–C, I, N). Mucous tube.

Remarks. *Nicolea murrayae* n. sp. differs from the only other Australian species of *Nicolea*, *N. amnis*, which was recorded from Lizard Island by Hutchings & Glasby (1988), in terms of number of pairs of notopodia and in having relatively few (2–3) dichotomous branchings on the branchiae; material identified as *N. amnis* by Hutchings & Glasby (1988) from Lizard Island was examined and is transferred to this new species.



FIGURE 4. *Nicolea murrayae* n. sp. NTM W.023126: A–D. Entire worm, ventral, left and right lateral, and dorsal views, respectively; E–H. Anterior end, dorsal, left and right lateral, and ventral views, respectively; I. Posterior end, left lateral view; J–M. Close ups of the anterior end, dorsal, right and left lateral, and ventral views, respectively; arrows point to nephridial and female genital papillae. Numbers refer to segments. Abbreviations: P = prostomium; ul = upper lip. Scale bars: A–D = 0.5 mm, E–G = 0.3 mm, H–I = 0.2 mm, J–M = 0.1 mm.

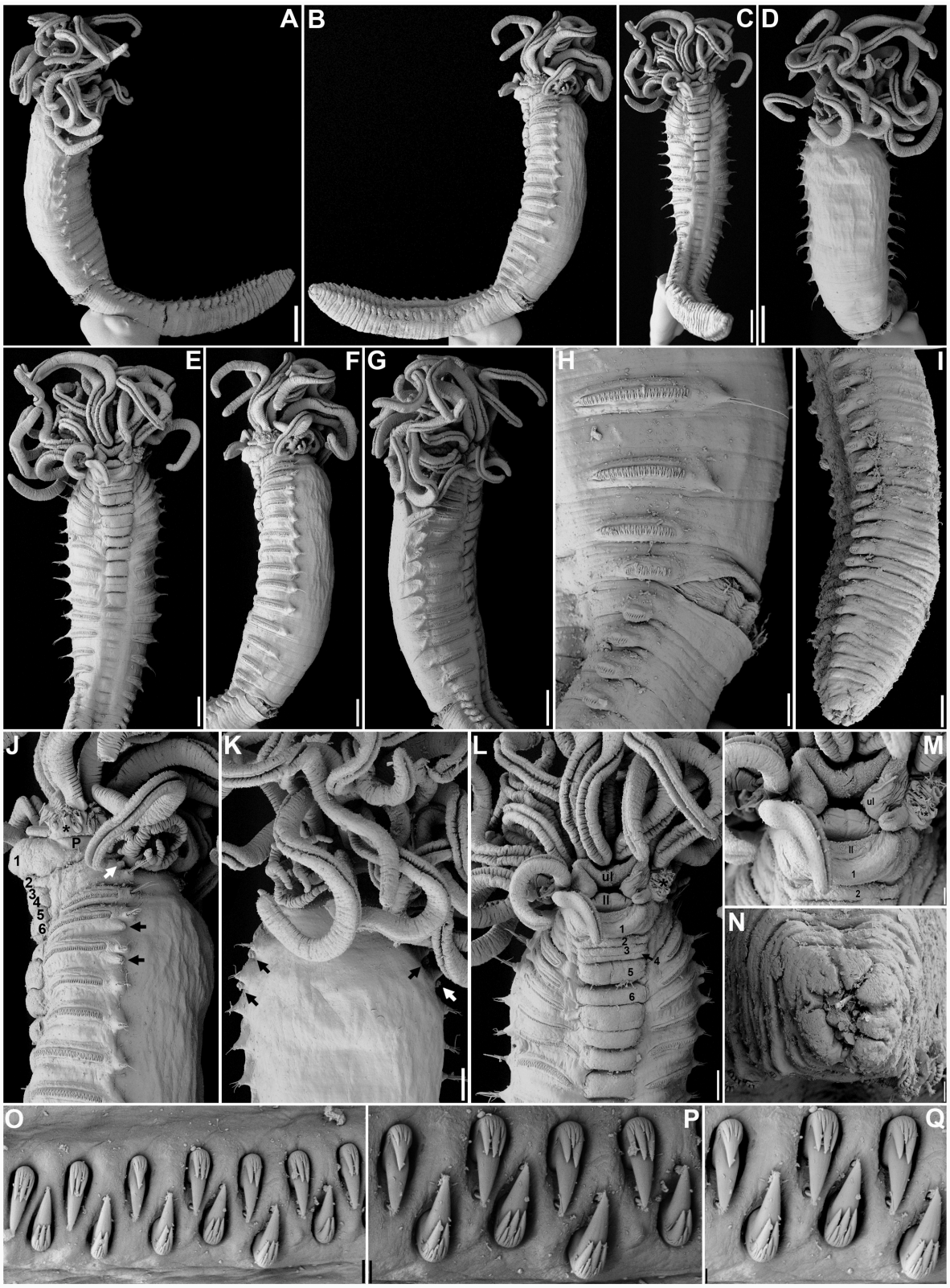


FIGURE 5. *Nicolea murrayae* n. sp. AM W.44607: A–C. Entire worm, right and left lateral, and ventral views, respectively; D–G. Anterior end, dorsal, ventral, left and right lateral views, respectively; H. Transition between anterior and posterior body, left lateral view; I. Posterior end, left lateral view; J–L. Close ups of the anterior end, right lateral, dorsal, and ventral views, respectively; unspecified arrows point to nephridial and male genital papillae; M–N. Close ups of the oral region and pygidium, respectively; O–Q. Uncini in double rows arrangement, segment 10. Numbers refer to segments. Abbreviations: ll = lower lip; P = basal part of prostomium; ul = upper lip; * = distal part of prostomium. Scale bars: A–C = 500 µm, D, G = 400 µm, E–F = 300 µm, H = 100 µm, I–L = 150 µm, M = 50 µm, N = 30 µm, O = 7 µm, P = 5 µm, Q = 3 µm.

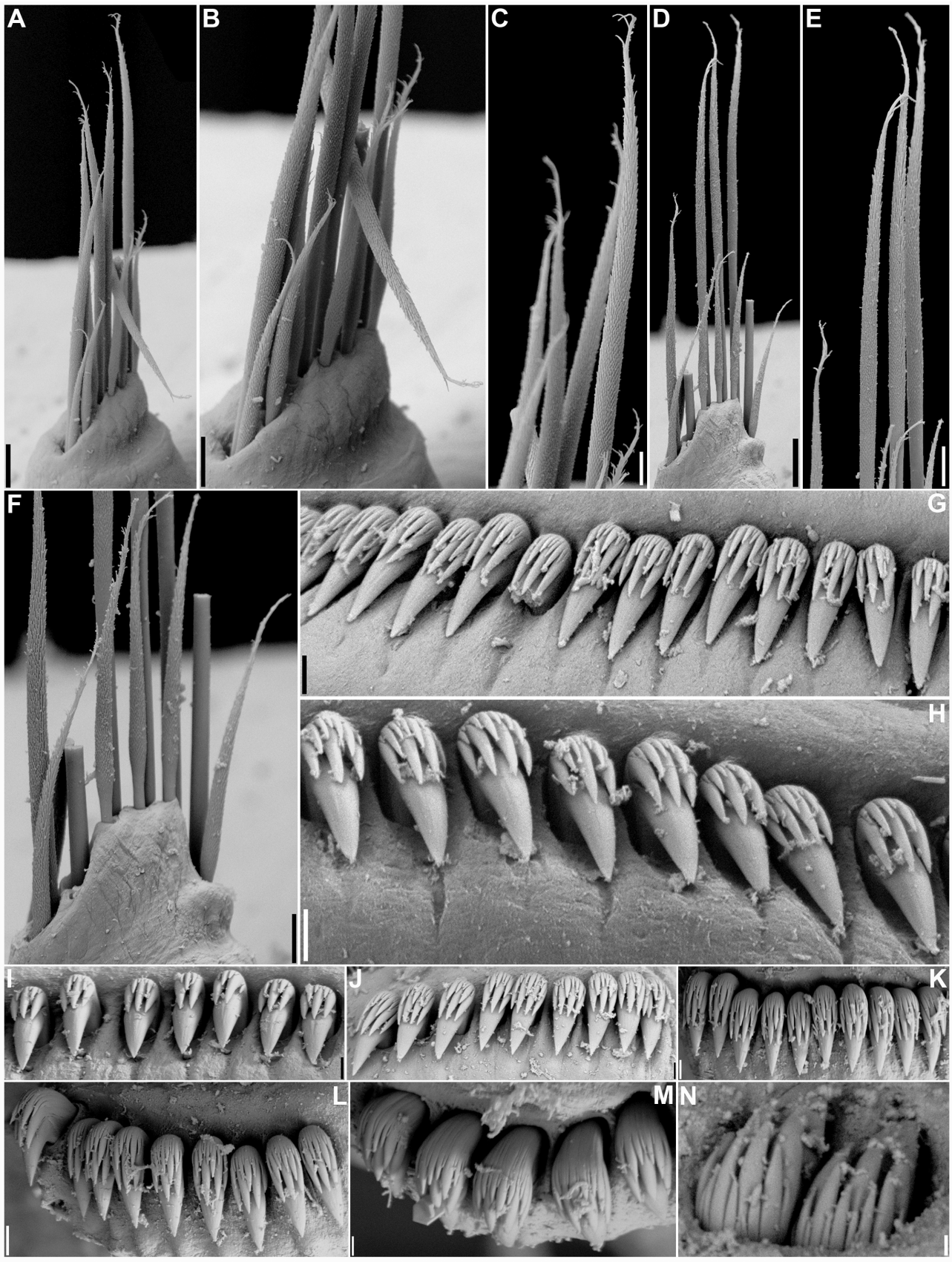


FIGURE 6. *Nicolea murrayae* n. sp. AM W.44607: A–C. Notochaetae, segment 6; D–F. Notochaetae, segment 12; G–L. Uncini, segments 5, 6, 8, 20, 30 and 31, respectively; M–N. Posterior uncini. Scale bars: A = 15 µm, B, E–F = 10 µm, C = 6 µm, D = 20 µm, G–H, L = 5 µm, I, K = 4 µm, J = 3 µm, M = 2 µm, N = 1 µm.

Nicolea amnis, originally described from Botany Bay, NSW, by Hutchings & Murray (1984), has 16 pairs of notopodia and two pairs of branchiae with dichotomous branches throughout their length. Subsequently Hutchings & Glasby (1988) expanded the distribution of this species to all around Australia and suggested that the number of pairs of notopodia was highly variable. They also suggested that *N. amnis* occurred over a wide depth range, from intertidal to 71 m.

However, we now believe that *N. amnis* has a much more restricted range and we suggest that records distant from the type locality should be re-examined. This just reinforces the statement made by Hutchings & Murray (1984) that an urgent revision of the group is needed and that many of the currently known species are poorly known. The reported variation into the number of pairs of notopodia (Hutchings & Glasby 1988) needs a careful re-evaluation and other characters, such as distribution and arrangement of papillae, distribution of ventral pads, and shape and orientation of uncini, which are rarely mentioned in other species descriptions, need to be carefully documented to distinguish between the species of this genus.

Etymology. This species is named after Anna Murray, who participated in the Lizard Island workshop and has had a long involvement in documenting the Australian polychaete fauna.

Type locality. Off SW Palfrey Island, 14°41'39"S, 145°26'29"E, Lizard Island, GBR, Australia.

Distribution. Known only from the Lizard Island region.

***Nicolea vaili* n. sp.**
(Figs 1C, 7–10)

Type material. Holotype: AM W.47703, CReefs, LI–10–74, MI QLD 2212, Day Reef, Outer Barrier, 14°28'19"S, 145°31'24"E, incomplete specimen, in excellent state of preservation, male, with 41 segments, 7.7 mm long and 0.7 mm wide. Paratypes: AM W.44522, MI QLD 2390, mounted on 2 SEM pins; AM W.44520, MI QLD 2387; AM W.44588, MI QLD 2387 (2); AM W.44487, MI QLD 2335; AM W.47809, CReefs, LI–10–034, MI QLD 2199, Turtle Beach, 14°39'08"S, 145°27'04"E.

Comparative material examined. Holotype of *Nicolea amnis* Hutchings & Murray, 1984, AM W.196218.

Description. In life, green body speckled with white iridescent spots (Fig. 1C). Transverse prostomium attached to dorsal surface of upper lip; basal part numerous eyespots more concentrated laterally, continuing across dorsum as relatively broad-line of even height, mid-dorsal gap absent; distal part of prostomium shelf-like (Figs 7A–H, J–M; 8A–H, J–M). Buccal tentacles deeply grooved, longer tentacles shorter than region with notopodia (Figs 7A–G, J–L; 8A–H, J–M, O). Peristomium forming lips; hood-like upper lip as long as wide; small, swollen lower lip, restricted to oral area (Figs 7A–H, J–M; 8C–D, K, M). Segment 1 reduced dorsally, developed ventrally, with ventral lobe marginal to mouth; other lobes on anterior segments absent, but segment 2 with thickened anterior margin, protruding as a ventral crest; segments 2–4 very narrow ventrally, especially segment 3 (Figs 7A–H, J–M; 8A–H, J–M, O). Anterior segments inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–3, branchial filaments with few dichotomous branches (3–5); first pair longer, about half body width of segment 2, longitudinally aligned to second pair (Figs 7A–H, J–M; 8A–H, J–L, O). Ventral shields on segments 2–15, shields all smooth, those of segments 2–9 rectangular, wider than long, shields progressively longer from segment 5, approximately squared on segments 10–11, then rectangular, progressively narrower to last, last pairs much shorter (Figs 7A, C–D, J–K; 8C–D). Seventeen pairs of short and conical notopodia, beginning on segment 4 and extending to segment 20, progressively longer until segment 10, then about same size until segment 18, last two pairs shorter; notopodia originating progressively more laterally until segment 8, then longitudinally aligned (Figs 7A–B, D–I, K–M; 8A–H, J–L, O; 9A–D; 10A–B). Notochaetae in both rows narrowly-winged distally (Figs 9B–G; 10C–E). Neuropodia present from segment 5, as low, almost sessile ridges until segment 20, last with notopodia, and slightly raised pinnules from segment 21 (Figs 7A–M; 8C–J; 9A; 10A–B). Neurochaetae throughout as short-handled avicular uncini, arranged in completely intercalated double rows on segments 10–20, last with notopodia, in single rows on anterior neuropodia and from segment 21 onwards. Uncini throughout with ~3 rows of progressively shorter secondary teeth (Figs 9H–M; 10F–J). Nephridial and genital papillae usually present on segments 3 and 6–7, in line and posterior to notopodia; genital papillae with sexual dimorphism, females with rounded papillae, males with elongate, digitiform papillae (Figs 7F, K–L; 8A–B, E–H, J). Pygidium smooth to crenulate (Fig. 8I, N). Mucous tube.

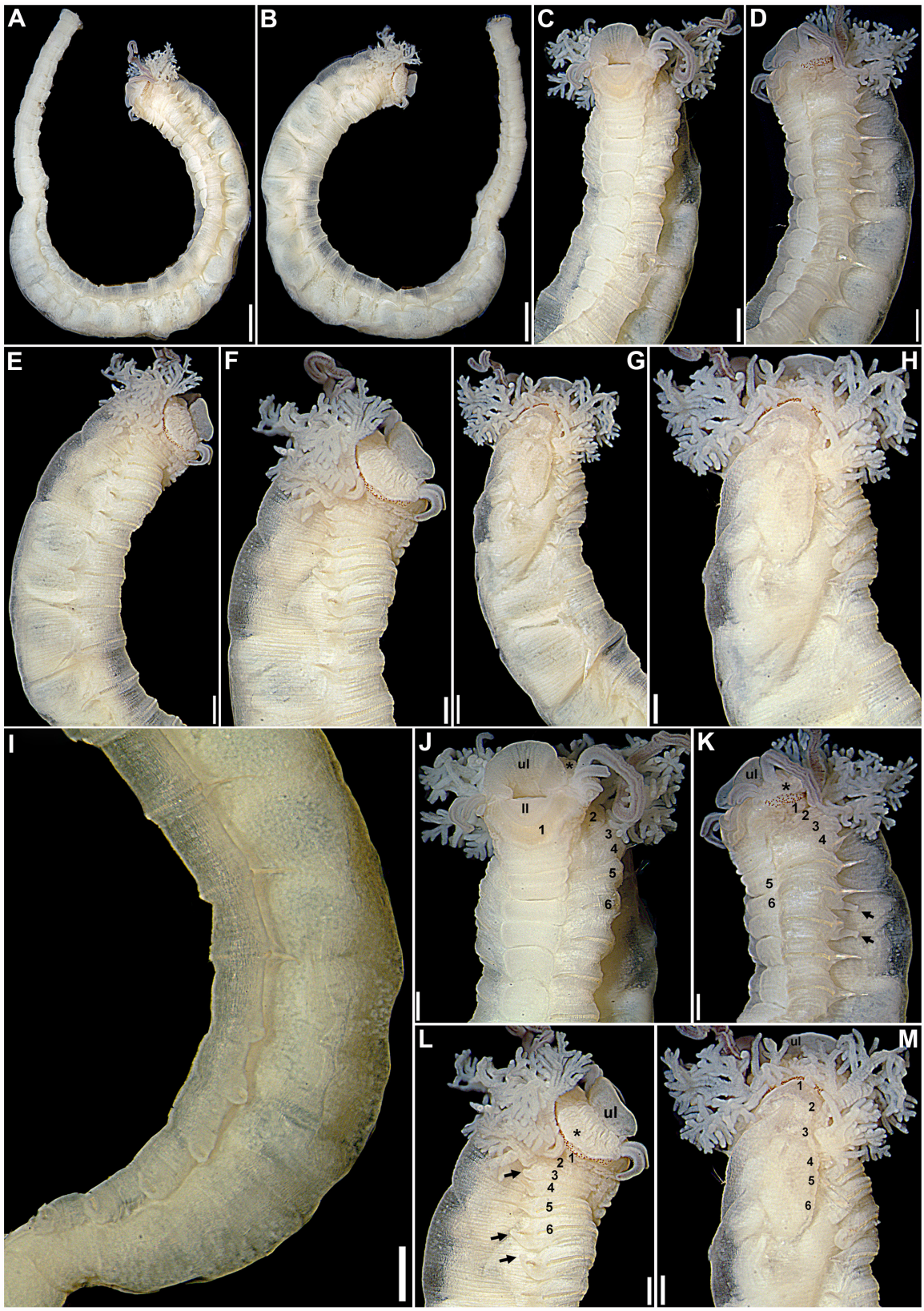


FIGURE 7. *Nicolea vaili* n. sp. AM W.47703: A–B. Entire incomplete worm, left and right lateral views, respectively; C–D. Anterior end, ventral, and left lateral views, respectively; E–H. Anterior end in progressively higher magnifications, right lateral and dorsal views, respectively; I. Transition between anterior and posterior body, left lateral view; J–M. Close ups of the anterior end, ventral, left and right lateral, and dorsal views, respectively; arrows point to nephridial and male genital papillae. Numbers refer to segments. Abbreviations: ll = lower lip; ul = upper lip; * = distal part of prostomium. Scale bars: A–B = 0.7 mm, C–E, G, I = 0.3 mm, F, H, J–M = 0.2 mm.

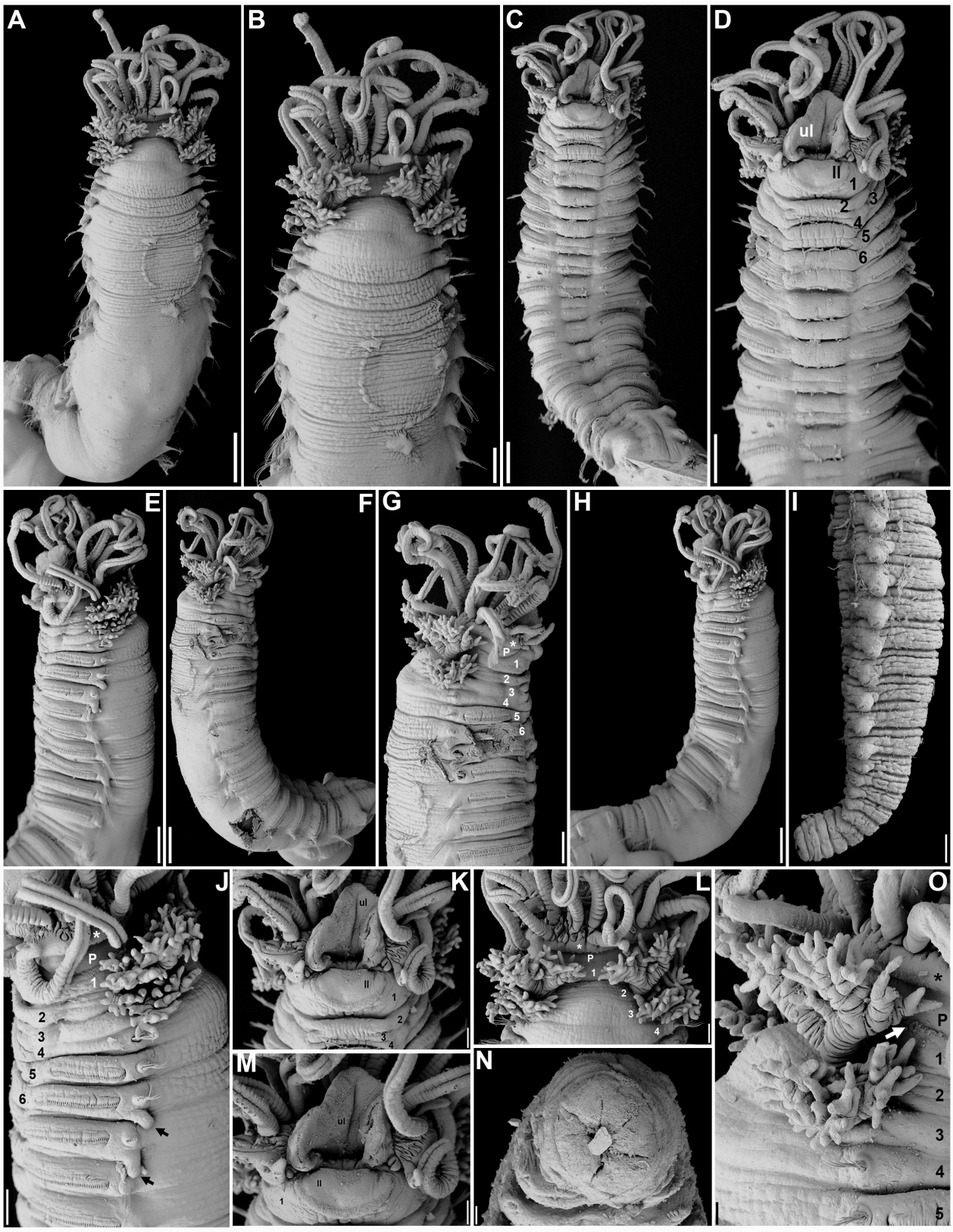


FIGURE 8. *Nicolea vaili* n. sp. AM W.44522: A–H. Anterior end in progressively higher magnifications, dorsal, ventral, right and left lateral views, respectively; I. Posterior end, left lateral view; J. Anterior end, left lateral view, arrows point to male genital papillae; K, M. Close ups of the oral area; L, N. Close ups of the anterior end, dorsal view, and the pygidium, respectively; O. Anterior end, right lateral view, arrow points to nuchal organ. Numbers refer to segments. Abbreviations: ll = lower lip; P = basal part of prostomium; ul = upper lip; * = distal part of prostomium. Scale bars: A, C, E, H = 400 µm, B, G = 200 µm, D, F = 300 µm, I–J = 150 µm, K–M = 100 µm, N = 30 µm, O = 50 µm.

Remarks. *Nicolea vaili* n. sp. is characterized by having 17 pairs of notopodia, few basal dichotomous branches on the branchiae, only 3–5, the first pair larger than second, and ventral shields present to segment 15 with their shape varying along the body. This new species is separated from both *N. murrayae* n. sp. and from *N. amnis* because these latter species have 14 and 16 pairs of notopodia, respectively. In addition, members of *N. amnis* have larger branchiae, with more levels of branchings and longer secondary stems, and uncini with two rows of secondary teeth and fewer teeth per row than in *N. vaili* n. sp**.**, which uncini have three rows of secondary teeth.

Etymology. This species is named after Dr Lyle Vail, a Co-Director of Lizard Island Research Station who helped considerably during the workshop, driving boats and diving with us.

Type locality. Day Reef, Outer Barrier, 14°28'19"S, 145°31'24"E, GBR, Australia.

Distribution. Known only from the Lizard Island region.

Genus *Terebella* Linnaeus, 1767

Terebella.—Hutchings & Glasby 1988: 51–52; Santos *et al.* 2010: 15.

Type-species. *Terebella lapidaria* Linnaeus, 1767, by monotypy.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part frequently with eyespots; distal part shelf-like. Buccal tentacles all similar, but of different lengths, longer ones frequently longer than body. Peristomium forming lips; hood-like upper lip, usually as wide as long; small, swollen lower lip, usually restricted to oral area. Segment 1 reduced dorsally, frequently developed ventrally, with ventral lobe marginal to mouth. Lobes on anterior segments absent, except for ventral lobe of segment 1. Paired dorso-lateral arborescent branchiae present on segments 2–4 or on discontinuous segments, 3 pairs. Anterior segments with glandular, rectangular to trapezoidal, usually smooth to slightly crenulate mid-ventral shields; mid-ventral groove extending posteriorly from termination of mid-ventral shields. Short and conical notopodia beginning from segment 4, extending for variable number of segments, frequently to posterior body. Notochaetae medially winged and distally serrated, and alimbate and serrated, frequently with blade at an angle, usually with transition of types of chaetae from anterior to mid-body. Neuropodia present from segment 5, as low ridges throughout. Neurochaetae throughout as short-handled avicular uncini, arranged in completely intercalated to partially back to back double rows from segment 11 to posterior body. Nephridial and genital papillae usually present on segments 3 and from segment 6, for variable number of segments, usually between parapodial lobes. Pygidium smooth to crenulate (Nogueira 2008; Santos *et al*. 2010).

Remarks. *Terebella* is a relatively large genus, reported worldwide, with more than 40 species, which differ in several characters which are not variable in other genera of Terebellidae, such as the number of pairs of notopodia, the types of notochaetae present along the body and the arrangement of the uncini in double rows (Santos *et al.* 2010). The genus is characterized by the absence of lobes on anterior segments, with the frequent exception of a ventral lobe on segment 1, around the mouth; presence of three pairs of arborescent branchiae, sometimes on discontinuous segments; notopodia present from segment 4, extending usually for large number of segments, with medially winged, distally serrated, and alimbate serrated chaetae, frequently with transition of types of chaetae along the body; and neuropodia from segment 5, as low ridges throughout, with short-handled uncini, arranged in completely intercalated to partially back to back double rows from segment 11 until mid- to posterior body.

Four species of *Terebella* are known from Australian waters: *T. maculata* Hutchings & Glasby, 1988, occurring off WA and NT, *T. muliarrus* Hutchings, 1993, described from material from Houtman Abrolhos Islands, WA, *T. pappus* Hutchings & Murray, 1984, occurring along western and southern Australian coast, and *T. tantabiddycreekensis* Hartmann-Schröder, 1980, found in northern Australia and QLD, including Lizard Island. A fifth species, *T. stenotaenia* Grube, 1871, was described from Moreton Bay, QLD, but the original description does not allow the confirmation even of the genus and type material could not be located by Hutchings & Glasby (1988), so we suggest this species is a *nomen dubium*. In the present study, we confirm the occurrence of *T. tantabiddycreekensis* in Lizard Island.

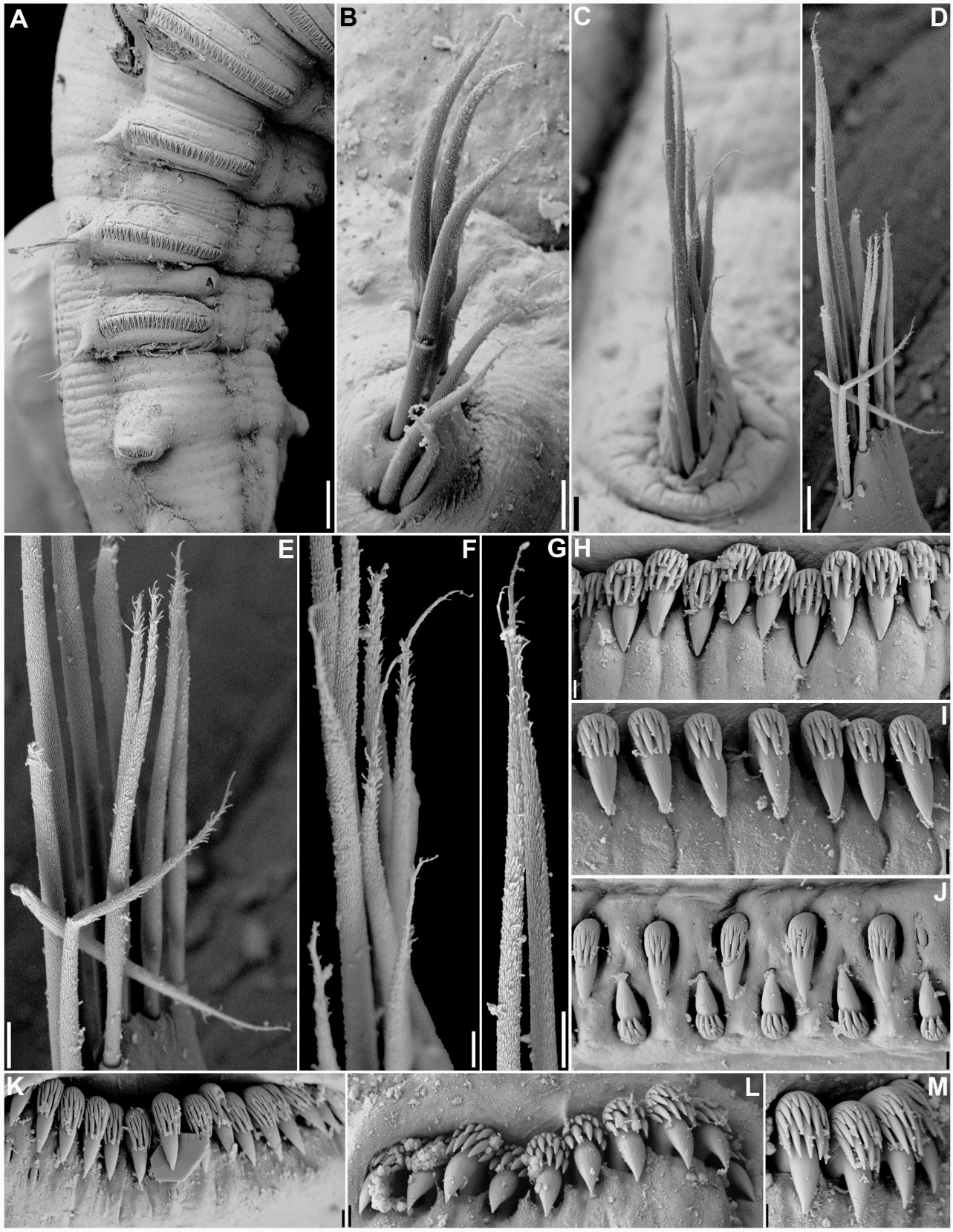


FIGURE 9. *Nicolea vaili* n. sp. AM W.44522: A. Transition between anterior and posterior body; B. Notochaetae, segment 4; C, F. Notochaetae of segment 5, general and chaetae from anterior row, respectively; D–E, G. Notochaetae of segment 14, general, chaetae from anterior and posterior rows, respectively; H–K. Anterior uncini, segments 5, 9, 10, and 21, respectively; L–M. Posterior uncini. Scale bars: A = 150 µm, B–C, E, G = 10 µm, D = 20 µm, F, I–K = 5 µm, H = 4 µm, L–M = 3 µm.

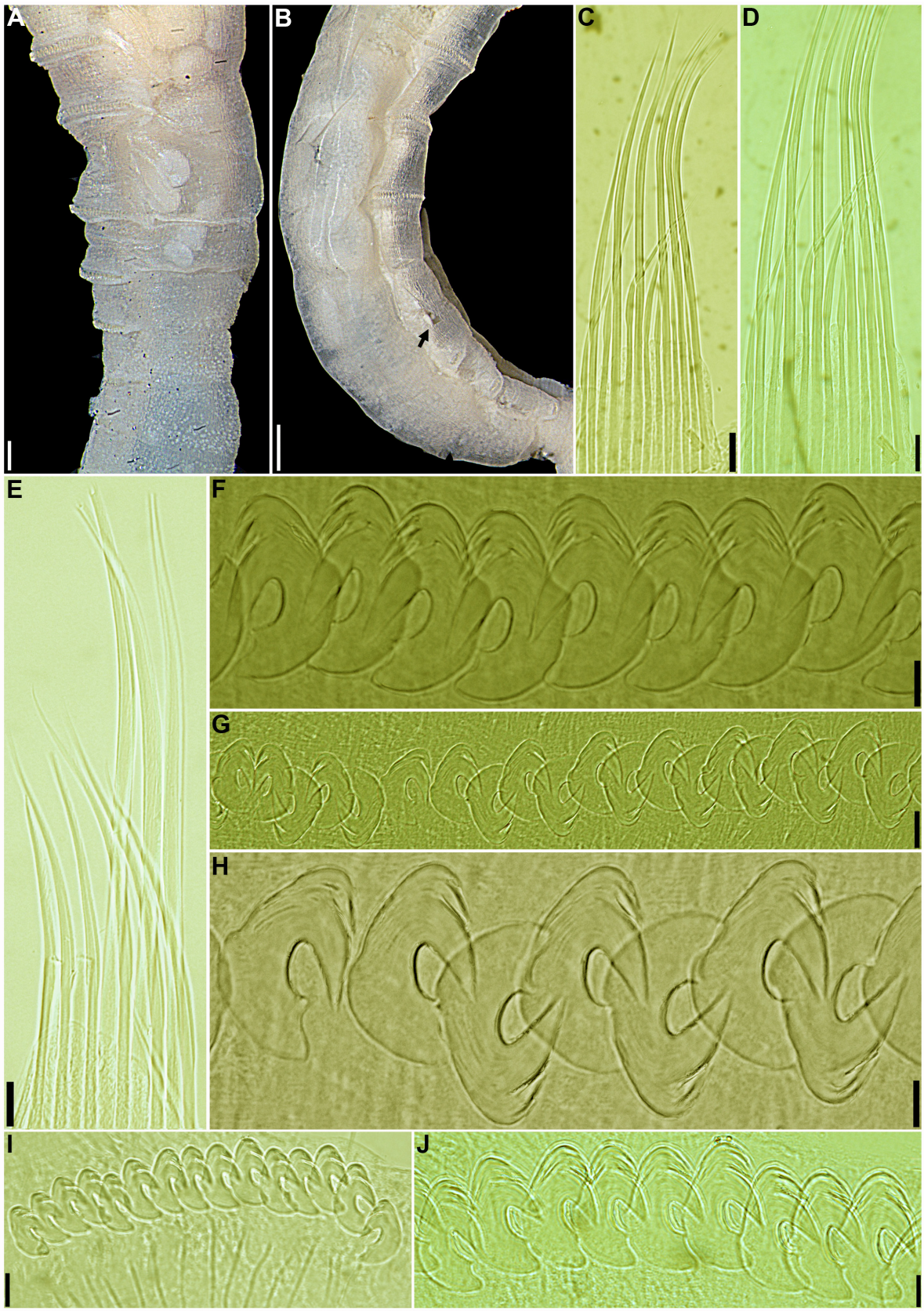


FIGURE 10. *Nicolea vaili* n. sp. NTM W.023126: A–B. Close ups of the transition between anterior and posterior body, left and right lateral views, respectively; arrow points to the last notopodium; C–D. Notochaetae, segment 7; E. Notochaetae, segment 17; F. Uncini, segment 6; G–H. Uncini, segment 10; I–J. Uncini, segment 22. Scale bars: A = 1 mm, B = 3 mm, C, I = 20 µm, D = 30 µm, E = 100 µm, F–H, J = 10 µm.

Terebella tantabiddycreekensis Hartmann-Schröder, 1980
(Figs 11–12)

Terebella tantabiddycreekensis Hartmann-Schröder 1980: 77–78, figs 122–123.—Hutchings & Glasby 1988: 55–56.

Material examined. AM W.47704, CReefs, LI–10–013, MI QLD 2191, intertidal reef walk at low tide from Loomis Beach to Palfrey Island, 14°41'01"S, 145°27'01"E, coll. Capa & Hutchings, complete specimen, in two pieces, anterior piece with 25 segments, with notopodia from segment 4, 7 mm long, ~1.1 mm wide at segment 23; posterior piece with 47 segments, 14.5 mm long, in excellent state of preservation; AM W.200075, Lizard Island lagoon, 14°40'55"S, 145°26'59"E, det. Hutchings & Glasby 1988.

Description. Transverse prostomium attached to dorsal surface of upper lip; basal part with eyespots more concentrated laterally, continuing dorso-laterally as a single band of eyespots, with eyespots progressively becoming more separated, leaving wide mid-dorsal gap; distal part shelf-like (Fig. 11A–L). Long buccal tentacles, about as long as body length or longer, with regular transverse bars of paired dark spots (Fig. 11A–L). Peristomium forming lips, hood-like upper lip, short, nearly circular, as long as wide; lower lip developed, forming swollen cushion-like structure, divided in two parts by transverse line (Fig. 11A–D, F, I–J). Segment 1 narrow, forming low ventral lobe marginal to mouth; other lobes on anterior segments absent, but segment 2 with thickened anterior margin, protruding as a ventral crest (Fig. 11A–L). Anterior segments inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–4, each with short, dichotomously branching basal stem, ending by relatively long filaments; second pair of branchiae shorter and originating laterally to other pairs, which are nearly longitudinally aligned and about same size; first pair originating on anterior margin of segment 2, second on posterior margin of segment 3, almost side by side with branchiae of segment 4, which originate from the anterior margin (Fig. 11A–L). Ventral shields on segments 2–15, rectangular, somewhat crenulate on anterior segments, then smooth; progressively longer until around segment 10, about same width, progressively narrower from segment 11 to last, which is almost inconspicuous; after segment 16, shields replaced by mid-ventral groove extending posteriorly (Fig. 11B–D, F, I–J, M). Notopodia beginning on segment 4, extending until segment 39; notopodia short, rectangular; first pair slightly shorter than following pairs, first three pairs, on segments 4–6, inserted progressively more laterally, following pairs longitudinally aligned (Fig. 11A–B, E–H, J–L). Notochaetae in both rows distally serrated, those of anterior row alimbate, with blade at an angle with shaft, smooth and rounded at curvature, then with gently tapering serrated tip directed upwards; chaetae of posterior row narrowly-winged for short extension, with gently tapering serrated tip; same types of notochaetae throughout, notopodia with progressively fewer chaetae, posterior ones with single chaeta in each row (Fig. 12A–E). Neuropodia present from segment 5, as low, almost sessile ridges throughout (Fig. 11A–F, I–K, M). Neurochaetae throughout as short-handled avicular uncini, arranged in double rows from segment 11 to posterior body, rows completely intercalated at mid-length of tori, progressively more separated towards edges, until back to back arrangement; uncini throughout with short triangular heel, distally pointed prow, nearly inconspicuous dorsal button at mid-length, and crest with 2 rows of secondary teeth (Fig. 12F–J). Large digitiform nephridial papillae on segments 2 and 3, obliquely aligned with notopodia of segments 4–6, those on segment 2 lateral to branchiae, anterior to branchiae on segment 3; large digitiform papillae on segments 6–7, between parapodial lobes (Fig. 11J–K) on a mature specimen. Pygidium crenulate, with rounded papillae (Fig. 11M). Tube unknown.

Remarks. This species was described by Hartmann-Schröder (1980) from Exmouth, on the NW Australian coast, from intertidal areas. Later, Hutchings & Glasby (1988) recorded it from Lizard Island. We provide an expanded description of the species with additional illustrations.

Type locality. Tantabiddy Creek, Exmouth, NW Australia.

Distribution. Widely distributed north of 32˚S on the west coast and about 35˚S on the east Australian coast, from intertidal to depths of 20 m and often in reefal environments.

Genus *Reteterebella* Hartman, 1963

Reteterebella Hartman 1963: 355.—Hutchings & Glasby 1988: 49.

Type-species. *Reteterebella queenslandia* Hartman, 1963, by monotypy.



FIGURE 11. *Terebella tantabiddycreekensis*, AM W.47704, LI–10–013: A–B. Anterior piece, right and left lateral views, respectively; C–D, G–H. Anterior end in progressively higher magnifications, ventral and dorsal views, respectively; E–F. Anterior end, right and left lateral views, respectively; I–L. Close ups of the anterior end, ventral, left and right lateral, and dorsal views, respectively; M. Close up of the posterior end, right lateral view. Numbers refer to segments. Abbreviations: ll = lower lip; P = basal part of prostomium; ul = upper lip; * = distal part of prostomium. Scale bars: A–B = 0.6 mm, C = 0.5 mm, D–F, L = 0.3 mm, G = 0.4 mm, H–K, M = 0.2 mm.

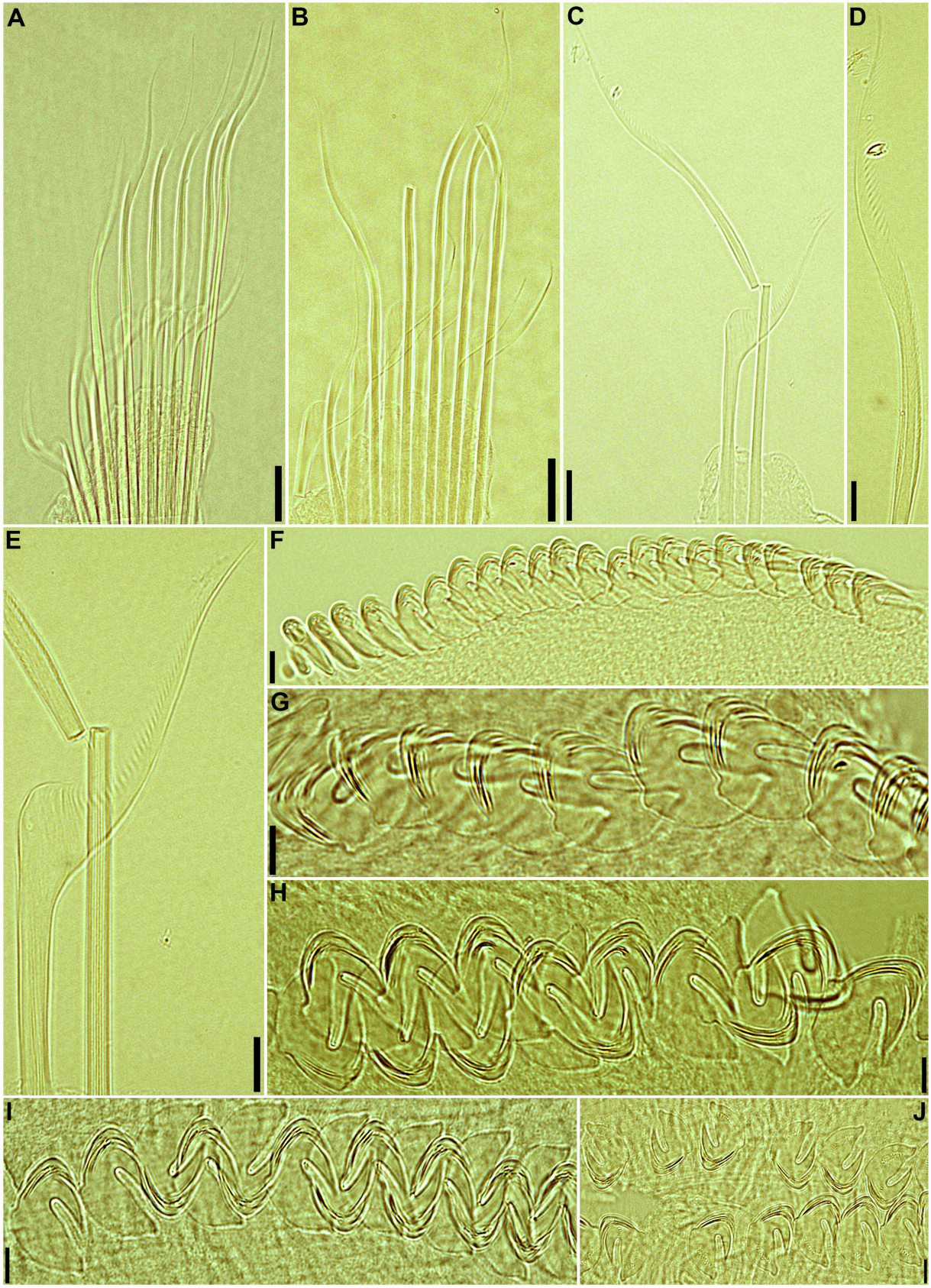


FIGURE 12. *Terebella tantabiddycreekensis* AM W.47704: A–B. Notochaetae, segments 8 and 15, respectively; C–E. Notochaetae of segment 35, general, chaetae from posterior and anterior rows, respectively; F–G. Uncini of segment 6 under higher magnifications; H–J. Uncini of segments 15, 29 and 69, respectively. Scale bars: A–B = 40 µm, C = 20 µm, D–F = 10 µm, G–J = 7 µm.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part with eyespots; distal part shelf-like. Buccal tentacles much longer than body length, highly extensile. Peristomium forming lips; hood-like upper lip, usually as wide as long; small, swollen lower lip, restricted to oral area. Segment 1 only conspicuous dorsally, ventrally fused to lower lip. Lobes on anterior segments usually present, low, flaring lobes on segments 2–5. Paired dorso-lateral arborescent branchiae present on segments 2–4, 3 pairs. Anterior segments with glandular, rectangular to trapezoidal, almost smooth to strongly corrugated mid-ventral shields; mid-ventral groove extending posteriorly from termination of mid-ventral shields. Short and conical notopodia beginning from segment 5, extending for 15–16 segments, until segments 20–21. Narrowly-winged notochaetae in both rows, wings almost inconspicuous, in the case of chaetae from posterior row only present on distal half of chaetae. Neuropodia present from segment 5, as low ridges until termination of notopodia, as low rectangular pinnules thereafter; elongate tori in region with notopodia, reaching mid-ventral groove on posterior thorax. Neurochaetae throughout as short-handled avicular uncini, arranged in partially to completely intercalated double rows from segment 10 until termination of notopodia; elongate, angular uncini, sharp cornered, superficially resembling type 1 uncini of some polycirrids. Nephridial and genital papillae usually present on segments 3–8, dorsal to line of notopodia on segments 3–4, between parapodial lobes and minute on segments 5–8. Pygidium smooth to slightly crenulate (Hutchings & Glasby 1988).

Remarks. *Reteterebella queenslandia* Hartman, 1963, the first known species in this genus, was described from Heron Island on the southern GBR, where it occurs in large numbers under boulders in the reef flat, extending the long and thick buccal tentacles all over the substrate. This has resulted in the popular name of "spaghetti worms". Members of this species are large, reaching around 20 cm in length from prostomium to pygidium and the buccal tentacles extending for up 1–1.5 m in length.

A second species of this genus, *R. aloba* was described from material from NSW by Hutchings & Glasby (1988), for much smaller specimens without lobes on anterior segments, but sharing with members of *R. queenslandia* the presence of three pairs of branchiae, 15–16 pairs of notopodia, both noto- and neuropodia beginning from segment 5, double rows of uncini from segment 10 to last with notopodia, and the unique morphology of the uncini, resembling type 1 uncini of some polycirrids, except for the position of the dorsal button at mid-length of base, instead of at the base of main fang, as occurs among members of that family.

We include here a redescription of *R. queenslandia* based on type material and also on additional material from Heron Island, to facilitate comparisons with our new species. *Reteterebella queenslandia* has also been reported for the Solomon Islands (Gibbs 1971) and that material should be reviewed to confirm the identification and the distribution of the species.

Key to the known species of *Reteterebella*

1. Lobes on anterior segments present 2
- Lobes on anterior segments absent . . . . . *Reteterebella aloba*
2. Almost smooth mid-ventral shields, terminating well before termination of notopodia . . . . . *Reteterebella queenslandia*
- Strongly corrugated mid-ventral shields, extending to last segment with notopodia, although last 2–3 pairs are almost inconspicuous. . . . . *Reteterebella lirrf* n. sp.

Reteterebella queenslandia Hartman, 1963

(Fig. 13)

Reteterebella queenslandia Hartman 1963: 353–357, pl. 1, figs 1–3.—Hutchings & Glasby 1988: 51 (in part).

Type material. Holotype: AM W.3755, Heron Island, reef flat, 23°27'S, 151°55'E, complete specimen, in excellent shape, but with a deep dorso-lateral cut on right side of body, above line of notopodia, extending from segments 2–16.

Other material examined. AM W.47705, CReefs, HI–10–046, MI QLD 2261, reef flat in front of Heron Island Research Station, 23°27'S, 151°55'E; AM W.32722, AM W.26896, One Tree Island, 23°30'S, 152°05'E.

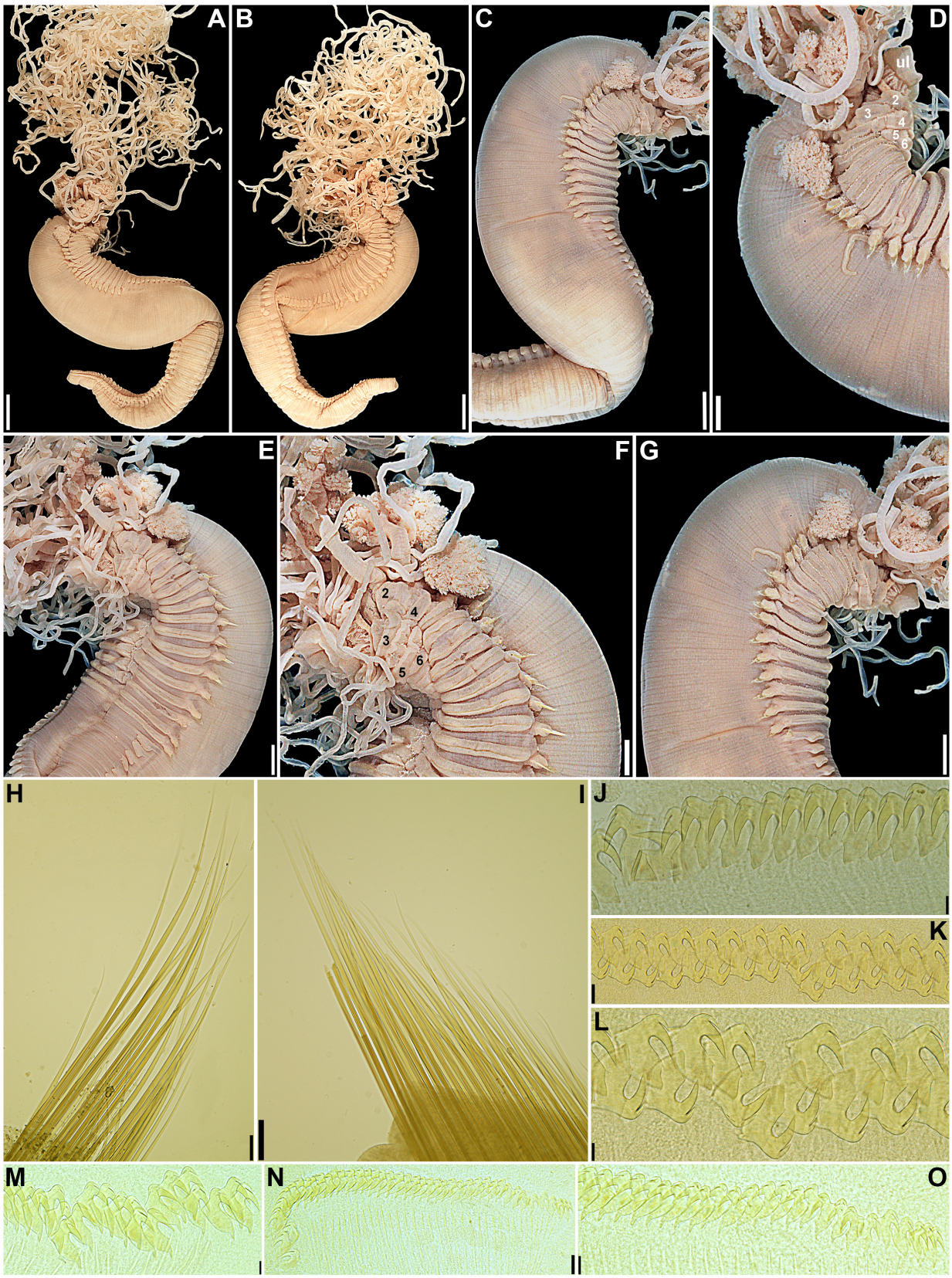


FIGURE 13. *Reteterebella queenslandia* AM W.47705, MI QLD 2261: A–B. Entire worm, right and left lateral views, respectively; C–D, G. Anterior end in progressively higher magnifications, right lateral views, respectively; E–F. Progressively closer views of the anterior end, left lateral view; H–I. Notochaetae, segments 8 and 18, respectively; J–M. Uncini, segments 8, 18 (2), 24, respectively; N–O. Posterior uncini. Numbers refer to segments. Abbreviations: ul = upper lip. Scale bars: A–B = 1 cm, C = 0.6 mm, D, F = 0.3 mm, E, G = 0.4 mm, H = 100 µm, I = 80 µm, J–M, O = 20 µm, N = 40 µm.

Description. Transverse prostomium attached to dorsal surface of upper lip; basal part with eyespots in a continuous row, mid-dorsal gap absent; distal part shelf-like. Long bright white buccal tentacles lacking any pigmentation, several times longer than body length (Fig. 13A–G). Peristomium forming lips, hood-like upper lip, short, nearly circular, as long as wide; short and swollen lower lip, button-like. Segment 1 narrow, ventrally fused to lower lip, segment 2 with thickened anterior margin, protruding as a ventral crest; low, flaring, mostly ventro-lateral lobes present on segments 2–5, wider on segment 2, extending from sides of mouth to lateral body, much narrower lobes on segment 3, aligned with dorsal margins of lobes of segment 2, lobes of segments 4 and 5 about same width, inserted ventro-laterally (Fig. 13A–G). Anterior segments inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–4, each with short, dichotomously branching basal stem, ending with short filaments; progressively shorter pairs, all longitudinally aligned (Fig. 13A–G). Ventral shields on segments 2–16 (in holotype), trapezoidal, those on segment 2 the shortest, larger shields on segments 3–4, short on segment 5 and progressively increasing in length until segment 12; shields broader anteriorly, merging with neuropodia, progressively tapering on segments 4–10, then remarkably narrower, only mid-ventral and almost inconspicuous until segment 16 (Fig. 13B, E–F). Notopodia beginning on segment 5, extending until segments 20 or 21; notopodia short, rectangular, all longitudinally aligned, first pair slightly shorter (Fig. 13A–G). Narrowly-winged notochaetae in both rows, those from posterior row with wings at distal half only (Fig. 13H–I). Neuropodia present from segment 5, as low, almost sessile ridges until termination of notopodia, as low rectangular pinnules thereafter; wide tori on anterior segments, ventral edges of tori of segments 12–20 almost reaching ventral mid-line (Fig. 13A–G). Neurochaetae throughout as short-handled avicular uncini, arranged in double rows from segment 10 to last with notopodia, segments 20 or 21; rows partially intercalated, dorsal buttons aligned; angular, sharp-angled uncini throughout, with short triangular heel, distally pointed prow, dorsal button at mid-length, and crest with 2 teeth above main fang and perhaps a second row as single, minute tooth between teeth of first row (Fig. 13J–O). Nephridial and genital papillae on segments 3–8, dorsal to line of notopodia on segments 3 and 4, between parapodial lobes on segments 5–8. Pygidium smooth to slightly crenulate (Fig. 13A–B). Lives in soft flimsy tubes made of very fine reefal sediments.

Remarks. *Reteterebella queenslandia* was described by Hartman (1963) from the reef flat at Heron Island on the southern GBR. Hutchings & Glasby (1988) reported that the species also occurred at Lizard Island. However, subsequent sampling at Lizard revealed that they represent a new species *R. lirrf* n. sp. These two species live in very different habitats. At Lizard Island, *R. lirrf* n. sp. lives deep down in the coral but still extend their buccal tentacles out over the coral and substrate, and can be challenging to collect. At Heron Island, *R. queenslandia* can be easily collected by just turning over loose flat dead coral plates and the flimsy fine sediment tube is loosely attached to the undersurface (see Mather & Bennett 1984, Plate 111, fig. 2) and easily removed. Our analysis of material from the Lizard Island, however, revealed slight, but conspicuous morphological variation between this material and specimens from Heron Island, mostly in the shape and number of mid-ventral shields, and the morphology of the uncini. For this reason, together with their occurrence in different habitats, we describe the material from Lizard Island as a new species. We suspect this species is widespread across the GBR. In contrast, we suggest that *R. queenslandia* is restricted to the reef flat at Heron and nearby One Tree Island, as this type of reef flat is not a widespread habitat on the GBR (PH pers observ.).

Distribution. Currently only known from Heron Island reef flat and nearby One Tree Island. The species has been recorded from the Solomon Islands by Gibbs (1971), but this material should be checked.

***Reteterebella lirrf* n. sp.**
(Figs 1E–H, 14–15)

Type material. Holotype: AM W.47708, Coconut Beach, Lizard Island, 14°40'S, 145°28'E, 20 Nov 1985, posteriorly incomplete, 60 mm long, 20 mm maximum width. Paratypes: AM W.44545, MI QLD 2416, posteriorly incomplete, 65 mm long, 15 mm maximum width; AM W.47709 (2), CReefs, LI–10–052, MI QLD 2206, Turtle Bay, 14°39'14"S, 145°26'59"E, 1 complete specimen in excellent shape, 500 mm long, 12 mm maximum width, other posteriorly incomplete; AM W.200132, Coconut Beach, Lizard Island, 14°40'S, 145°28'E, 20 Nov 1985, well preserved, complete but in 3 pieces, anterior section 70 mm long, 15 mm maximum width, mid section 30 mm long, 6 mm wide, posterior section 60 mm long, 5 mm wide; AM W.29559, off Mermaid Cove, North Point, 14°39'S, 145°27', Mar 1995, complete but in 2 pieces, anterior 70 mm long, 12 mm maximum width and posterior piece 35 mm long, 8 mm maximum width.

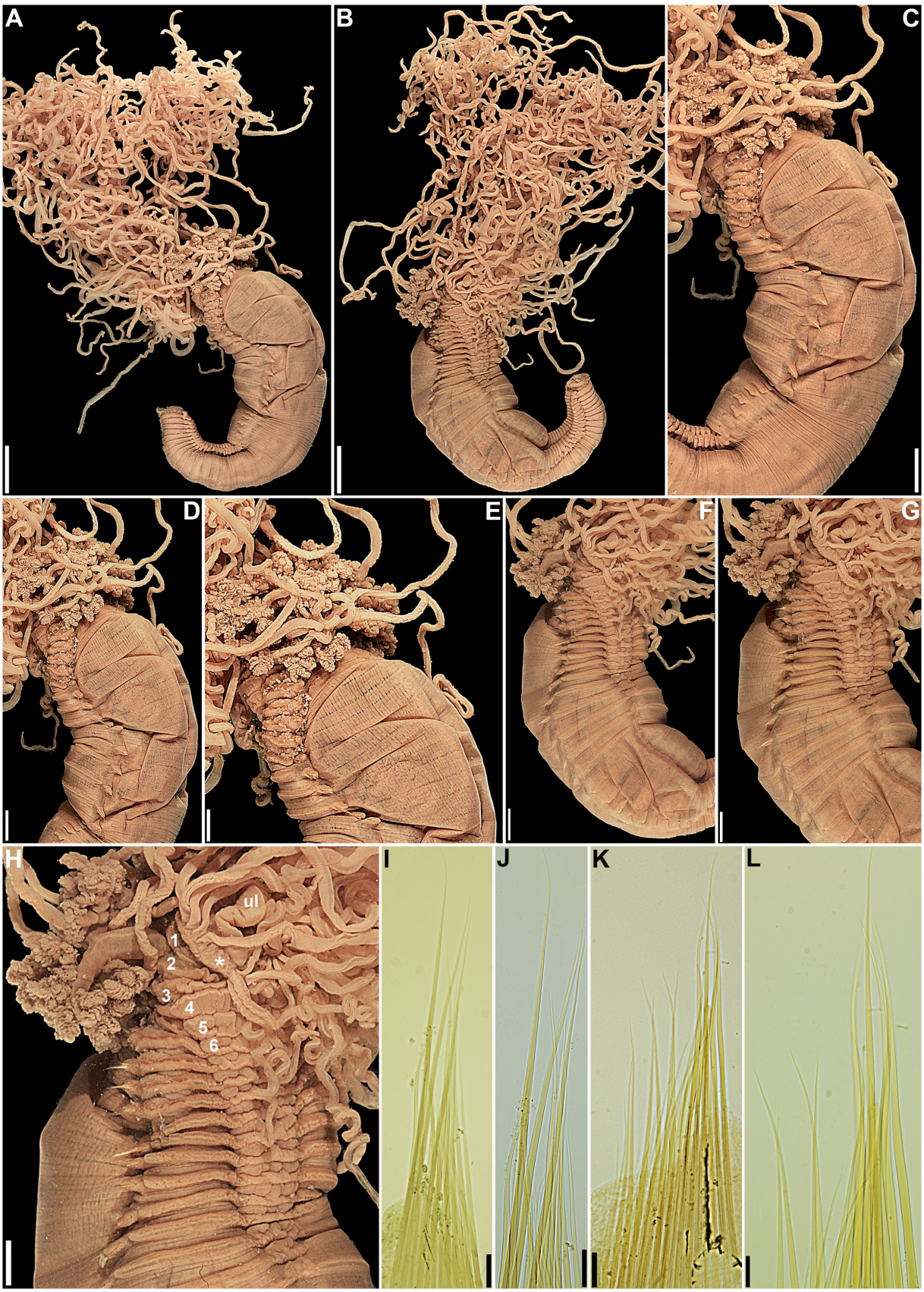


FIGURE 14. *Reteterebella lirrf* n. sp. AM W.47708: A–B. Entire incomplete worm, left and right lateral views, respectively; C–H. Anterior end in progressively higher magnifications, left dorso-lateral and right ventro-lateral views, respectively; I–J. Notochaetae, segment 7; K–L. Notochaetae, segment 19. Numbers refer to segments. Abbreviations: ul = upper lip; * = distal part of prostomium. Scale bars: A–B = 1 cm, C, F = 5 mm, D, G = 4 mm, E, H = 3 mm, I–K = 100 µm, L = 50 µm.

Other material examined. AM W.47710 (incomplete), CReefs, LI–10–052, MI QLD 2206, Turtle Bay, 14°39'14"S, 145°26'59"E.

Comparative material examined. Holotype of *Reterebella queenslandia* Hartman, 1963, AM W.3755.

Description. In life pinkish white body with dark red, brownish branchiae (Fig. 1E–H). Transverse prostomium attached to dorsal surface of upper lip; basal part with eyespots in a continuous row, mid-dorsal gap absent; distal part shelf-like. Long, bright white buccal tentacles lacking any pigmentation, several times longer than body length, highly extensile (Figs 1E–H; 14A–H). Peristomium forming lips, hood-like upper lip short, nearly circular, as long as wide; short and swollen lower lip button-like. Segment 1 narrow, ventrally fused to lower lip, segment 2 with thickened anterior margin, protruding as a ventral crest; low, flaring, mostly ventro-lateral lobes present on segments 2–5, wider on segment 2, from sides of mouth to lateral body, progressively narrower until segment 5 (Fig. 14B, F–H). Anterior segments inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–4, each with short, dichotomously branching basal stem, ending by relatively short filaments; progressively shorter pairs, all longitudinally aligned (Fig. 14A–H). Ventral shields from segment 4 to last with notopodia, rectangular, deeply corrugated, progressively narrower until last, on segment 20, last 2–3 pairs much narrower, only mid-ventral (Fig. 14B, F–H). Notopodia beginning on segment 5, extending until segment 20; notopodia short, rectangular, all longitudinally aligned, first pair slightly shorter (Fig. 14A–H). Narrowly-winged notochaetae in both rows, those from posterior row with wings at distal half only (Fig. 14I–L). Neuropodia present from segment 5, as low, almost sessile ridges until termination of notopodia, as low rectangular pinnules thereafter; wide tori on anterior segments, ventral edges of tori of last 4 segments with notopodia almost reaching ventral mid-line (Fig. 14A–H). Neurochaetae throughout as short-handled avicular uncini, arranged in double rows from segment 10 to last with notopodia, segment 20; rows partially intercalated, dorsal buttons aligned; angular, sharp-angled uncini throughout, with short triangular heel, distally pointed prow, dorsal button at mid-length, and crest with 2 teeth above main fang and perhaps a second row as single, minute tooth between teeth of first row (Fig. 15A–D). Nephridial and genital papillae on segments 3–8, those on segments 3 and 4 elongate, inserted ventrally to branchiae, those on segments 5–8 rounded, situated between notopodia and neuropodia, more ventral than those of segments 3 and 4. Pygidium smooth to slightly crenulate. Lives in flimsy tube which lines the burrow deep within the coral, made of very fine coralline sediment.

Remarks. Morphologically, *R. queenslandia* and *R. lirrf* n. sp. are very similar species, sharing similar body measurements, number of pairs of notopodia, beginning of noto- and neuropodia, and of double rows of uncini, and morphology of lobes on segments 2–5, notochaetae and uncini. These species differ, however, in addition to the different life habitats, because specimens from Lizard Island *R. lirrf* n. sp. have deeply corrugated mid-ventral shields extending through all segments with notopodia, although the last pairs are much shorter, while *R. queenslandia* material only has mid-ventral shields on anterior segments with notopodia, and these are smooth. In addition, there is a slight difference in the morphology of the uncini, as in *R. lirrf* n. sp. the prow is more abruptly inclined (compare Figs 13J–O and 15A–D). Both these species can easily be distinguished from the other species of the genus, *R. aloba* Hutchings & Glasby, 1988, which completely lacks lobes and is a much smaller species.

Although not a borer, this new species lives deep inside crevices within the reef substrate, and spreads its highly extensile buccal tentacles over the substrate, from narrow openings on the reef structure. The Australian Museum database has no other records from the GBR other than those from Lizard Island, which all represent *Reterebella lirrf* n. sp. We also know that it occurs at Milln Reef, off Cairns (OC pers observ.). The lack of museum records is almost certainly due to the difficulty in extracting this species from deep down in the reef structure. However, this has not prevented numerous photographs of this genus occurring in coral reef books, with the white buccal tentacles extending over the reef floor, and we suggest that any specimen photographed in waters below 3–5 m belong to this new species, especially where surrounded by living coral.

Etymology. This species is called "*lirrf*", after the acronym of the Lizard Island Reef Research Foundation, which generously supported this polychaete workshop.

Type locality. Coconut Beach, 14°40'S, 145°28'E, Lizard Island, GBR, Australia.

Distribution. Currently only known from Lizard Island, but likely occurs elsewhere on the GBR.

Genus *Pista* Malmgren, 1866

Pista.—Hutchings & Glasby 1988: 38; Santos *et al.* 2010: 32–33; Nogueira *et al*. 2011: 3.

Type-species. *Amphitrite cristata* Müller, 1776, by original designation.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part sometimes with eyespots; distal part shelf-like. Buccal tentacles usually much shorter than body. Peristomium forming lips; hood-like upper lip, usually as wide as long; small, swollen lower lip, restricted to oral area. Segment 1 reduced dorsally, with lobes of variable size and position. Lobes of variable size and position present on following anterior segments, usually until segment 4, sometimes even more posteriorly. Paired dorso-lateral arborescent, pectinate or plumous branchiae present from segment 2, typically 2 pairs, on segments 2 and 3, rarely a single pair or 3 pairs. Anterior segments with glandular, rectangular to trapezoidal, smooth to slightly corrugated mid-ventral shields; mid-ventral groove extending posteriorly from termination of mid-ventral shields. Short and conical notopodia beginning from segment 4, typically extending for 17 segments, until segment 20. Winged notochaetae in both rows, wings always conspicuous, frequently broadly-winged, as broad as width of shaft or broader. Neuropodia present from segment 5, as low ridges until termination of notopodia, as raised pinnules thereafter. Neurochaetae throughout as avicular uncini, arranged in partially to completely intercalated double rows from segment 11 until termination of notopodia; at least some anterior segments with long-handled uncini, frequently until segment 10, or until termination of notopodia; uncini with dorsal button at mid-length of base, conspicuous at least until termination of notopodia, and crest with several transverse rows of secondary teeth. Nephridial and genital papillae usually present on segments 3 and 6–7, respectively, the latter posterior and dorsal to notopodia. Pygidium smooth to slightly crenulate (Santos *et al.* 2010; Nogueira *et al.* 2011).

Remarks. *Pista* has been reported worldwide and more than 70 species are known, of which 14 are known to occur in Australian waters (Hutchings & Glasby 1988; Hutchings 1997a, 2007). This genus is characterized by the presence of lobes on anterior segments, two pairs of branchiae, 17 pairs of notopodia, on segments 4–20, bearing winged chaetae, usually broadly-winged, and long-handled uncini at least on some anterior segments. Hutchings & Glasby (1988) provide a table of the characters to distinguish among Australian species, but since then three additional Australian species have been described, *P. kimberliensis* Hutchings & Glasby, 1990, from NW Australia, *P. gwoyarrma* Hutchings, 1997b, from Darwin Harbour, NT, and *P. torquata* Hutchings, 2007, from Tasmania.

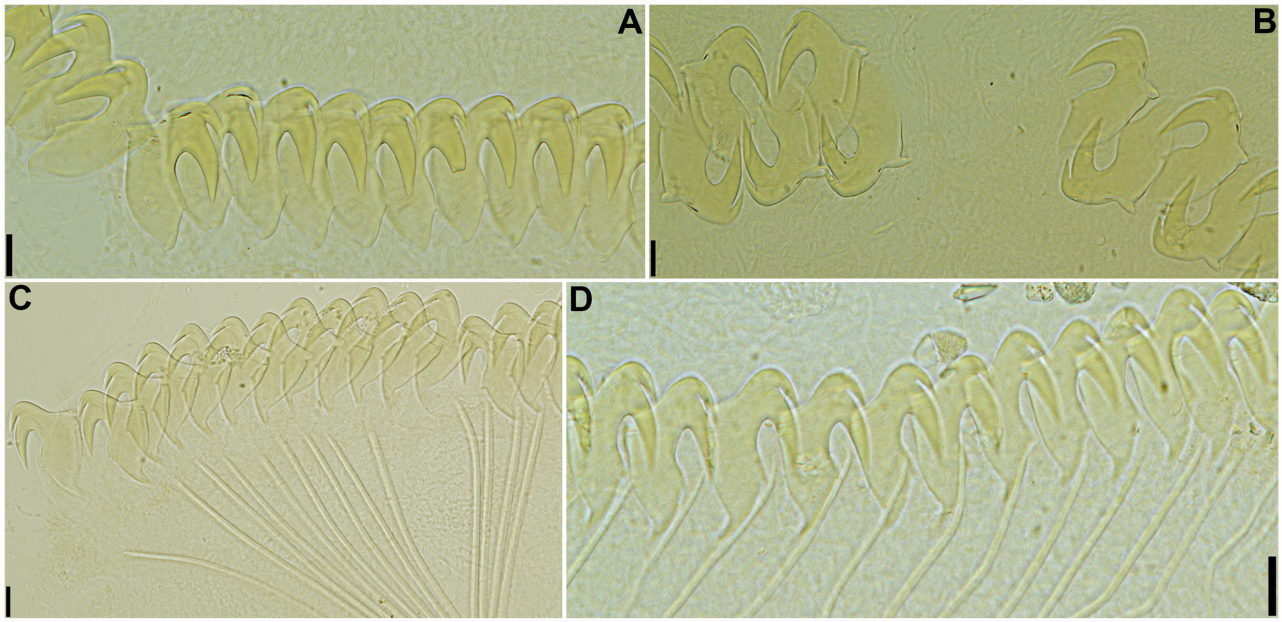


FIGURE 15. *Reteterebella lirrf* n. sp. AM W.44545: A–D. Uncini, segments 7, 19, 23 and posterior uncini, respectively. Scale bars: A–D = 20 µm.

Smith (1992), Santos *et al.* (2010) and Nogueira *et al.* (2011) discussed the most important characters to distinguish among the species in this genus, which include the morphology of the lobes on anterior segments, branchiae and uncini, distribution of long-handled uncini, and distribution and position of nephridial and genital papillae.

Out of the 14 species of *Pista* recorded for Australian waters, seven are known from the GBR or other reefal areas in Australia, *P. curtiuncinata* Hartmann-Schröder, 1981 (from NW Australia & GBR), *P. pectinata* Hutchings, 1977 (from NW Australia & southern GBR), *P. trina* Hutchings, 1977 (from Moreton Bay, southern QLD), *P. trunca* Hutchings, 1977 (from Moreton Bay, southern QLD & GBR), *P. violacea* Hartmann-Schröder, 1984 (from NT & WA), *P. typha* Grube, 1878 (from GBR & southern QLD), and *P. kimberliensis* Hutchings & Glasby, 1990 (from NW Australia). In the present study we found three new species of *Pista.* The types of all these species were examined and compared with the new species from Lizard Island. No species of *Pista* have previously been recorded from Lizard Island or from the northern GBR.

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

1. Large lobes on segments 1, directed anteriorly and covering the upper lip; arborescent branchiae 2
- Short lobes on segment 1, just lateral to mouth; plumose branchiae . . . . . *Pista anneae* n. sp.

2. (1) Long-handled uncini only present on segments 5–7. . . . . *Pista chloroplokamia* n. sp.
- Long-handled uncini present until segment 20 . . . . . *Pista kristiani* n. sp.

Pista anneae n. sp.

(Figs 1D, 16–20)

Type material. Holotype: AM W.44513, MI QLD 2370, Vicki´s Reef, 14°41'16"S, 145°26'35"E. Paratypes: AM W.44958, MI QLD. 2424 (mounted on SEM pin), reef on north eastern side of South Island, 14°42'13"S, 145°27'37"E, 21 Aug 2013; AM W.47711, CReefs, LI–10–041, MI QLD 2202, MacGillivray Reef, 14°39'24"S, 145°29'34"E, complete, in excellent state, 92 segments, ~18 mm long, ~1 mm wide.

Comparative material examined. Holotype of *Pista curtiuncinata* Hartmann-Schröder, 1981, HZM P16500. Holotype of *Pista kimberliensis* Hutchings & Glasby, 1990, AM W.203525. Holotype of *Pista pectinata* Hutchings, 1977, AM W.6795. Holotype of *Pista pegma* Hutchings & Smith, 1997, AM W.22574. Holotype of *Pista trina* Hutchings, 1977, AM W.6798. Holotype of *Pista trunca* Hutchings, 1977, AM W.6973. Holotype of *Pista typha* Grube, 1878, MPW 518. Holotype of *Pista violacea* Hartmann-Schröder, 1984, NTM W.1644.

Description. In life, orange to red anterior body with bright red branchiae, brownish after termination of notopodia, colourless buccal tentacles (Fig. 1D). Transverse prostomium attached to dorsal surface of upper lip; basal part with eyespots in thin, continuous row, mid-dorsal gap absent; distal part shelf-like. Relatively elongate buccal tentacles lacking any pigmentation, longer tentacles longer than region with notopodia (Figs 1D; 16A–I, K–M, O–Q, 17A–M, 18A). Peristomium forming lips, hood-like upper lip, short, wider than long; short and swollen lower lip, button-like (Figs 16A, F, I, P; 17B, G–H, M). Segment 1 narrow, forming low ventral lobe marginal to mouth; anterior segments with thickened anterior margins dorsally, forming low crests; segment 2 also protruding as a ventral crest, with pair of triangular, distally rounded ventro-lateral lobes; segment 3 with pair of developed lateral lobes, larger than those segment 2 and covering them, with straight lateral and distal margins; segment 4 with pair of much shorter rounded lobes, almost inconspicuous (Figs 16A–I, K–M, O–Q; 17A–M; 18A). Anterior segments not remarkably inflated dorsally. Paired dorso-lateral plumous branchiae present on segments 2–3, usually first pair distinctly larger and inserted more dorsally, but frequently missing one or both branchiae of a pair, and different sizes within a pair; each branchia with relatively long, crenulate basal stem, and branchial filaments originating in a spiral at tip; branchial filaments dichotomously branching for few levels, with lateral ciliary track and short tips (Figs 16B–E, G–H, K–M, O, Q; 17A, C–F, I–L; 18A–C). Smooth, slightly corrugated anteriorly mid-ventral shields present from segment 2 to termination of notopodia, on segment 20, rectangular shields, of uniform width except for last 3–4 pairs (Figs 16C, E–F, I, L, O–P; 17B, G–J, L–M). Notopodia beginning on segment 4, extending until segment 20; notopodia short, rectangular, all longitudinally aligned, first two pairs slightly shorter and dorsally aligned to following pairs (Figs 16A–E, G–H, K–M, O, Q; 17A–M; 18A–B, D–F, J–K). Broadly-winged notochaetae in both rows, rounded geniculate wings, broader on one side, those from posterior row with wings at tips

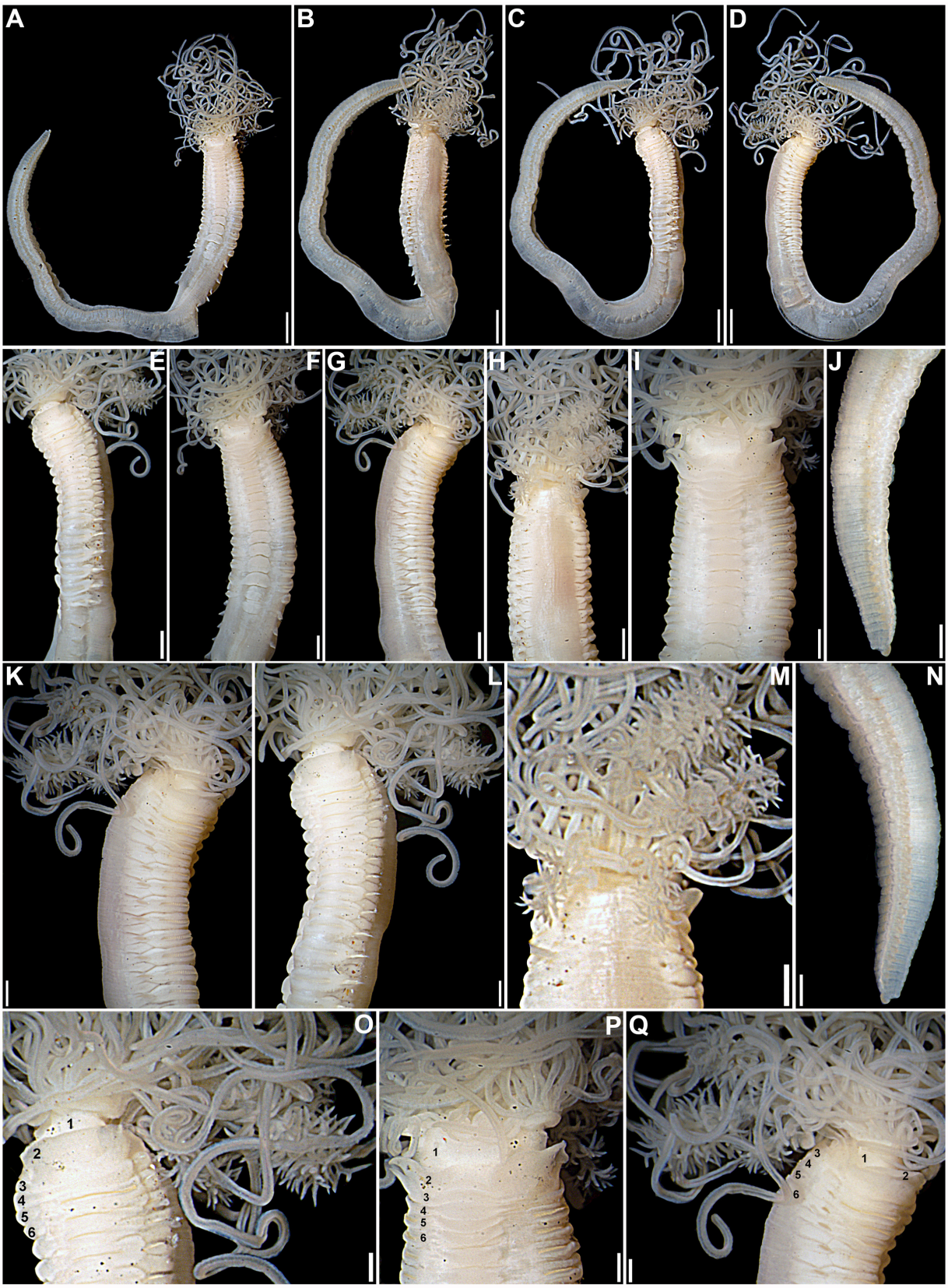


FIGURE 16. *Pista anneae* n. sp. AM W.44513: A–D. Entire worm, ventral, left dorso-lateral, left and right lateral views, respectively; E–H. Anterior end, left lateral, ventral, right lateral, and dorsal views, respectively; I, K–M. Close ups of the anterior end, ventral, right and left lateral, and dorsal views, respectively; J, N. Posterior end, right and left lateral views, respectively; O–Q. Progressively closer views of the anterior end, left lateral, ventral and right lateral views, respectively. Numbers refer to segments. Scale bars: A–D = 1 mm, E–H = 0.5 mm, I–N = 0.3 mm, O–Q = 0.2 mm.

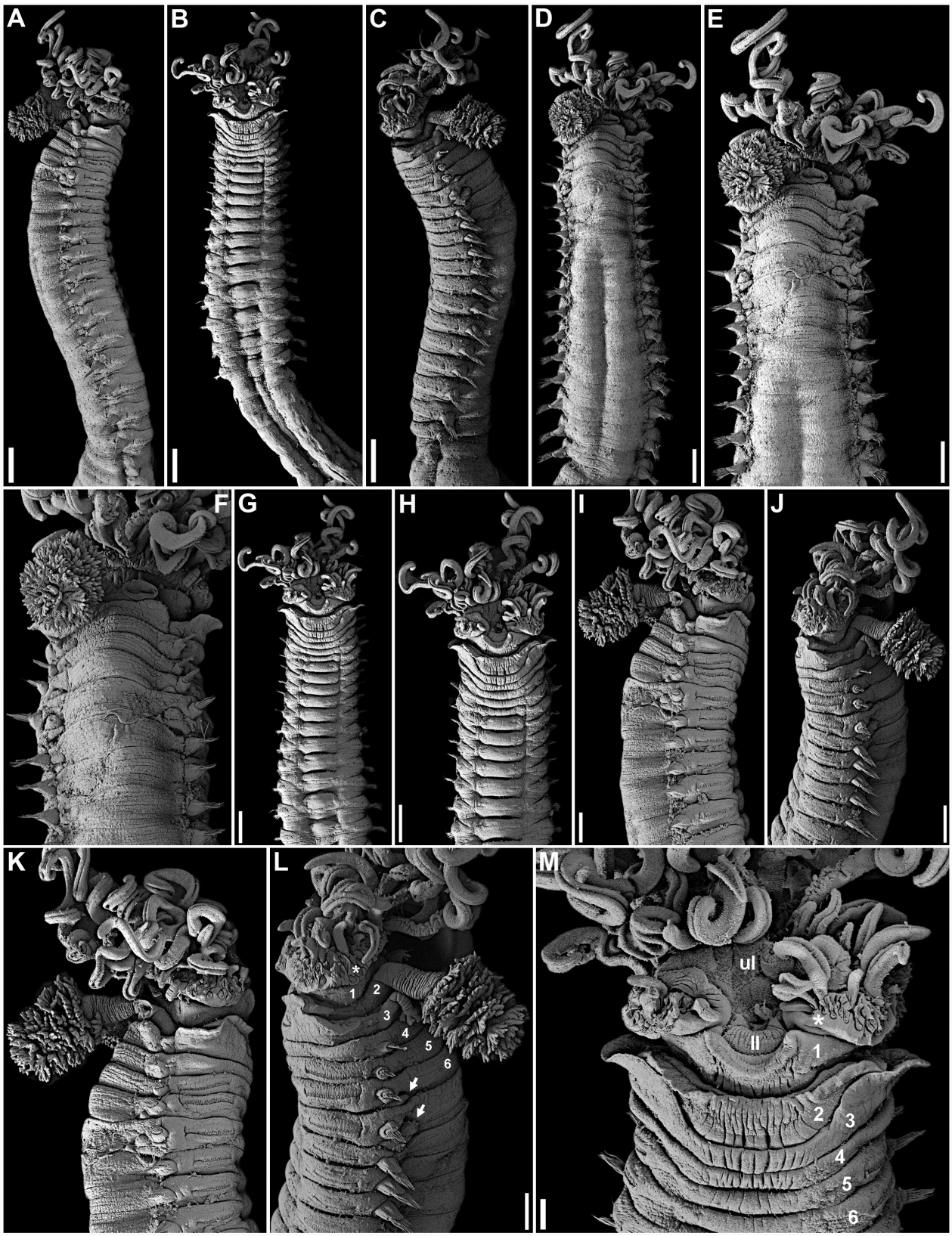


FIGURE 17. *Pista anneae* n. sp. AM W.44958: A–C. Anterior end, right lateral, ventral, and left lateral views, respectively; D–F. Anterior end in progressively higher magnifications, dorsal views; G–H. Progressively closer views of the anterior end, ventral views; I–J. Anterior end, right and left lateral views, respectively; K–M. Close ups of the anterior end, right and left lateral, and ventral views, respectively. Numbers refer to segments. Abbreviations: ll = lower lip; ul = upper lip; * = distal part of prostomium. Scale bars: A, D, H = 0.7 mm, B–C = 1 mm, E, J = 0.6 mm, F, K = 0.3 mm, G = 0.8 mm, I, L = 0.4 mm, M = 0.2 mm.

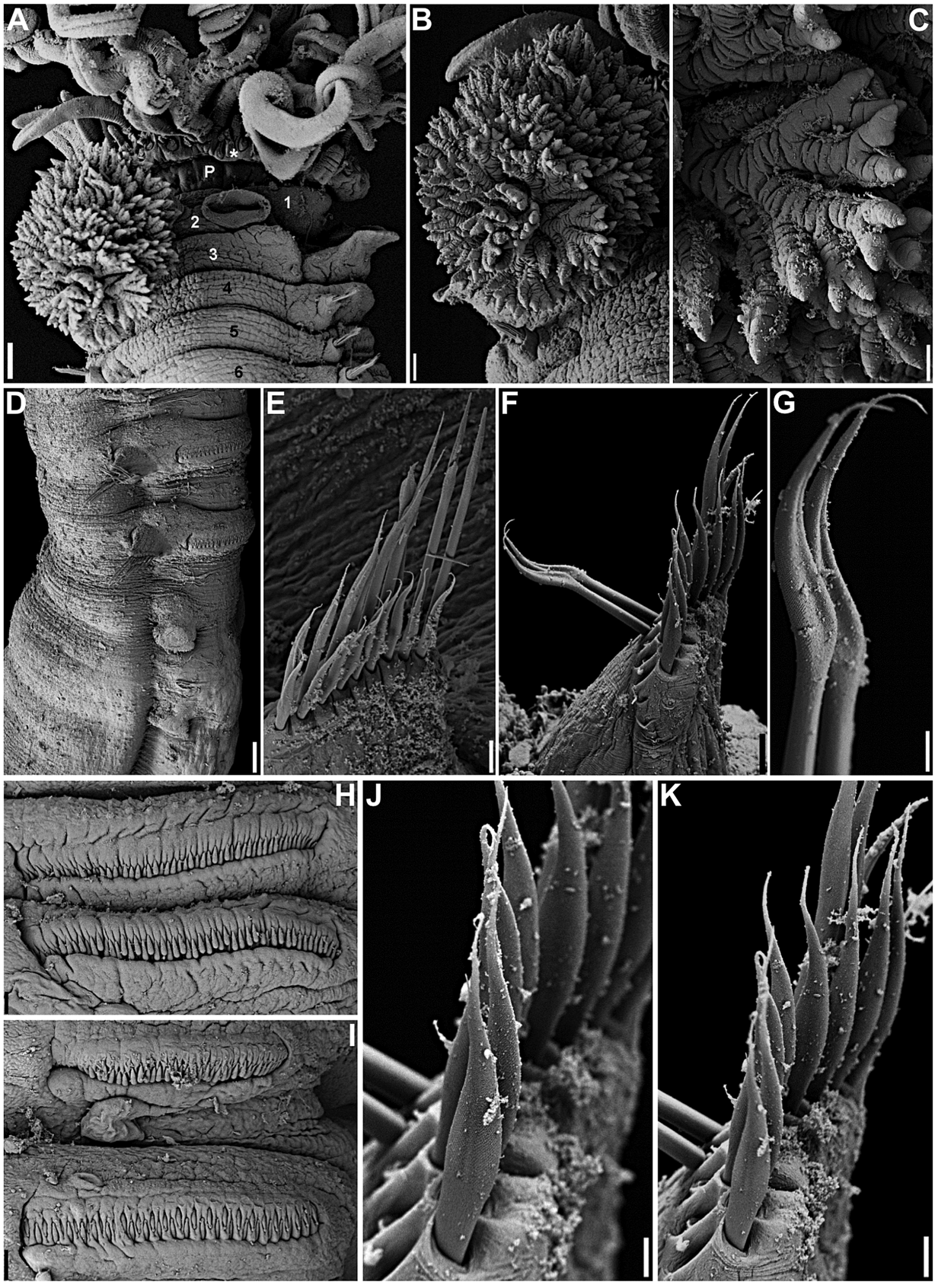


FIGURE 18. *Pista anneae* n. sp. AM W.44958: A. Close up of the anterior end, dorsal view; B–C. Closer views of the branchiae; D. Transition between anterior and posterior body, right lateral view; E. Notopodium of the segment 20; F–G, J–K. Progressively closer views of notochaetae, segment 10; H–I. Close ups of neuropodia, segments 5–6 and 10–11, respectively Scale bars: A, D = 200 µm, B = 100 µm, C, H = 40 µm, E–F = 30 µm, G, J = 10 µm, I = 50 µm, K = 15 µm.

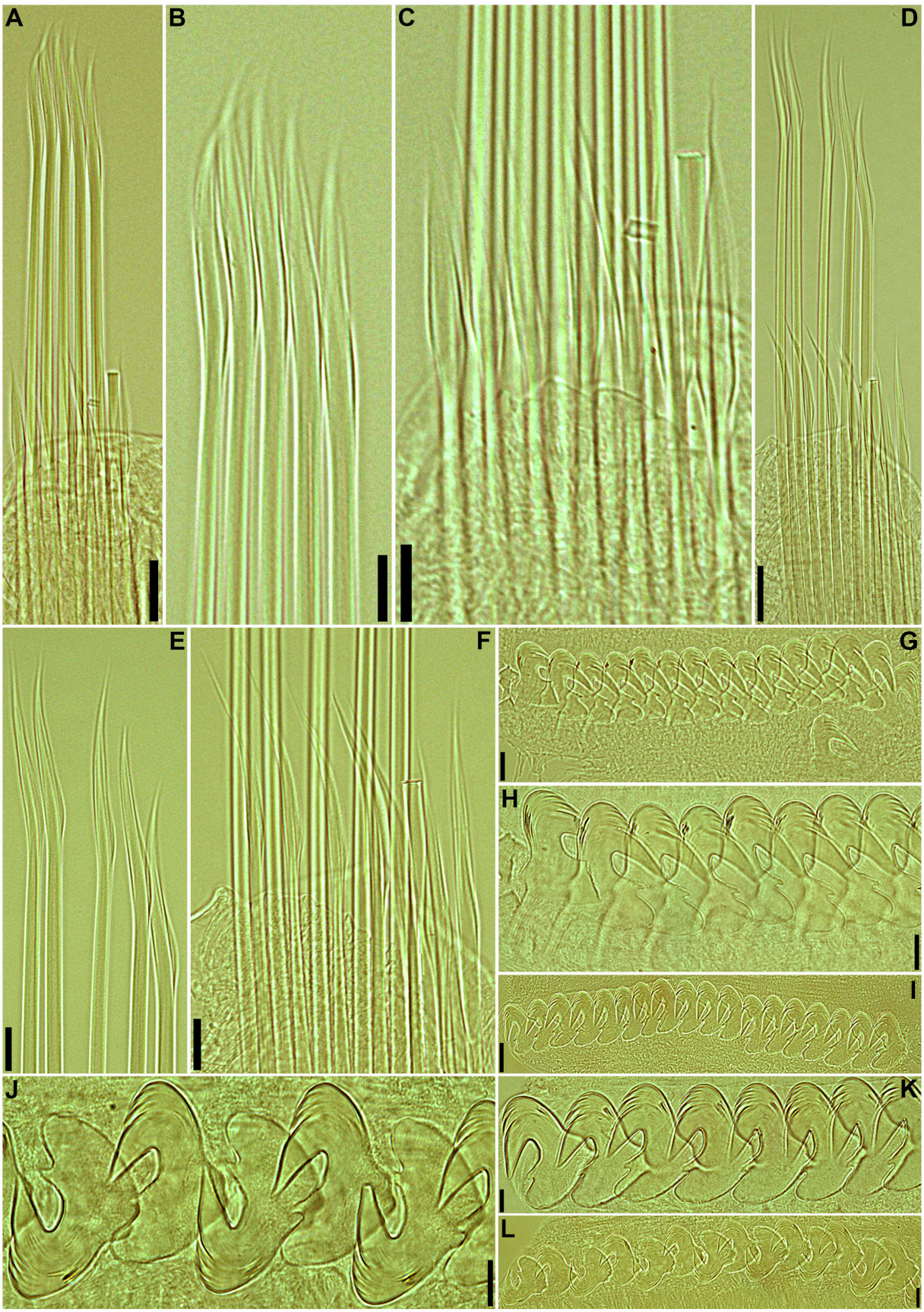


FIGURE 19. *Pista anneae* n. sp. AM W.44513: A–C. Notochaetae, segment 6; D–F. Notochaetae, segment 20; G–H. Uncini, segment 5; I, K. Uncini, segment 10; J, L. Uncini, segment 20. Scale bars: A = 30 µm, B–C, G = 15 µm, D = 40 µm, E–F, I, L = 20 µm, H, J–K = 10 µm.

only (Figs 18E–G, J–K; 19A–F). Neuropodia present from segment 5, as low, almost sessile ridges until termination of notopodia, as low rectangular pinnules thereafter (Figs 16A–G, I–L, N–Q; 17A–C, G–M). Neurochaetae as long-handled avicular uncini on segments 5–10, thin handles originating from heel only, progressively less developed; on segments 11–20, short-handled uncini, arranged in completely intercalated double rows; avicular uncini throughout, with short, triangular and distally rounded heel, rounded prow, dorsal button at mid-length, conspicuous throughout, and crest with 4–5 transverse rows of numerous, progressively shorter secondary teeth (Figs 19G–L; 20A–G). Nephridial papillae at base of branchiae of segment 3, genital papillae on segments 6–7, dorsal and posterior to notopodia. Pygidium smooth to slightly crenulate, with rounded ventral papilla (Fig. 16A–D, J, N). Tube unknown.

Remarks. Of the 14 species of *Pista* known to occur in Australian waters, seven have plumous branchiae: *P. anthela* Hutchings & Glasby, 1990, *P. australis* Hutchings & Glasby, 1988, *P. curtiuncata* Hartmann-Schröder, 1981, *P. gwoyarrma* Hutchings, 1997b, *P. kimberliensis* Hutchings & Glasby, 1990, and *P. typha* Grube, 1878.

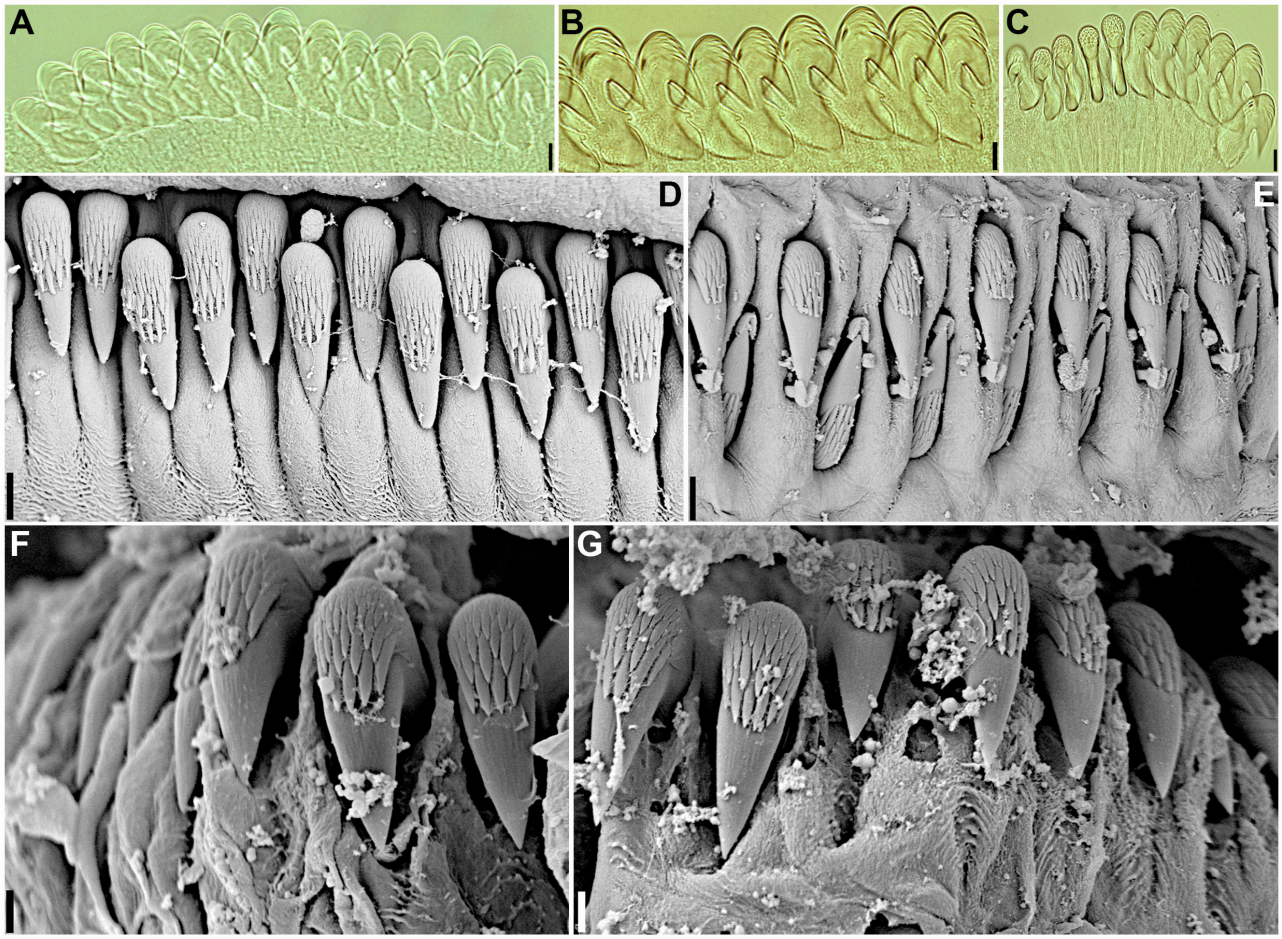


FIGURE 20. *Pista anneae* n. sp. AM W.44513: A–C. Uncini, segments 23, 25, 58, respectively. AM W.44958: D–G. Uncini, segments 6, 12, 21, 31, respectively. Scale bars: A = 10 µm, B–C = 7 µm, D–E = 10 µm, F–G = 5 µm.

Of those, *P. curtiuncata* and *P. typha* clearly differ from *P. anneae* n. sp. in having segment 1 with large lobes, directed anteriorly and covering partially or completely the upper lip. *Pista anthela*, on the other hand, has a single pair of branchiae on segment 2 and short-handled uncini throughout, which are diagnostic features for the genus *Pistella* Hartmann-Schröder, 1996 and this species is herein transferred to that genus (see below).

Pista australis, described from southern Australia, differs from *P. anneae* n. sp. in lacking prostomial eyespots, and in having branchiae with different branching pattern, with large secondary stems; oblique, laterally higher lobes of segment 3; and broadly-winged, not geniculate notochaetae, with wings of similar size at both sides (Hutchings & Glasby 1988). In *P. anneae* n. sp., on the other hand, eyespots are present in a thin continuous row

across prostomium; branchial filaments are of uniform width, without enlarged secondary stems; lobes of segment 3 are rectangular, with straight lateral and distal margins; and notochaetae are geniculate, with rounded wings broader at one side.

Prostomial eyespots are also absent among specimens of *P. gwoyarrma* and, in addition, members of this species have lobes of anterior segments of different morphology in relation to *P. anneae* n. sp., those of segment 2 are larger, rectangular and those of segment 3 are oblique; and long-handled uncini are only present on segments 5 and 6 (Hutchings 1997b). In *P. anneae* n. sp. the lobes of segment 2 are distally rounded and lobes of segment 3 are rectangular and larger, completely covering lobes of segment 2 in lateral view, while long-handled uncini are present until segment 10.

Pista kimberliensis also lacks prostomial eyespots and has lobes of anterior segments with different morphology, those of segment 2 are rectangular, visible all around, lobes of segment 3 distally rounded and inserted laterally, and long-handled uncini are only present until segment 9 (Hutchings & Glasby 1990).

Etymology. This species is named "*anneae*" after Dr Anne Hoggett, a Co-Director of Lizard Island Research Station who strongly supported the workshop and helped in the development of the funding proposal to the LIRRF.

Type locality. Big Vicki´s Reef, 14°41'16"S, 145°26'35"E, Lizard Island, GBR, Australia.

Distribution. Known only from the Lizard Island region.

***Pista chloroplokamia* n. sp.**
(Figs 1I–J; 21–25)

Material examined. Holotype: AM W.44613, MI QLD 2400, Coconut Beach, 14°40'53"S, 145°28'12"E, reef flat, extreme low tide. Paratypes: AM W.44599, MI QLD 2396, complete, in excellent state of preservation, ~20 mm long, 1.8 mm wide at mid-thorax, ~2 mm wide at beginning of abdomen, mounted on SEM pin; AM W.47712, CReefs, LI–10–039, MI QLD 2203, Lagoon, 14°41'14"S, 145°27'18"E, 3 specimens, all incomplete, one of which in excellent state of preservation, with 33 segments, both pairs of branchiae present, 10 mm long, ~5 mm wide, dissected and put in a separate vial, other two specimens also incomplete, one with 30 segments, the other with 18–19; AM W.44713, CReefs, LI–10–021, MI QLD 2195, Watsons Bay, 14°39'26"S, 145°27'03"E, incomplete specimen, in excellent state of preservation, with 53 segments, ~11 mm long, ~0.7 mm wide; AM W.44962, MI QLD 2429, posteriorly incomplete, 5 mm long, 1 mm wide, gravid.

Other material examined. AM W.40289, Outer Yonge Reef, GBR, 14°36'S, 145°38'E, 11 Jan 1975.

Comparative material examined. Holotype of *Pista curtiuncinata* Hartmann-Schröder, 1981, HZM P16500. Holotype of *Pista kimberliensis* Hutchings & Glasby, 1990, AM W.203525. Holotype of *Pista pectinata* Hutchings, 1977, AM W.6795. Holotype of *Pista pegma* Hutchings & Smith, 1997, AM W.22574. Holotype of *Pista trina* Hutchings, 1977, AM W.6798. Holotype of *Pista trunca* Hutchings, 1977, AM W.6973. Holotype of *Pista typha* Grube, 1878, MPW 518. Holotype of *Pista violacea* Hartmann-Schröder, 1984, NTM W.1644.

Description. In life, orange to red body and branchiae, with diffuse green buccal tentacles (Fig. 1I–J). Transverse prostomium attached to dorsal surface of upper lip; basal part with numerous isolated eyespots laterally, covered by lobes on segment 1, and distinctly thin row at base of prostomium with scattered isolated eyespots, leaving wide mid-dorsal gap; distal part of prostomium shelf-like. Peristomium forming lips, hood-like upper lip, short, about as wide as long, circular; short and swollen lower lip, button-like (Figs 21A, E, J; 22A, E, I). Segment 1 narrow, with pair of large lobes directed anteriorly and reaching tip of upper lip; lobes originating dorso-laterally, at level of first pair of branchiae; dorsal edges oblique, lobes higher laterally, distally rounded, connected to each other by thinner indented membrane ventrally, partially exposing lower lip; anterior margins of anterior segments as protruding crests dorsally, segment 2 with pair of short, rounded ventro-lateral lobes, connected to each other by mid-ventral crest; segment 3 with pair of developed lateral lobes, larger than those of segment 2, rounded, almost semicircular lobes, originating ventrally at level of dorsal edges of neuropodia and laterally to branchiae dorsally; segment 4 with pair of much shorter distally rounded lobes, almost inconspicuous (Figs 1J; 22A–H, J–M; 22A–K; 23A). Anterior segments slightly inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–3, usually first pair distinctly larger and inserted more dorsally, but frequently missing one or both branchiae of a pair, and also members of a pair differing in size; each branchia with conspicuous, crenulate basal stem, and secondary stems originating all at same level and dichotomously branching for some levels, with lateral ciliary track and short tips (Figs 21B, D, F, H, K, M; 22A–K; 23A–C). Smooth, slightly corrugated anteriorly mid-ventral shields



FIGURE 21. *Pista chloroplokamia* n. sp. AM W.44613: A–D. Entire worm, ventral, left and right lateral, and dorsal views, respectively; E–H. Anterior end, ventral, left and right lateral, and dorsal views, respectively; I. Transition between anterior and posterior body, left lateral view; J–M. Close ups of the anterior end, ventral, left and right lateral, and dorsal views, respectively; N. Close up of the posterior end, right lateral view. Numbers refer to segments. Abbreviations: ll = lower lip; ul = upper lip. Scale bars: A–D = 1.5 mm, E–H = 0.6 mm, I–N = 0.3 mm.

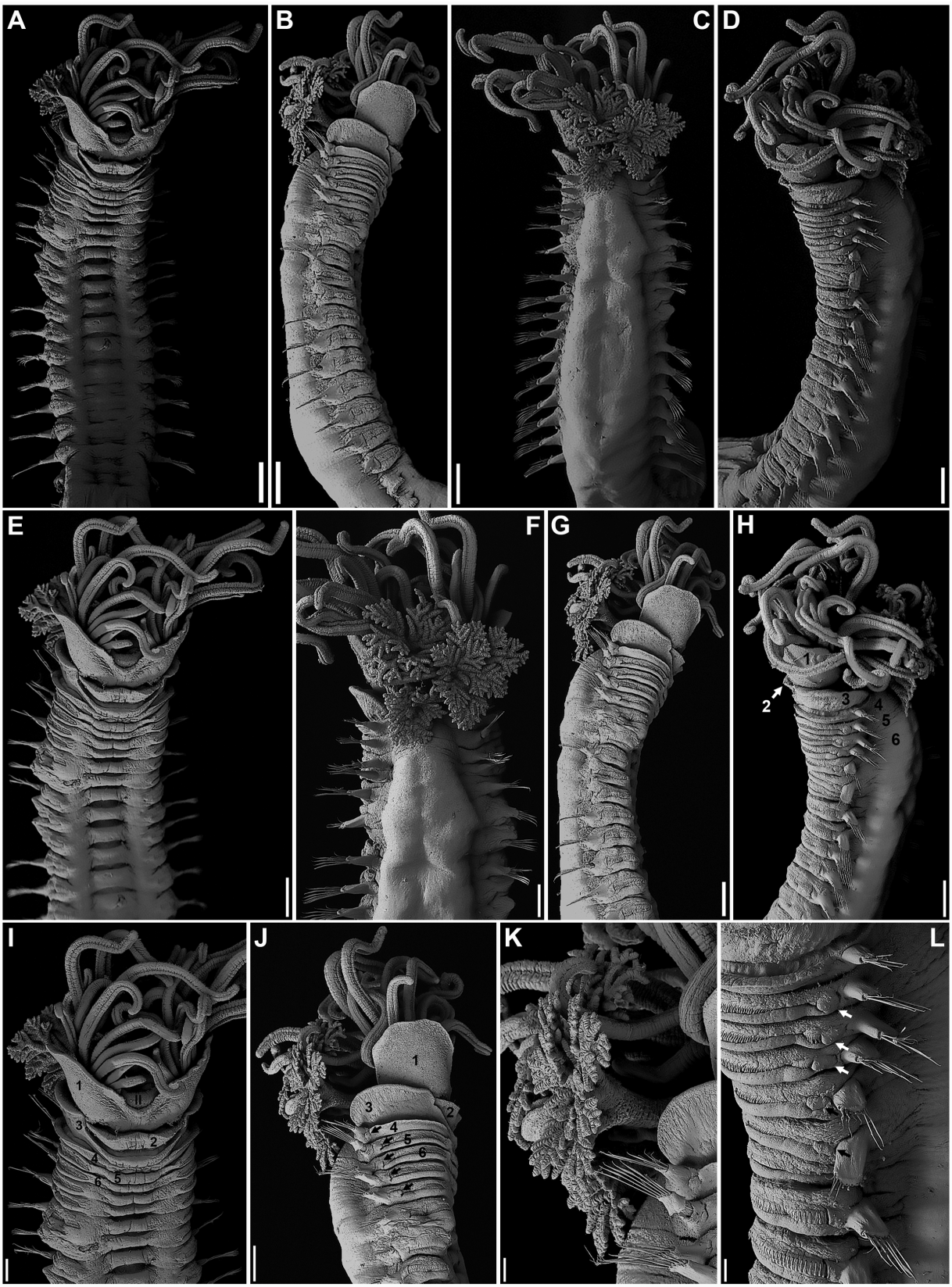


FIGURE 22. *Pista chloroplokamia* n. sp. AM W.44599: A–D. Anterior end in ventral, right lateral, dorsal and left lateral views, respectively; E–H. Closer views of the anterior end, ventral, dorsal, right and left lateral views, respectively; I–J. Close ups of the anterior end, ventral and right lateral views, respectively; K. Close up of the branchiae and notopodia of segments 4–6; L. Close up of the parapodia of segments 4–10, left lateral view. Numbers refer to segments; unspecified arrows point to nephridial and genital papillae. Abbreviations: ll = lower lip. Scale bars: A–C = 500 µm, D, F, H = 300 µm, E, G = 400 µm, I–J = 200 µm, K–L = 100 µm.

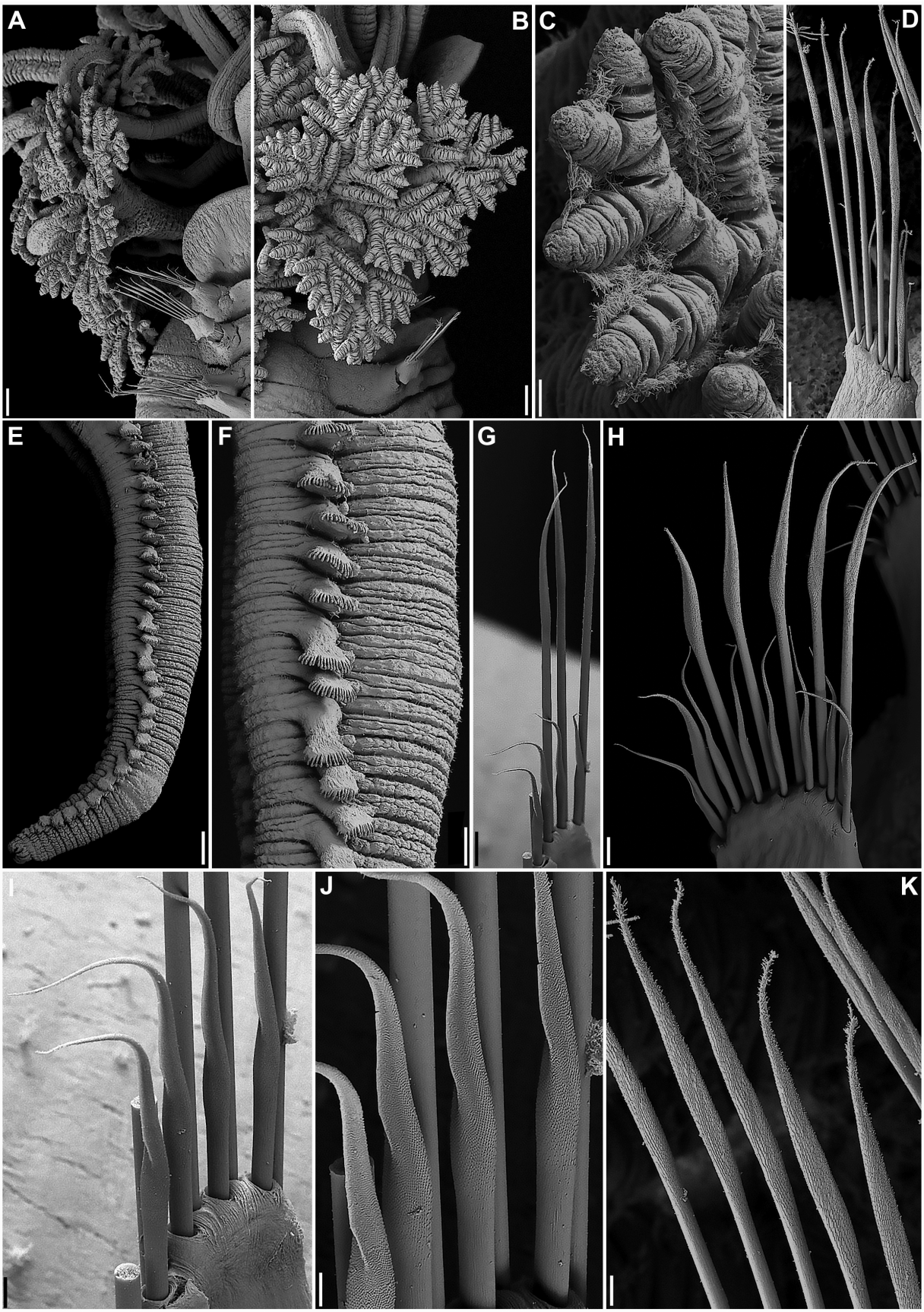


FIGURE 23. *Pista chloroplokamia* n. sp. AM W.44599: A–C. Progressively closer views of the branchiae; D, G–K. Notochaetae, segments 5, 19, 20, 11, 11 (2), and 5, respectively; E. Posterior end, left lateral view; F. Posterior chaetigers, left lateral view. Scale bars: A–B, F = 100 µm, C = 15 µm, D, G = 30 µm, E = 200 µm, H, 20 µm, I, K = 10 µm, J = 7 µm.

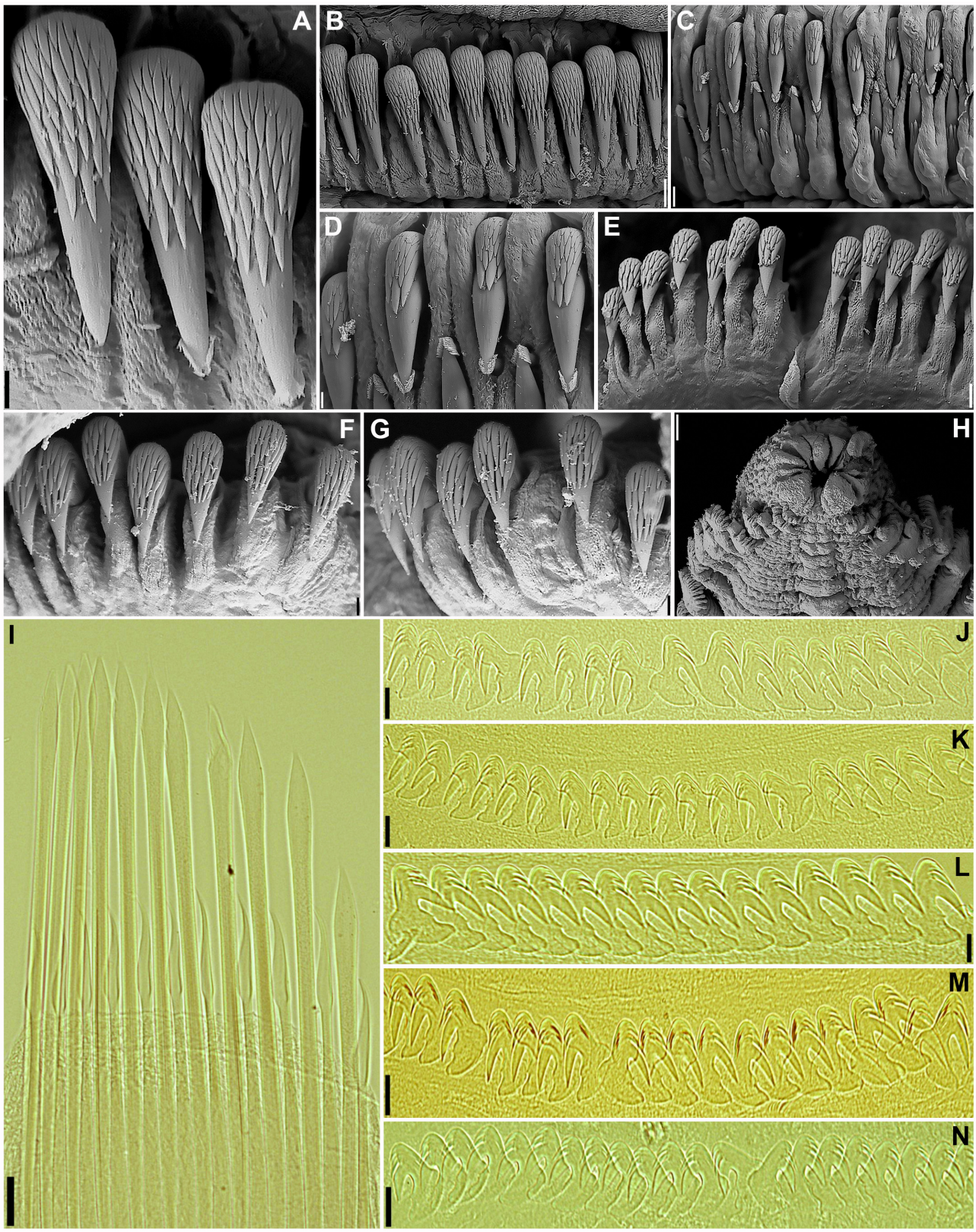


FIGURE 24. *Pista chloroplokamia* n. sp. AM W.44599: A–B. Uncini of the segment 7 under different magnifications; C–D. Closer views of uncini, segment 20; E. Posterior uncini, segment 32; F–G. Posterior uncini; H. Close up of the pygidium. AM W.47712: I. Notochaetae, segment 15; J–N. Anterior uncini, segments 5, 10, 7, 8, and 9, respectively. Scale bars: A = 4 µm, B = 8 µm, C = 7 µm, D, F–G = 3 µm, E = 6 µm, H = 50 µm, I = 30 µm, J–K, M–N = 15 µm, L = 10 µm.

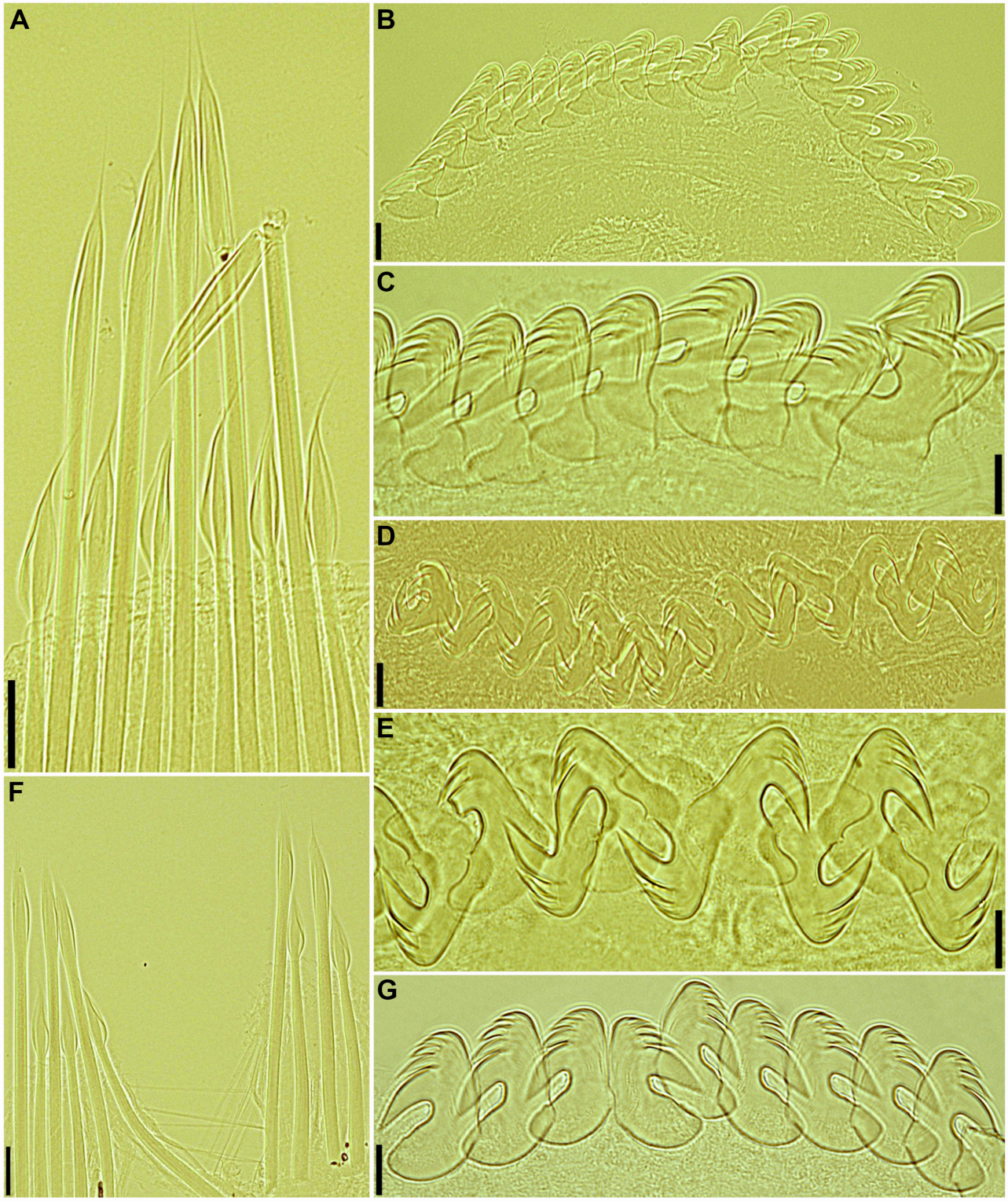


FIGURE 25. *Pista chloroplokamia* n. sp. AM W.47712: A, Notochaetae, segment 9; B–C. Anterior uncini, segment 5; D–E. Anterior uncini, segment 11; F. Notochaetae, segment 12; G. Posterior uncini, segment 24. Scale bars: A = 50 µm, B, D = 15 µm, C, E, G = 10 µm, F = 30 µm.

present from segment 2 to termination of notopodia, on segment 20, rectangular shields, of uniform width throughout, progressively longer until segment 12; from segment 15 shields brownish instead of white (Figs 21A, E–F, J–L; 22A, E, I). Notopodia beginning on segment 4, extending until segment 20; notopodia short, rectangular,

first four pairs inserted progressively more laterally, then longitudinally aligned (Figs 21A–M; 22A–L; 23A–B, D, G–I). Broadly-winged notochaetae in both rows, rounded geniculate wings, broader on one side, those from anterior row with twisted tips and in posterior row with wings at tips only (Figs 23D, G–K; 24I, 25A, F). Neuropodia present from segment 5, as low, almost sessile ridges until termination of notopodia, as low rectangular pinnules thereafter (Figs 21A–G, I–L, N; 22A–B, D–E, G–J, L; 23E–F). Neurochaetae as long-handled avicular uncini on segments 5–7, with thin, poorly developed handles originating from heel only, progressively less conspicuous; from segment 8, handles absent; uncini arranged in partially intercalated double rows on segments 11–20; avicular uncini throughout, with short, triangular and distally rounded heel, rounded prow, dorsal button at mid-length, almost inconspicuous after termination of notopodia, and crest with 5 rows of numerous, progressively shorter secondary teeth, on anterior segments and after notopodia terminate, 4 rows on segments 11–20 (Figs 24A–G, J–N; 25B–E, G). Nephridial and genital papillae on segments 5–9, between parapodial lobes (Fig. 22B, D, G–H, J, L). Pygidium crenulate, with slightly larger ventral papillae (Figs 21A–D, N; 24H).

Remarks. *Pista chloroplokamia* n. sp. is characterized by the presence of lobes on all anterior segments, those of segment 1 being directed anteriorly and covering the upper lip; presence of two pairs of arborescent, dichotomously branching branchiae, with secondary stems originating all together; long-handled uncini only present in segments 5–7; and nephridial and genital papillae present on segments 5–9, between parapodial lobes, while many species in this genus have genital papillae on segments 6 and 7 only, posterior and dorsal to notopodia. Out of the 14 species of *Pista* known to occur in Australian waters, five have arborescent branchiae: *P. sinusa* Hutchings & Glasby, 1988, *P. trina* Hutchings, 1977, *P. trunca* Hutchings, 1977, *P. turawa* Hutchings & Glasby, 1988, and *P. violacea* Hartmann-Schröder, 1986. In addition, *P. pegma* Hutchings & Smith, 1997 from New Zealand also has arborescent branchiae. Of these, *P. trina* has three pairs of branchiae whereas all the others and *Pista chloroplokamia* n. sp. have two pairs.

The new species has long-handled uncini only in the first three rows of thoracic uncini, and these are poorly chitinised, which is similar to *P. violacea* and *P. pegma.* Other Australian species have long-handled uncini present on all thoracic neuropodia. *Pista chloroplokamia* n. sp. can be distinguished from *P. violacea* by the poor development of a lateral lobe on segment 4, whereas in the latter species it is a small rectangular lobe. These two species also clearly differ in the development of the branchiae, as in *P. violacea* there are few branches and branchiae are poorly developed in contrast to the well developed branchiae of *P. chloroplokamia* n. sp.

Pista pegma, known only from New Zealand, can be easily distinguished by the arrangement of the lateral lobes, segment 1 with well developed lobes connected mid-dorsally by shallow U-shaped structure, segment 2 with elongate rectangular lobe, segment 3 with large semi-circular lobes and continuing across the dorsum forming a thickened dorsal glandular shelf, which is completely absent in *P. chloroplokamia* n. sp**.** For these reasons this taxon is described as a new species.

Etymology. During the Lizard Island Workshop, specimens of this species, which were relatively common in our samples, were referred to as "*Pista green tentacles*" by participants. Due to this, we have named the species after the green buccal tentacles, from the Greek words "*chloro*" for green and "*plokamia*" for tentacles.

Type locality. Coconut Beach, 14°40'53"S, 145°28'12"E, Lizard Island, GBR, Australia.

Distribution. Known only from the Lizard Island region.

***Pista kristiani* n. sp.**
(Figs 2A–B, 26–27)

Type material. Holotype: AM W.45451, MI QLD 2445, north of North Point, 14°38'35"S, 145°27'9"E. Paratypes: AM W.40291, off Station Beach, Lizard Island, 14°40'S, 145°28'E, 6 Jan 1975, posteriorly incomplete, 5 mm long, 1.5 mm wide; AM W.47740, CReefs, LI–10–62, MacGillivray Reef, 14°39'24"S, 145°29'34"E, complete specimen, with 86 segments, more or less in good state of preservation, with anterior end damaged, body almost severed in two pieces between segments 26 and 27, 17 mm long, 1.4 mm wide.

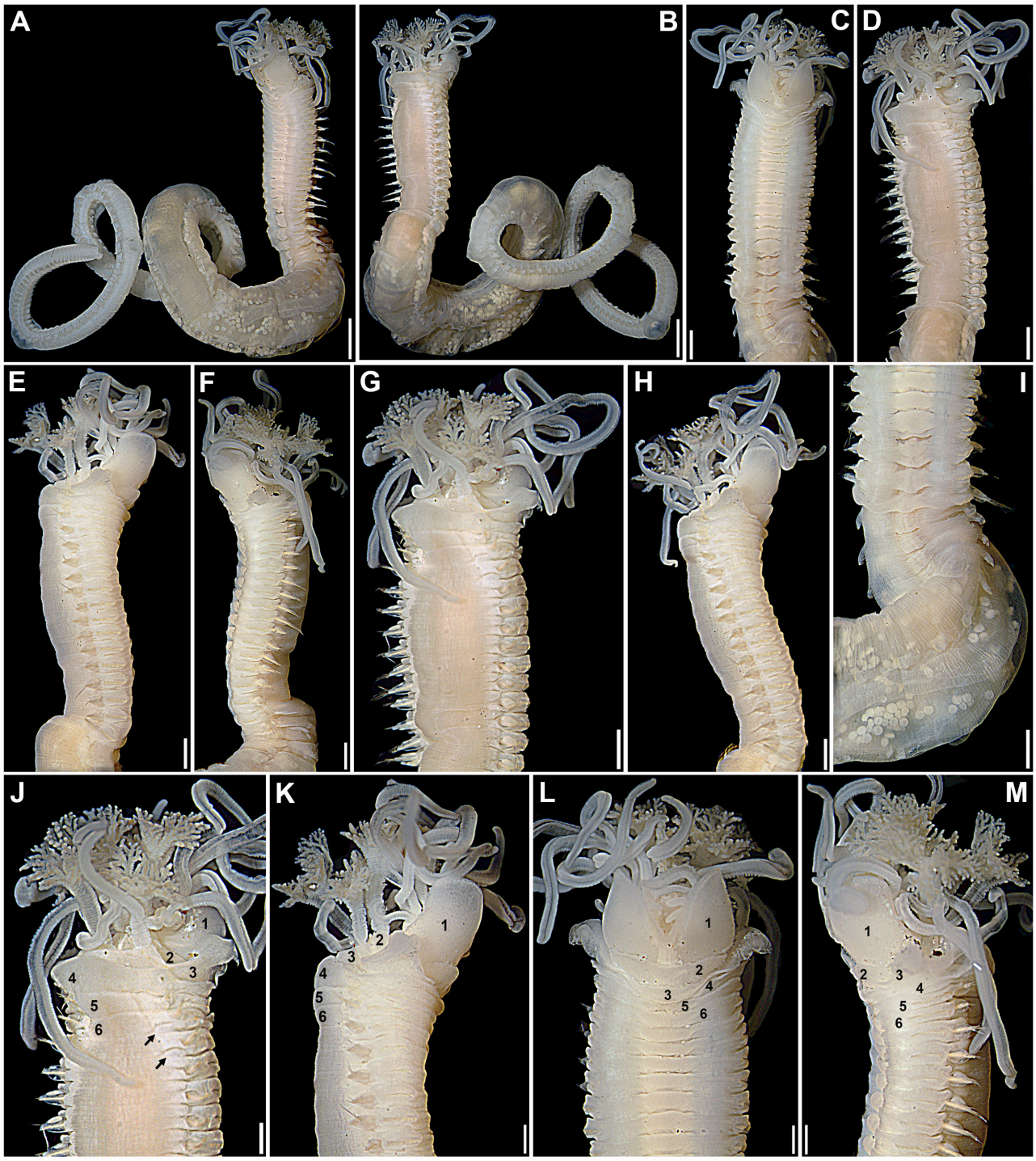


FIGURE 26. *Pista kristiani* n. sp. AM W.45451: A–B. Entire worm, left ventro-lateral and right dorso-lateral views, respectively; C–H. Anterior end in ventral, right dorso-lateral, right and left lateral, dorsal and right ventro-lateral views respectively; I. Transition between anterior and posterior body; J–M. Close ups of the anterior end, dorsal, right lateral, ventral and left lateral views, respectively; arrows point to genital papillae. Scale bars: A–B = 1 mm, C–D = 0.6 mm, E–F, H = 0.7 mm, G, I = 0.5 mm, J–M = 0.3 mm.

Comparative material examined. Holotype of *Pista curtiuncinata* Hartmann-Schröder, 1981, HZM P16500. Holotype of *Pista kimberliensis* Hutchings & Glasby, 1990, AM W.203525. Holotype of *Pista pectinata* Hutchings, 1977, AM W.6795. Holotype of *Pista pegma* Hutchings & Smith, 1997, AM W.22574. Holotype of *Pista trina* Hutchings, 1977, AM W.6798. Holotype of *Pista trunca* Hutchings, 1977, AM W.6973. Holotype of *Pista typha* Grube, 1878, MPW 518. Holotype of *Pista violacea* Hartmann-Schröder, 1984, NTM W.1644.

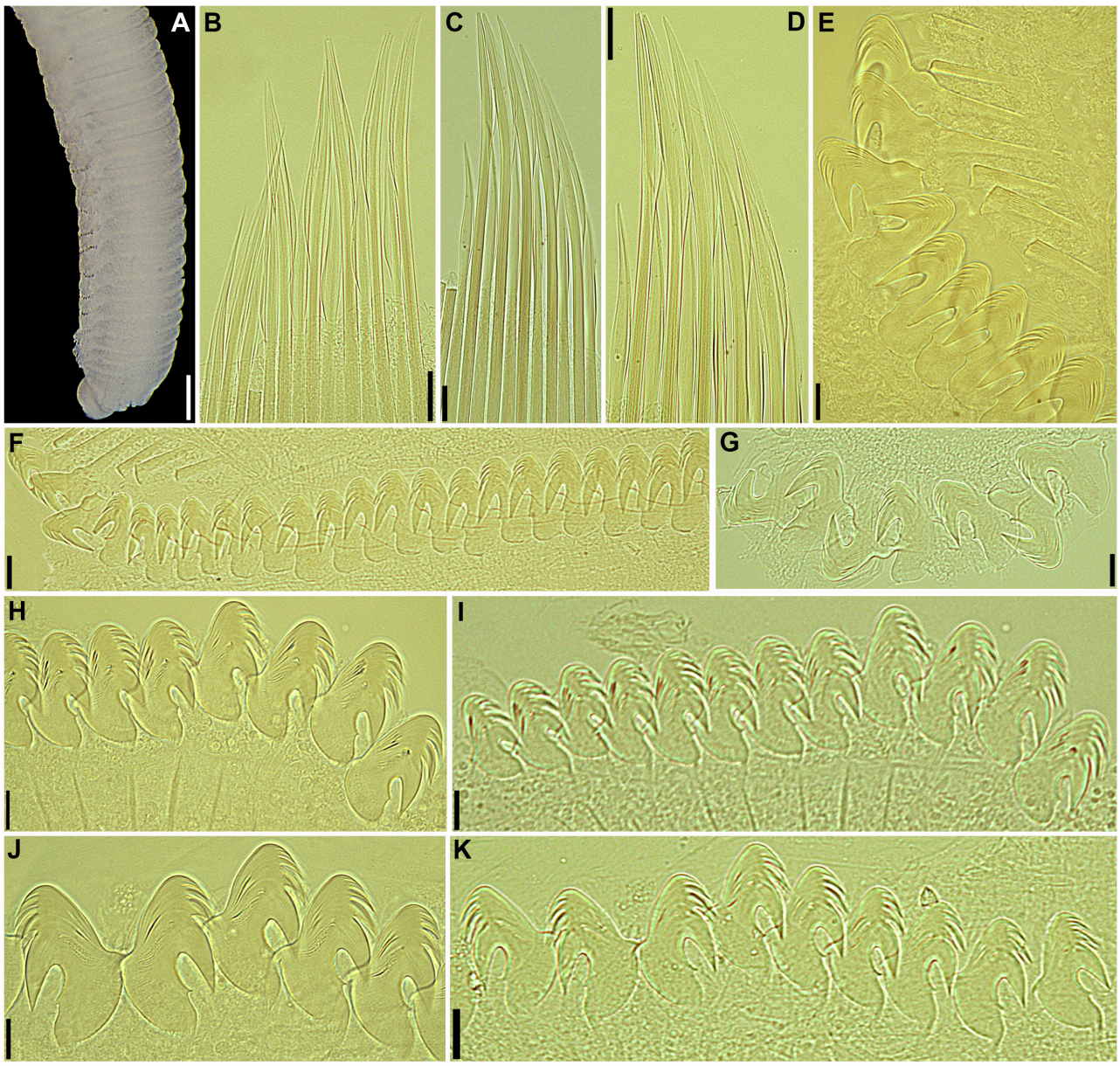


FIGURE 27. *Pista kristiani* n. sp. AM W.45451: A. Posterior end (damaged), left lateral view; B–D. Notochaetae, segments 6, 18 (2), respectively; E–F. Anterior uncini, segment 6; G. Mid-body uncini, segment 18; H–I. Posterior uncini, segment 70; J–K. Posterior uncini, segment 22. Scale bars: A = 0.2 mm, B–D = 30 µm, E, H–I, K = 10 µm, F–G, J = 15 µm.

Description. In life, pink to red body and branchiae, with white lobes and colourless buccal tentacles (Fig. 2A–B). Transverse prostomium attached to dorsal surface of upper lip; basal part with few eyespots dorso-laterally, covered by lobes of segment 1, a single row of eyespots at base of of prostomium, terminating far away from dorsal mid-line, leaving wide mid-dorsal gap; distal part shelf-like. Short buccal tentacles, reaching around mid-length of region with notopodia (Figs 2A–B; 26A–H, J–M). Peristomium forming lips, hood-like upper lip, short, about as wide as long, circular; short and swollen lower lip button-like (Fig. 26C, L). Segment 1 narrow, with pair of large, almost rectangular lobes directed anteriorly and reaching tip of upper lip; lobes originating ventro-laterally, at level of dorsal edges of neuropodia; dorsal and distal edges straight, lobes connected to each other by thinner indented membrane ventrally, partially exposing lower lip; anterior margins of anterior segments as protruding crests dorsally, segment 2 also with mid-ventral crest, with pair of rounded ventro-lateral lobes; segment 3 with pair of developed lateral lobes, larger than those segment 2, reaching mid-length of lobes of segment 1, lobes distally rounded, triangular to semi-circular, aligned with line of notopodia dorsally and ventral edges of neuropodia,

ventrally; segments 4 and 5 with much lower, progressively shorter lateral lobes, those of segment 4 continuing dorsally as low collar (= sinus) (Figs 2A–B; 26A–H, J–M). Anterior segments not very inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–3, usually first pair distinctly larger and inserted more dorsally, but frequently missing one or both branchiae of a pair; each branchia with conspicuous, crenulate basal stem, and secondary stems originating all at same point and further branching dichotomously for few levels (Figs 2A–B; 26A–H, J–M). Smooth, slightly corrugated anteriorly mid-ventral shields present on segments 2–20, rectangular to trapezoidal, about same size until segment 11, then progressively longer and narrower to segment 17, last 3 pairs much shorter, almost inconspicuous (Fig. 26A, C, I, L–M). Notopodia beginning on segment 4, extending until segment 20; notopodia short, rectangular, first pair much shorter, notopodia of segments 4–8 inserted progressively more laterally, then longitudinally aligned (Fig. 26A–K, M). Broadly-winged notochaetae in both rows, those of anterior row with wings broader on one side, bulbous, and chaetae in posterior row with wings almost throughout, except for basal third (Fig. 27B–D). Neuropodia present from segment 5, as low, almost sessile ridges until termination of notopodia, as low rectangular pinnules thereafter (Figs 26A–M; 27A). Neurochaetae as long-handled avicular uncini on segments 5–20, until termination of notopodia, with well developed handles originating from heel only; uncini arranged in completely intercalated double rows on segments 11–20; avicular uncini throughout, with short, triangular and distally rounded heel, rounded prow, dorsal button at mid-length, conspicuous throughout, and crest with 4 rows of numerous, progressively shorter secondary teeth, on anterior segments and after notopodia terminate, 3 rows on segments 11–20, and 5 rows posteriorly (Fig. 27E–K). Nephridial papillae of segment 3 not visible, genital papillae on segments 6–7, posterior notopodia and dorsal to notopodia or longitudinally aligned to them, visibility depending on maturity of specimens (Fig. 26J). Pygidium crenulate, with larger and rounded ventral papillae (Fig. 27A). Tube unknown.

Remarks. *Pista kristiani* n. sp., which has two pairs of dichotomous branchiae and all thoracic uncini with well developed handles, most closely resembles *P. sinusa* Hutchings & Glasby, 1988, *P. trunca* Hutchings & Glasby, 1988 and *P. turawa* Hutchings & Glasby, 1988. However, the new species can easily be distinguished from *P. sinusa* and *P. trunca* because in these two species the lobes of segment 3 form a dorsal sinus, which is also present in *P. kristiani* n. sp., but on segment 4, and not connected to the lobes of segment 3.

Pista turawa can be separated from *Pista kristiani* n. sp. as *P. turawa* completely lacks lobes on segment 2, which are present ventro-laterally in the new species. For this reason *Pista kristiani* n. sp. is described as a new species.

Etymology. This species is named after Dr Kristian Fauchald, who visited Lizard Island several times, and inspired all of us to study polychaetes and to continue to investigate their diversity and beauty.

Type locality. North of North Point, 14°38'35"S, 145°27'9"E, Lizard Island, GBR, Australia.

Distribution. Known only from the Lizard Island region.

Genus *Lanicides* Hessle, 1917

Lanicides.—Hutchings & Glasby 1988: 20.

Type-species. *Terebella (Phyzelia) bilobata* Grube, 1878, by original designation (see Nogueira *et al.* 2011, for the problems with the type species of this genus and the consequent issues for the diagnosis).

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part sometimes with eyespots; distal part shelf-like. Buccal tentacles all similar, except in length. Peristomium forming lips; hood-like upper lip; small, swollen lower lip, restricted to oral area. Segment 1 reduced dorsally, with lobes of variable size and position. Lobes of variable size and position present on segments 2 and 3. Paired dorso-lateral arborescent or plumous branchiae present from segment 2, 2 or 3 pairs. Anterior segments with glandular, rectangular to trapezoidal, smooth to corrugated mid-ventral shields; mid-ventral groove extending posteriorly from termination of mid-ventral shields. Short and conical notopodia beginning from segment 4, extending for variable number of segments. Notochaetae distally winged or serrated, the latter with wings at mid-length followed by finely serrated tip. Neuropodia present from segment 5, as low ridges throughout or only until termination of notopodia, as low pinnules thereafter. Neurochaetae throughout as avicular uncini, arranged in partially to completely intercalated double rows from segment 11 until termination of notopodia; some anterior segments with long-handled uncini;

with dorsal button at mid-length of base, conspicuous at least until termination of notopodia, and crest with several transverse rows of secondary teeth. Nephridial and genital papillae usually poorly developed, almost inconspicuous, of variable position and distribution. Pygidium smooth to slightly crenulate (Hutchings & Glasby 1988). Tube unknown.

Remarks. Species of *Lanicides* differ in characters which usually are not variable within other genera of Terebellidae, such as the number of pairs of notopodia and types of notochaetae present. Especially in regards to this latter character, the type species, *L. bilobata* (Grube, 1878) has winged chaetae throughout, in both rows of notochaetae, while several species also have medially winged and distally serrated notochaetae at least on some region of the body.

Anterior neuropodia bear long-handled uncini in all species of *Lanicides*, but most species have anterior uncini with thin and poorly developed handles, originating only from the uncinial heel, such as in *L. bilobata*, while a few others have heavily chitinized uncini on anterior neuropodia, with well developed handles originating from most of the base, as the new species described herein.

The diagnoses of *Pista*, *Lanicides* and *Longicarpus* Hutchings & Murray, 1984 overlap and the distinction between these genera is very subtle. Members of species of all these genera have lobes on anterior segments, branching branchiae and long-handled uncini at least in some anterior neuropodia. The differences between these genera lie in the type of notochaetae present and the neuropodia after termination of notopodia being as low ridges or pinnules. Notochaetae are all distally winged in *Pista* and some species of *Lanicides*, including the type species, *L. bilobata*; all medially winged and distally serrated among members of *Longicarpus*, while both types, distally winged, and medially winged and distally serrated notochaetae, are usually found among species of *Lanicides.* A revision of this entire group is urgently needed to determine which of the genera are valid, but that is beyond the scope of this paper.

Lanicides is well represented in Australian waters with six known species, *L. attenuata* Hutchings & Glasby, 1990, *L. banatawa* Hutchings, 1997b, *L. fascia* Hutchings & Glasby, 1988, *L. lacuna* Hutchings & Glasby, 1988, *L. physa* Hutchings, 1993, and *L. tribranchiata* Hutchings & Glasby, 1988. Of those, only *L. lacuna* has been previously found in the southern GBR, at One Tree Island. In the present paper, we describe another species from the GBR and this represents the first record of the genus from Lizard Island.

Key to the Australian species of *Lanicides*

1. Heavily chitinized uncini on first 2–3 pairs of neuropodia, usually darker than those of following pairs, with well developed handles originating from most of base; notochaetae of anterior row medially winged and finely serrated distally, or both rows with distally winged notochaetae 2
- Uncini of similar colour throughout, anterior ones with thin, poorly-developed handles originating from heel only; distally winged notochaetae in both rows 5
2. (1) Segment 1 with pair of short lobes, just near the mouth; 2 pairs of branchiae 3
- Segment 1 with pair of large lobes directed anteriorly and covering the upper lip, indented mid-ventrally to expose partially lower lip; 3 pairs of branchiae. . . . . *Lanicides tribranchiata*
3. (2) Anterior margins of segment 4 as on other anterior segments, protruding dorsally as low crests, dorsal lobe absent; notochaetae of anterior row medially winged and finely serrated distally 4
- Segment 4 with dorsal transverse lobe indented mid-dorsally, with paired triangular lappets; notochaetae distally winged in both rows. . . . . *Lanicides physa*
4. (3) Long branchiae, branching into secondary stems further branching for several levels, terminating by relatively long branchial filaments; long-handled uncini with dorsal button as compact cushion of bristles around beak of main fang . . . . . *Lanicides lacuna*
- Short branchiae, dichotomously branching for few levels, with short branchial filaments of uniform thickness; long-handled uncini with dorsal button as spatulate, distally rounded process . . . . . *Lanicides rubra* n. sp.
5. (1) Segment 1 with pair of short lobes, just near the mouth; 2 or 3 pairs of branchiae 6
- Segment 1 with pair of large lobes directed anteriorly and covering the upper lip, indented mid-ventrally to partially expose the lower lip; 3 pairs of branchiae. . . . . *Lanicides attenuata*
6. (5) Two pairs of branchiae . . . . . *Lanicides fascia*
- Three pairs of branchiae . . . . . *Lanicides banatawa*

***Lanicides rubra* n. sp.**
(Figs 2C–D, 28–29)

Type material. Holotype: AM W.44272, MI QLD 2344, complete, in two pieces, in excellent state of preservation, anterior piece 7 mm long, ~1.3 mm wide, with 19–20 segments, posterior piece ~20 mm long, with 2–3 thoracic segments, then abdominal. Paratype: AM W.47808, CReefs, LI–10–099, MI QLD 2220, Loomis Beach, 14°41'02"S, 145°27'01"E, intertidal.

Comparative material examined. Holotype of *Lanicides bilobata* (Grube, 1878), MNHU 898. Holotype of *Lanicides fascia* Hutchings & Glasby, 1988, AM W.200608. Holotype of *Lanicides lacuna* Hutchings & Glasby, 1988, AM W.200609. Paratypes of *Lanicides lacuna*, AM W.200610 and AM W.200611. Non-types of *Lanicides lacuna*, AM W.200761, AM W.200878, AM W.200879, AM W.200881. Paratypes of *Lanicides tribranchiata* Hutchings & Glasby, 1988, MV F.52569, MV F.52571, MV F.52570, MV F.52572. Non-type of *Lanicides tribranchiata*, MV F.91050.

Description. In life, red body and buccal tentacles, irregularly speckled with numerous red granules (Fig. 2C–D). Transverse prostomium attached to dorsal surface of upper lip; basal part with broad, a continuous row of eyespots, mid-dorsal gap absent (Figs 2D; 28C, E, I–M). Short buccal tentacles, reaching around 1/3 of extension of region with notopodia (Figs 2C–D; 28A–M). Peristomium forming lips, hood-like upper lip, short, about as wide as long, circular; short and swollen lower lip, button-like (Figs 2D; 28D–E, K). Segment 1 narrow, with pair of short flaring lobes lateral to mouth, reaching level of lower lip and connected to each other by low ventral lobe marginal to mouth; anterior margins of anterior segments as protruding crests dorsally, segment 2 also with pair of short rounded ventro-lateral lobes connected to each other by mid-ventral crest; segment 3 with pair of low lateral lobes covering almost completely segment 2 laterally, rectangular lobes, dorsal and distal margins straight, dorsal margins aligned with dorsal edge of neuropodia, ventral margins oblique, terminating at mid-ventral shield; from segment 4, lobes absent (Figs 2C–D; 28A–M). Anterior segments slightly inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–3, dorsal to line of notopodia, with branchial filaments branching dichotomously in few levels from distinctly short basal stem; first pair longer, about half body width of segment 2, longitudinally aligned to second pair (Figs 2C–D; 28A–C, F–J, L–M). Mid-ventral shields present on segments 2–22, rectangular to trapezoidal, about same size until segment 14, then progressively longer and narrower to last shield, corresponding to blood red ventral region in live specimens (Fig. 2C); anterior shields smooth to slightly corrugated, deeply corrugated from segment 11 to last shield (Fig. 28D–E, K, N). Notopodia beginning on segment 4, extending until segment 22; short, rectangular notopodia, first pair shorter, those of segments 4–6 inserted progressively more laterally, then longitudinally aligned (Fig. 28A–M). Notochaetae throughout medially winged and finely serrated distally in anterior row, posterior row with broadly-winged chaetae, wings broader on one side, geniculate basally and rounded, chaetae of posterior row with wings only at tips (Fig. 29A–F). Neuropodia present from segment 5, as low, almost sessile ridges throughout (Fig. 28A–O). Neurochaetae of segments 5 and 6 heavily chitinized, darker than those of following segments, with well developed handles originating from most of base, crest with 4 transverse rows of secondary teeth, remarkably rounded prow and dorsal button modified in spatulate, distally rounded process (Figs 28P; 29G); from segment 7, short-handled uncini, with 3 rows of secondary teeth and short dorsal button; uncini in completely intercalated double rows from segment 11 to termination of notopodia, on segment 22; from segment 23, uncini in single rows, with thin posterior ligaments and crest with 4 teeth on mid-body, 5 rows on posterior neuropodia (Fig. 29H–L). Large nephridial papillae on segment 3, between bases of branchiae and dorsal margins of lobes, other papillae not visible. Pygidium with minute papillae (Fig. 28O).

Remarks. *Lanicides rubra* n. sp. is characterized by the presence of a conspicuous row of prostomial eyespots, extending across the entire prostomium; short ventral lobes on segment 1, just around the mouth, ventro-lateral lobes on segment 2, and low, rectangular lobes on segment 3, with straight dorsal and distal margins; 2 pairs of short branchiae, with few levels of dichotomous branching, all branchial filaments about same width, without conspicuous secondary stems; notopodia throughout with medially winged and finely serrated distally chaetae in anterior row, and geniculate, broadly-winged notochaetae in posterior row; heavily chitinized, dark uncini on segments 5 and 6, with well developed handles originating from most of the base and dorsal buttons forming rather unusual spatulate process; and nephridial and genital papillae only conspicuous on segment 3.

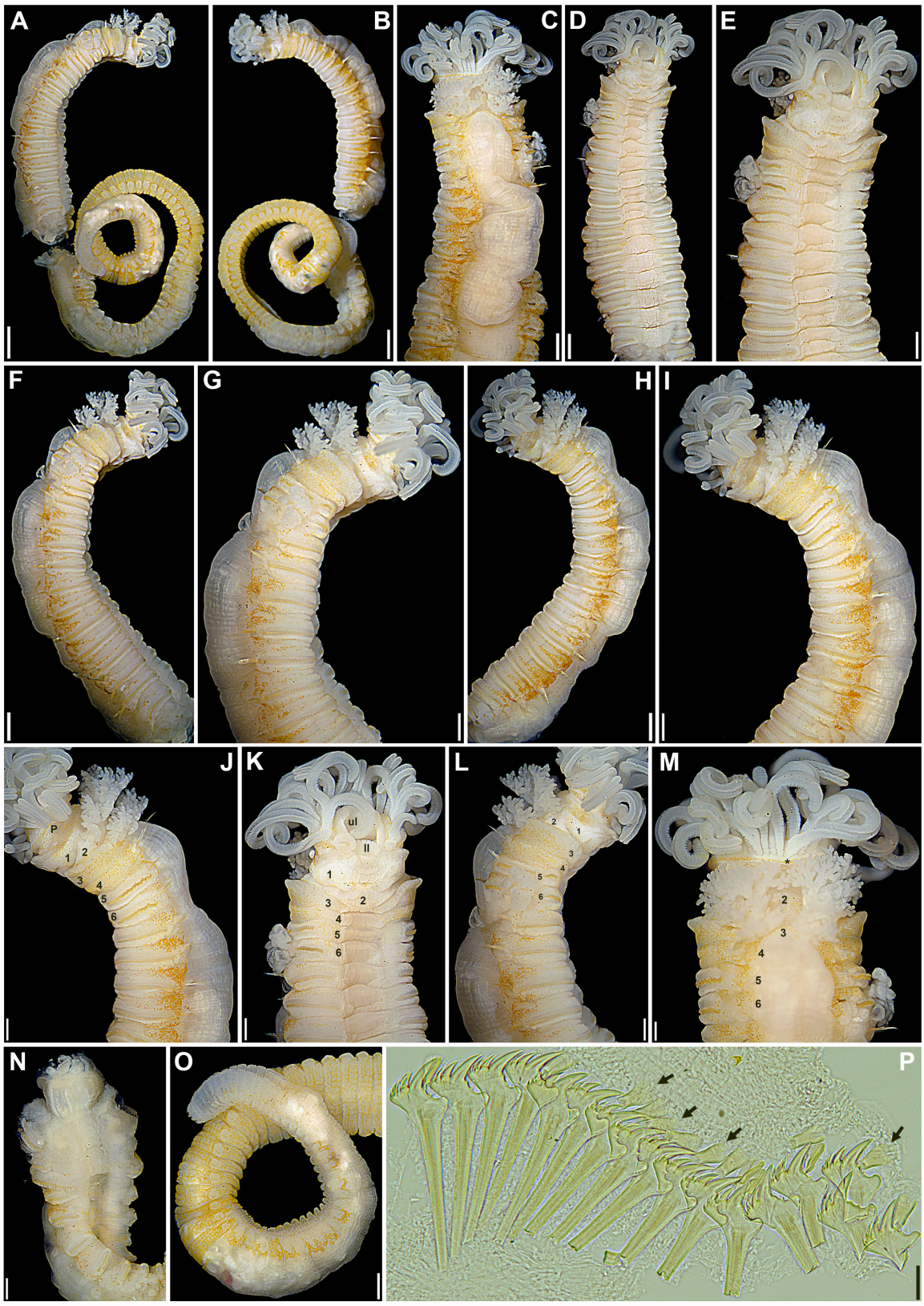


FIGURE 28. *Lanicides rubra* n. sp. AM W.44272: A–B, Entire worm, right and left lateral views, respectively; C–I. Anterior end in progressively higher magnifications, dorsal, ventral, left and right lateral views, respectively; J–M. Close ups of the anterior end, left lateral, ventral, right lateral and dorsal views, respectively; N. Transition between anterior and posterior body; O. Posterior end, right dorso-lateral view; P. Anterior uncini, segment 5; arrows point to spatulate dorsal buttons. Numbers refer to segments. Abbreviations: ll = lower lip; P = basal part of prostomium; ul = upper lip; * = distal part of prostomium. Scale bars: A–B = 1 mm, C = 0.5 mm, D, F, H, = 0.6 mm, E, G, I, O = 0.4 mm, J–N = 0.3 mm, P = 30 µm.

Only three other Australian species of *Lanicides* have heavily chitinized uncini on anterior segments, *L. physa* Hutchings, 1993 described from Rottnest Island in SW WA, *L. lacuna* Hutchings & Glasby, 1988 from One Tree Island, GBR, and *L. tribranchiata* Hutchings & Glasby, 1988 from Solitary Islands, NSW.

Lanicides physa differs from *L. rubra* n. sp. in lacking prostomial eyespots and in having larger lobes of segment 1, lacking lobes on segment 2, and with a dorsal lobe on segment 4, indented mid-dorsally, forming paired triangular lappets near dorsal mid-line, which are absent in *L. rubra* n. sp. In addition, the notochaetae of members of *L. physa* are distally winged in both rows, the dorsal buttons of the long-handled uncini do not form the spatulated process as found in *L. rubra* n. sp., and genital papillae are conspicuous on segments 5–11 (Hutchings 1993).

Lanicides lacuna also lacks prostomial eyespots and has lobes on segment 1 larger than those present on *L. rubra* n. sp. The branchiae are longer in *L. lacuna*, branching into several secondary stems, each further branching for several levels and terminating with relatively long branchial filaments. The long-handled uncini have dorsal button as compact cushion of bristles around beak of main fang, and nephridial and genital papillae are conspicuous on segments 4–8, which is different from *L. rubra* n. sp., in which papillae are only conspicuous on segment 3.

Lanicides tribranchiata is another species which lacks prostomial eyespots and, in addition, it also differs from *L. rubra* n. sp. in having a pair of larger lobes on segment 1, directed anteriorly and covering the upper lip, indented mid-ventrally to partially expose the lower lip, together with distally rounded lobes of segment 3; 3 pairs of branchiae with conspicuous secondary stems; and long-handled uncini with dorsal button as compact cushion of bristles around beak of main fang.

Etymology. We name this species after the red colour of living specimens (Fig. 2C–D), from the Latin word "*rubra*" = red.

Type locality. South of lagoon entrance, reef near Bird Islet, 14°41'38"S, 145°27'56"E, Lizard Island, GBR, Australia.

Distribution. Known only from the type locality.

Genus *Lizardia* n. gen.

Type-species. *Lizardia quasimodo* Nogueira, Hutchings & Carrerette, this paper, by monotypy.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part without eyespots; distal part shelf-like. Peristomium forming lips; hood-like upper lip; small, swollen lower lip, restricted to oral area. Segments 1–3 with thick and low ventral lobes of uniform length across ventrum, running from one side to another of body, originating progressively more laterally. Branchiae absent. Anterior segments with glandular, rectangular, smooth to slightly corrugated anteriorly mid-ventral shields; mid-ventral groove extending posteriorly from termination of mid-ventral shields. Short and conical notopodia beginning from segment 4, extending for 9 segments, until segment 12. Anterior notopodia with distally narrowly-winged notochaetae in both rows, wings only present at tips of chaetae; posterior notopodia with distally serrated chaetae in both rows, alimbate, with blade at an angle with shaft and with short and rounded teeth in anterior row, and with blade aligned with shaft and long teeth in posterior row. Neuropodia present from segment 6, as low ridges throughout. Neurochaetae throughout as avicular uncini, arranged in completely separated double rows from segment 11 until posterior body; uncini throughout with short base, almost inconspicuous dorsal button at base of main fang, and crest with numerous transverse rows of secondary teeth. Inconspicuous nephridial and genital papillae. Pygidium smooth.

Remarks. This new abranchiate genus is characterized by having nine pairs of notopodia from segment 4, with narrowly-winged notochaetae on anterior notopodia, and serrated notochaetae on posterior ones, and neuropodia from segment 6.

No other genus of Terebellidae, either branchiate or not, has only nine pairs of notopodia; in fact all of them have a much larger number. Currently the following abranchiate genera are known from Australia: *Baffinia* Wesenberg-Lund, 1950 and *Spinosphaera* Hessle, 1917, which have notopodia extending almost to the pygidium, *Arranooba* Hutchings & Glasby, 1988, which has 17 pairs of notopodia, *Lanassa* Malmgren 1866, with 15 pairs of notopodia, *Phisidia* Saint-Joseph, 1894, with 14 pairs, and *Pseudoproclea* Hutchings & Glasby, 1990, with 16 pairs of notopodia.

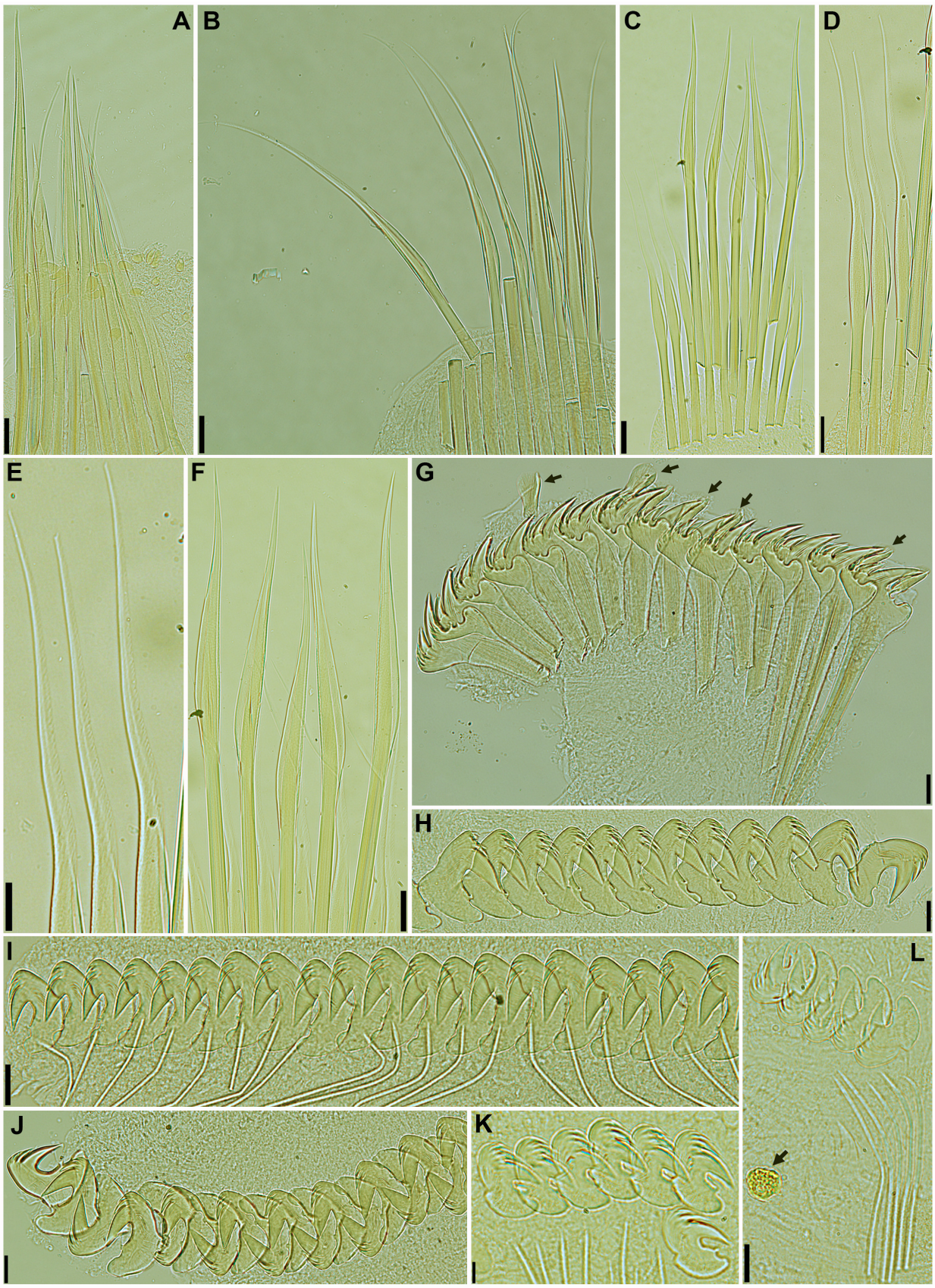


FIGURE 29. *Lanicides rubra* n. sp. AM W.44272: A–B. Notochaetae, segments 5 and 6, respectively; C–F. Notochaetae, segment 20 under higher magnifications, general and chaetae from anterior (2) and posterior rows, respectively; G–J. Uncini, segments 6, 7, 24, 20, respectively; arrows point to spatulate dorsal buttons; K–L. Posterior uncini; arrow points to pigment granule. Scale bars: A–B, D, F = 30 µm, C = 20 µm, E, G–J = 20 µm, K = 5 µm, L = 10 µm.

Five other abranchiate genera of terebellids have not been found in Australia so far, *Articulatia* Nogueira, Hutchings & Amaral, 2003, which has 11–20 pairs of notopodia, *Laphania* Malmgren, 1866, which has 17 pairs of notopodia, *Leaena* Malmgren, 1866, with 10–17 pairs, *Morgana* Nogueira & Amaral, 2001, with 18–25 pairs, and *Stschapovella* Levenstein, 1957, with 16 pairs. For this reason we are describing this as a new genus, which is currently monotypic.

Etymology. This new genus is named after Lizard Island, where a major coral reef research station is located, the Lizard Island Research Station, founded in 1973 and run by the Australian Museum.

***Lizardia quasimodo* n. sp.**
(Figs 30–31)

Type material. Holotype: AM W.45151, MI QLD 2443, complete, in relatively good state of preservation, except for medial damage, 11 mm long, 1 mm wide, in calcareous algae and brown algae at a depth of 14 m.

Description. Transverse prostomium attached to dorsal surface of upper lip; basal part without eyespots; distal part shelf-like (Fig. 30A–H). Peristomium forming lips; hood-like upper lip, almost circular, about as wide as long; small, swollen lower lip, restricted to oral area (Fig. 30A–H). Segments 1–3 with thick and low ventral lobes of uniform length across entire ventrum, originating progressively more laterally; from segment 2, anterior segments markedly inflated dorsally, with dorsal hump on segments 2–3 (Fig. 30A–H). Branchiae absent. Anterior segments with glandular, rectangular, smooth to slightly corrugated anteriorly mid-ventral shields, on segments 2–11; mid-ventral groove extending posteriorly from segment 12 (Fig. 30B, D–E). Short and conical notopodia beginning from segment 4, extending for 9 segments, until segment 12; notopodia of first pair slightly shorter and inserted more dorsally than following pairs (Fig. 30A–H). Anterior notopodia with narrowly-winged notochaetae distally in both rows, wings only present at tips of chaetae (Fig. 30J–M); posterior notopodia with distally serrated chaetae in both rows, alimbate, with blade at an angle with shaft and with short and rounded teeth in anterior row, and with blade aligned with shaft and long teeth in posterior row (Fig. 31A–C). Neuropodia present from segment 6, as low ridges throughout (Fig. 30A–I). Neurochaetae throughout as avicular uncini, arranged in completely separated double rows, beak to beak, from segment 11 until posterior body; uncini throughout with short base, almost inconspicuous dorsal button at base of main fang, and crest with numerous transverse rows of secondary teeth (Fig. 31D–E). Inconspicuous nephridial and genital papillae. Pygidium smooth (Fig. 30A–B).

Etymology. This new species is named "*quasimodo*" after the protagonist of "The Hunchback of Notre Dame", by Victor Hugo, in reference to the pronounced hump this species has on anterior segments.

Type locality. Off Watson's Bay, 14°39'41"S, 145°26'27"E, Lizard Island, GBR, Australia.

Distribution. Only known from the type locality.

Genus *Pistella* Hartmann-Schröder, 1996

Pistella Hartmann-Schröder 1996: 520.

Type-species. *Scionella lornensis* Pearson, 1969, by monotypy.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part without eyespots; distal part shelf-like. Buccal tentacles all similar, but of different lengths, usually shorter than body length. Peristomium forming lips; hood-like upper lip, usually as wide as long; small, swollen lower lip, restricted to oral area. Segment 1 reduced dorsally, frequently with paired ventral lobes lateral to mouth, connected to each other by low lobe marginal to mouth. Segment 2 with paired ventro-lateral lobes connected to each other by protruding mid-ventral crest. Segment 3 with relatively short lateral lobes. Paired dorso-lateral plumous branchiae present on segment 2, single pair. Anterior segments with glandular, rectangular to trapezoidal, smooth to slightly corrugated mid-ventral shields; shields typically divided in two parts, anterior part white, posterior part bright red. Short and conical notopodia beginning from segment 4, typically extending for 17 segments, until segment 20. Winged notochaetae in both rows, wings always conspicuous, frequently broadly-winged, as broad as width of shaft or broader. Neuropodia present from segment 5, as low ridges until termination of notopodia, as raised pinnules thereafter. Neurochaetae throughout as short-handled avicular uncini, arranged in partial to completely intercalated double rows from segment 11 until termination of notopodia; uncini with dorsal button at mid-length of base, conspicuous



FIGURE 30. *Lizardia quasimodo* n. sp. AM W.45151: A–B. Entire worm, dorsal and ventral views, respectively; C–D. Anterior end, left lateral and ventral views, respectively; E–H. Close ups of the anterior end, ventral, left and right lateral, and dorsal views, respectively; I. Close up of the posterior body; arrow points to the last neuropodium with uncini in double rows arrangement; J–M. Notochaetae under higher magnifications, segment 3, general and chaetae from anterior and posterior rows (2), respectively. Numbers refer to segments. Abbreviations: ll = lower lip; P = basal part of prostomium; ul = upper lip; * = distal part of prostomium. Scale bars: A–B = 0.5 mm, C–D, I = 0.2 mm, E–H = 0.15 mm, J = 20 µm, K–M = 10 µm.

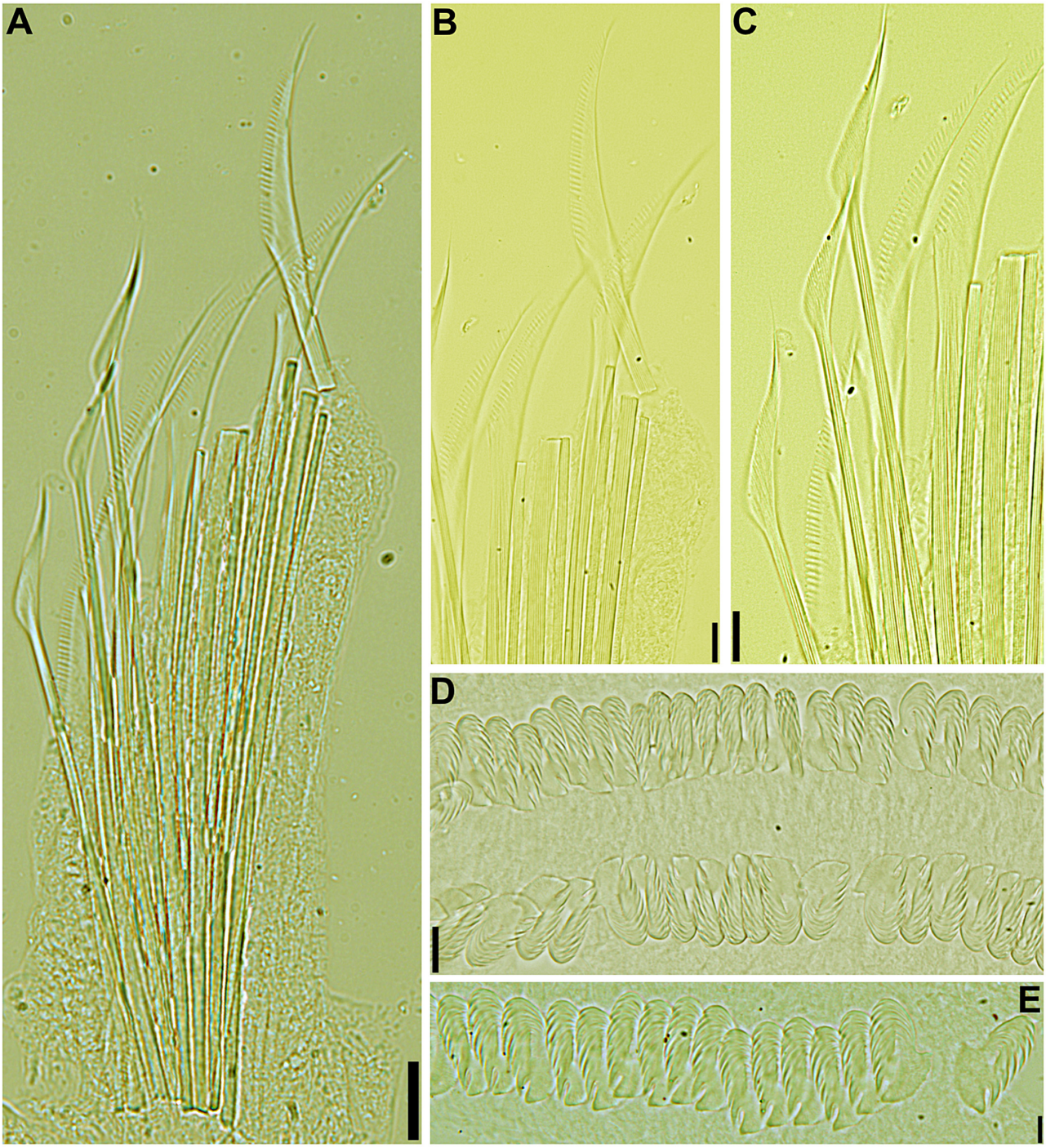


FIGURE 31. *Lizardia quasimodo* n. sp. AM W.45151: A–C. Notochaetae under higher magnifications, segment 20, general and chaetae from posterior and anterior rows, respectively; D. Uncini, segment 13; E. Uncini from posterior body. Scale bars: A = 20 µm, B–D = 10 µm, E = 5 µm.

at least until termination of notopodia, and crest with several transverse rows of secondary teeth. Nephridial and genital papillae usually present on segments 3 and 6–7, respectively, the latter posterior and dorsal to notopodia. Pygidium papillate.

Remarks. *Pistella* was erected by Hartmann-Schröder (1996) to accommodate species previously considered as belonging to *Pista* by Safronova (1988) in her partial revision of the type species of the genus. *Pistella* has a single pair of branchiae and short-handled uncini throughout (Hartmann-Schröder 1996). Safronova (1988) transferred *Scionella lornensis* Pearson, 1969 to *Pista*, subsequently Hartmann-Schröder (1996) moved it into her new genus *Pistella* and designated it as the type species.

More recently, Jirkov *et al*. (2001) synonymized *Pistella lornensis* with *Pista cristata* (Müller, 1776), based on a reinterpretation of the original description of the latter species in regards to the number of pairs of branchiae present, a single pair instead of two pairs, as considered by Malmgren (1866) in the original description of *Pista*. That synonymy, however, requires that all species currently assigned to *Pista* should be transferred to a new, still undescribed genus, due to the presence of long-handled uncini on anterior segments, which are absent in *P. cristata sensu* Jirkov *et al.* (2001). As both forms, with single pair of branchiae and short-handled uncini throughout, and with two pairs of branchiae and long-handled uncini on anterior segments co-occur in the type locality of *P. cristata*, we prefer to follow Malmgren´s interpretation of *P. cristata* and consider both *Pista* and *Pistella* as valid genera.

This genus has never been formally reported from Australian waters, but *Pista anthela* Hutchings & Glasby (1990) matches the diagnosis above, with regards to the number of pairs of branchiae and the uncinial morphology, and, therefore, is herein transferred to *Pistella*. In the material from Lizard Island a second species of *Pistella* was found, described below.

Key to the Australian species of *Pistella*

1. Lateral lobes of segments 1, 3 and 4 continuing across dorsum as thickened ridges . . . . . *Pistella anthela*
- Lateral lobes of segments 1, 3 and 4 not continuing across dorsum as thickened ridges . . . . . *Pistella franciscana* n. sp.

Pistella franciscana n. sp.

(Figs 2H–I, 32–35)

Type material. Holotype: AM W.45445, MI QLD 2444, north of North Point, 14°38'36"S, 145°27'09"E, complete specimen, in excellent state of preservation, ~15 mm long, 0.6 mm wide. Paratypes: AM W.47715, CReefs, LI–10–033, MI QLD 2198, Watsons Bay, 14°39'30"S, 145°26'56"E, incomplete specimen, in excellent state of preservation; AM W.44593, MI QLD 2394, mounted on 2 SEM pins; AM W.44964, MI QLD 2435 (photographed).

Other material examined. AM W.44957, MI QLD 2429; AM W.44626, MI QLD 2414; AM W.44628, MI QLD 2416; AM W.45441, MI QLD 2444; AM W.45145, MI QLD 2440; AM W.45447, MI QLD 2444 (3); AM W.45146, MI QLD 2441; AM W.45446, MI QLD 2444.

Comparative material examined. Holotype of *Pistella anthela* Hutchings & Glasby, 1990, AM W.203515. Paratypes of *Pistella anthela*, AM W.203516, AM W.203517, AM W.203520, AM W.203521, AM W.203523. Holotype of *Pistella lornensis* (Pearson, 1969), ZB 1968: 15. Paratype of *Pistella lornensis*, ZB 1968: 16. Non-type of *Pistella lornensis*, ZMUC Pol 1744.

Description. In life, body pink to greenish, with colourless buccal tentacles and mid-ventral shields with bright red posterior section (Fig. 2H–I). Transverse prostomium attached to dorsal surface of upper lip; basal part without eyespots; distal part shelf-like (Figs 32E–F, J–K; 33A, D, F, J). Buccal tentacles, longer than region with notopodia in life, but shorter after preservation (Figs 2H–I; 32A–F, J–K; 33A–K). Peristomium forming lips; hood-like upper lip, short, as wide as long; small, swollen lower lip, restricted to oral area (Figs 32E, J; 33G–H). Segment 1 reduced dorsally, expanded ventrally with paired ventral lobes lateral to mouth, connected to each other by low lobe marginal to mouth; segment 2 with paired ventro-lateral lobes connected to each other by protruding mid-ventral crest, lobes almost semi-circular, covering posterior half of segment 1; segment 3 with pair of triangular, distally rounded lateral lobes, lobes short, only covering posterior part of segment 2, dorsal margins aligned with line of notopodia, ventral margins terminating in line with the mid-length of subsequent neuropodial tori (Figs 32A–F, J–K; 33A–L). Anterior segments not markedly inflated dorsally. Paired dorso-lateral plumous branchiae present on segment 2, single pair, frequently one branchia missing, presumably lost by predation, supported by the fact that some individuals have branchiae of remarkably different sizes (Figs 32A–F, K; 33A–F, I–K); each branchia with conspicuous, crenulate basal stem, and branchial filaments originating in a spiral at tip; branchial filaments dichotomously branching for 1–2 levels, with relatively long tips, bearing ciliary tracks laterally and around bald tips (Fig. 33A–F, I–K, M–N). Anterior segments with glandular, rectangular to trapezoidal, smooth to slightly corrugated mid-ventral shields; shields typically divided in two parts, anterior part white, posterior part bright red, not always visible after preservation (Figs 2H–I; 32A, D–E, J–K; 33A, C, G–I, K). Short and conical notopodia beginning from segment 4, typically extending for 17 segments, until segment 20. Winged notochaetae in both rows,

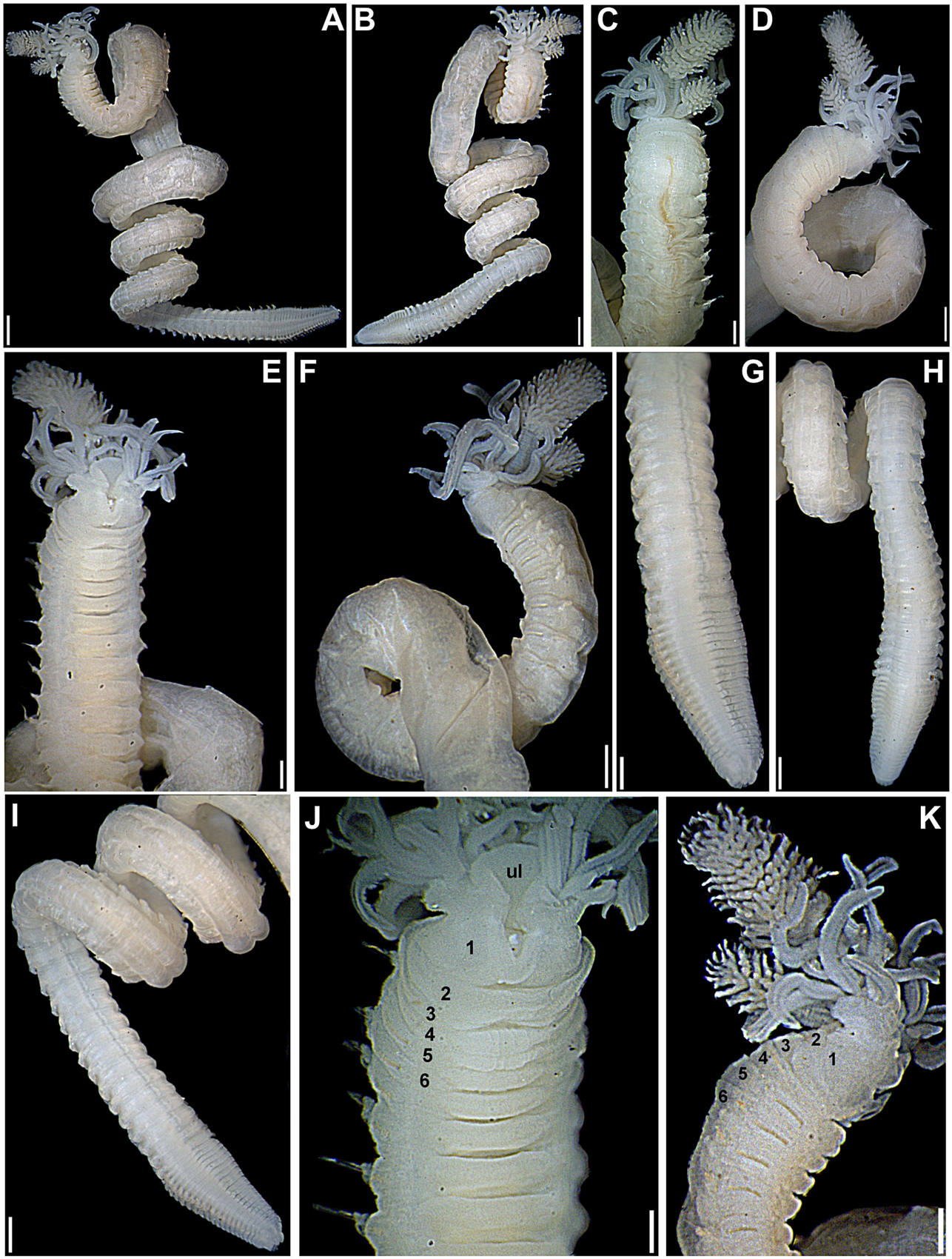


FIGURE 32. *Pistella franciscana* n. sp. AM W.45445: A–B. Entire worm, ventro-lateral and dorsal views, respectively; C–F. Anterior ends, dorsal, right lateral, ventral and left lateral views, respectively; G–I. Posterior end, in progressively lower magnifications, ventral views; J–K. Close ups of the anterior end, ventral and right lateral views, respectively. Numbers refer to segments. Abbreviations: ul = upper lip. Scale bars: A–B = 0.5 mm, C, E, G, K = 0.2 mm, D, F, H–I = 0.3 mm, J = 0.15 mm.

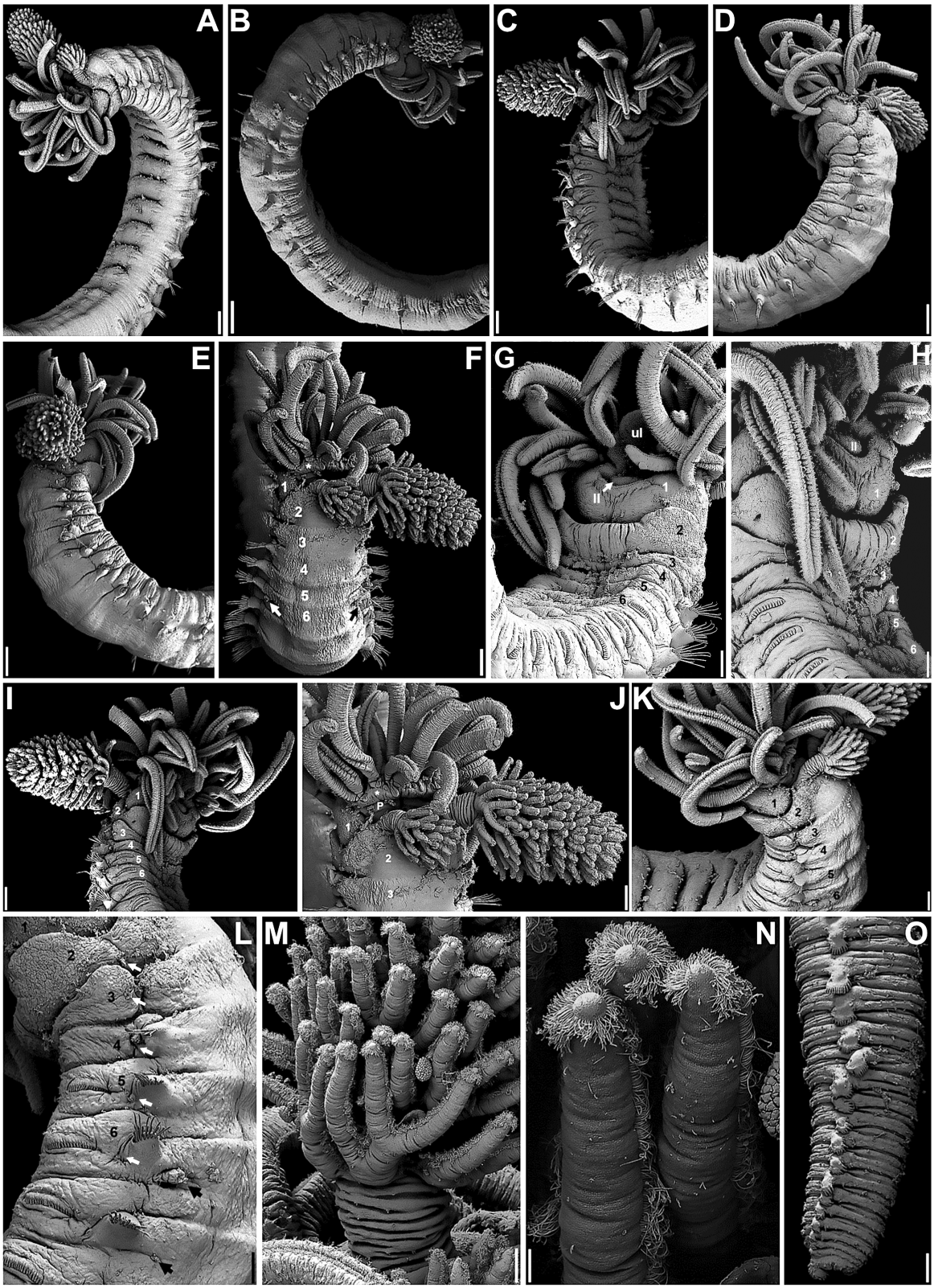


FIGURE 33. *Pistella franciscana* n. sp. AM W.44593: A–E. Anterior end, left ventro-lateral, right lateral, right ventro-lateral, left lateral and right dorso-lateral views, respectively; F–K. Close ups of the anterior end, dorsal, left and right (2) ventro-lateral views, left dorso-lateral and left lateral views, respectively; L. Close up of segments 2–8, left lateral view, white and black arrows point to the two sets of papillae; M–N. Progressively closer views of the branchiae; O. Posterior end, left lateral view. Numbers refer to segments. Abbreviations: ll = lower lip, P = basal part of prostomium, ul = upper lip, * = distal part of prostomium. Scale bars: A, C–E = 200 µm, B = 300 µm, F, I = 150 µm, G, L = 70 µm, H, J–K, O = 100 µm, M = 40 µm, N = 10 µm.

broadly-winged, wings as broad as width of shaft or broader (Figs 34C–G; 35A–B, F). Neuropodia present from segment 5, as low ridges until termination of notopodia, as low pinnules thereafter. Neurochaetae throughout as short-handled avicular uncini, arranged in partially to completely intercalated double rows from segment 11 until termination of notopodia; uncini with dorsal button at mid-length of base, conspicuous at least until termination of notopodia, and crest with 3–4 transverse rows of secondary teeth (Figs 34B, H–M; 35C–E, G–K). Nephridial and genital papillae usually present on segments 3 and 6–7, respectively, the latter posterior and dorsal to notopodia (Fig. 33D, K, L). In addition there are additional minute papillae on segments 2–6 which are labelled in Fig. 33L, the function of which is unknown, perhaps they are sensory. Pygidium with larger ventral papillae (Figs 2H–I; 32A–B, G–I; 33O; 36A). Mucous tube.

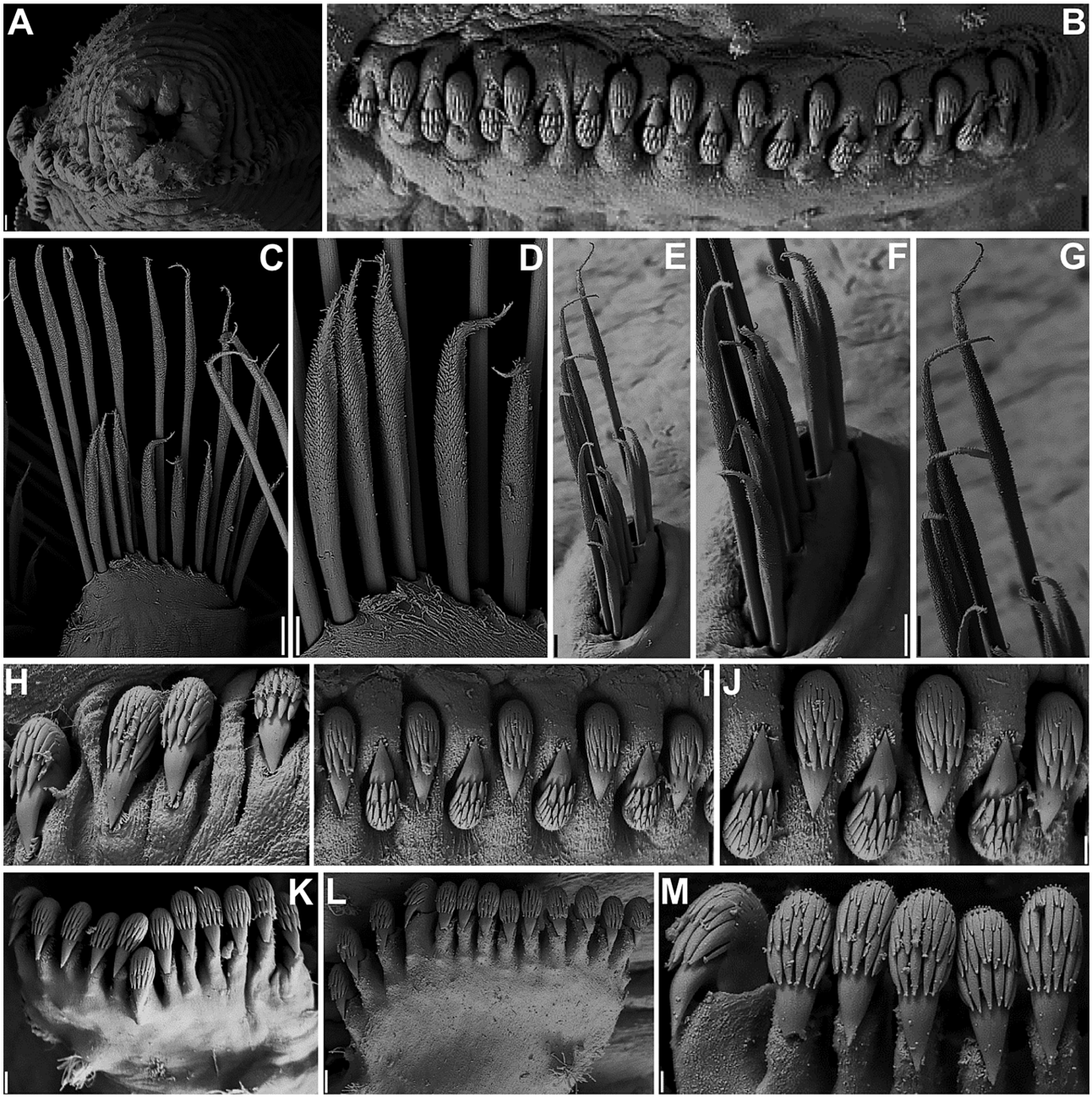


FIGURE 34. *Pistella franciscana* n. sp. AM W.44593: A. Pygidium, frontal view; B. Neuropodium, segment 16; C–D. Notochaetae, segment 8, general and chaetae from anterior row, respectively; E–G. Notochaetae of segment 15, general, chaetae from anterior and posterior rows, respectively; H. Uncini, segment 10; I–J. Uncini, segment 15 under higher magnifications; K. Uncini, segment 24; L–M. Posterior uncini, under higher magnifications. Scale bars: A = 20 µm, B, D, L = 7 µm, C = 15 µm, E–G = 10 µm, H, M = 2 µm, I, K = 5 µm, J = 3 µm.

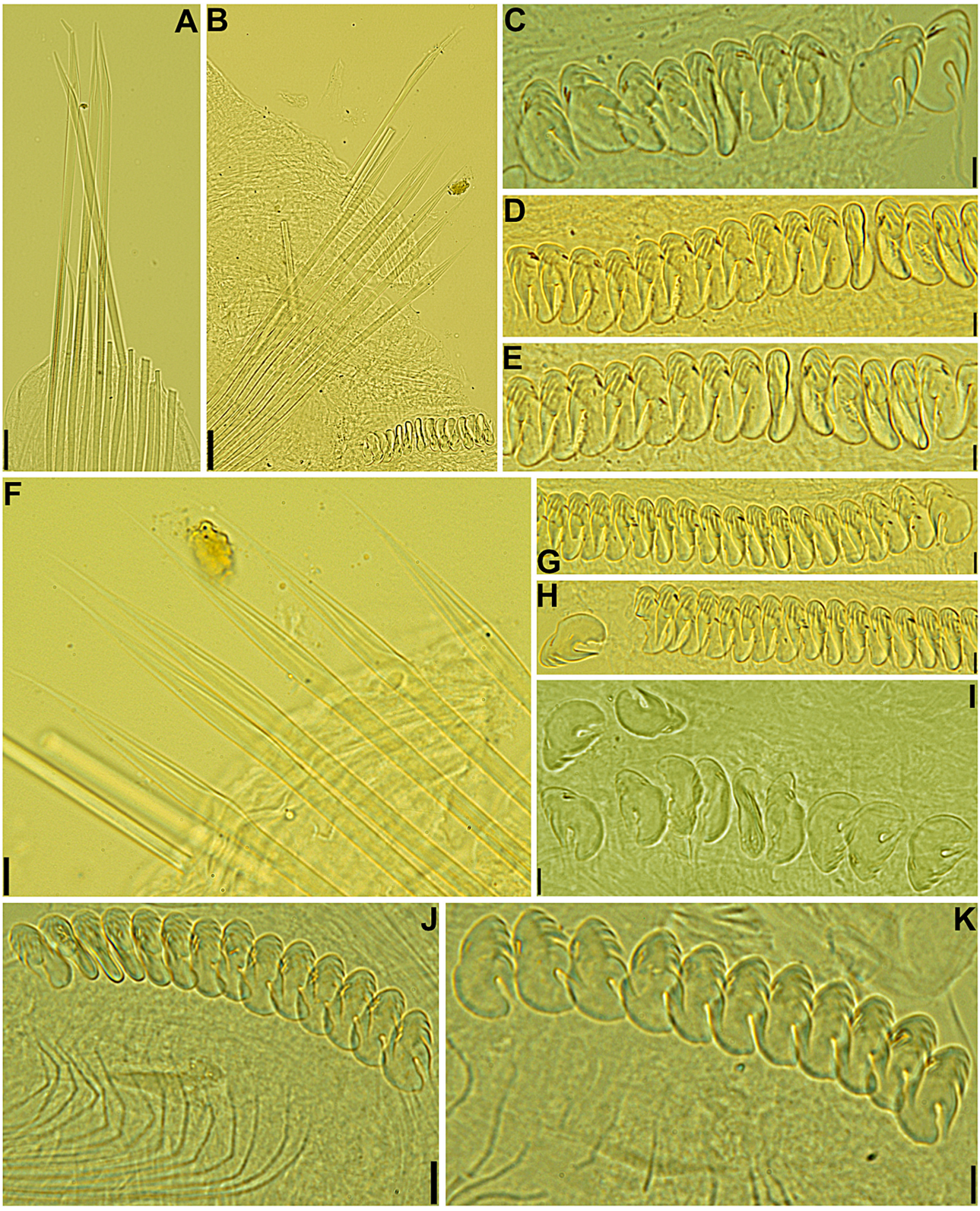


FIGURE 35. *Pistella franciscana* n. sp. AM W.44628: A–B, F. Notochaetae, segments 8 and 19, general and chaetae from anterior row, respectively; C–E, G–K. Uncini, segments 5, 6 (2), 7 (2), 19, 24 and posterior, respectively. Scale bars: A–B = 30 µm, C–E, G–I, K = 7 µm, F, J = 10 µm.

Remarks. *Pistella franciscana* n. sp. differs from the only other known Australian species of *Pistella*, *P. anthela* (Hutchings & Glasby, 1990) described from the Dampier Archipelago in Western Australia, by the shape

and arrangement of lateral lobes. In the new species no lobes continue across the dorsum as glandular ridges as they do in *P. anthela*. The tips of the branchial filaments are completely bald surrounded by well developed cilated sides (Fig. 33M, N), whereas those of *P. anthela* appear ciliated throughout including the tips (JMMN pers observ.).

The type species of the genus, *P. lornensis* (Pearson, 1969), has much larger lobes on segments 1–3, those of segment 1 extending ventrally from one side to another of body, lobes of segment 2 much longer, almost reaching level of prostomium and with straight distal margins, and those of segment 3 extending to the corners of the mid-ventral shield, while in *P. franciscana* n. sp. the lobe of segment 1 is only marginal to mouth, lobes of segment 2 are almost semi-circular and only cover the posterior part of segment 1, and those of segment 3 are only lateral.

Etymology. We name this species as "*franciscana*" due to the unusual pattern of ciliation of branchial filaments, which encircle a bald tip, resembling the head of Franciscan monks from the Middle Ages.

Type locality. North of North Point, 14°38'36"S, 145°27'09"E, Lizard Island, GBR, Australia.

Distribution. Widespread around Lizard Island.

Genus *Eupolymnia* Verrill, 1900

Eupolymnia.—Hutchings & Glasby 1988: 12–13; Capa & Hutchings 2006: 4.

Type-species. *Amphitrite nesidensis* Delle Chiaje, 1828, designated by Hartman (1959).

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part usually with eyespots; distal part shelf-like. Peristomium forming lips; hood-like upper lip; small, swollen lower lip, restricted to oral area. Lobes present on segments 1–4, ventral, marginal to mouth on segment 1, ventro-lateral on segment 2, and progressively shorter and inserted more laterally on segments 3 and 4. Paired dorso-lateral arborescent branchiae present on segments 2–4, 3 pairs. Anterior segments with glandular, rectangular, smooth to corrugated mid-ventral shields; mid-ventral groove extending posteriorly from termination of mid-ventral shields. Short and conical notopodia beginning from segment 4, extending for 17 segments, until segment 20. Notopodia throughout with narrowly-winged distally notochaetae in both rows. Neuropodia present from segment 5, as low ridges until termination of notopodia, as short pinnules thereafter. Neurochaetae throughout as short-handled avicular uncini, arranged in completely intercalated double rows from segment 11 until termination of notopodia, on segment 20; uncini throughout with dorsal button at mid-length of base, distally pointed prow and crest with few rows of secondary teeth. Nephridial and genital papillae usually present between parapodial lobes of variable number of anterior segments. Pygidium smooth to slightly crenulate.

Remarks. *Eupolymnia* is a readily recognizable genus due to the shape of the lobes on anterior segments, ventral, around the mouth on segment 1, ventro-lateral on segment 2 and progressively shorter and more laterally inserted on segments 3 and 4.

Another character which is diagnostic for this genus is the distribution of prostomial eyespots. After observation of live specimens of species from Brazil and Australia, we noticed that species of *Eupolymnia*, at least those occurring in Australia and Brazil, typically have a continuous row of eyespots across the prostomium, without mid-dorsal gap, but with a single eyespot wide line instead mid-dorsally, with eyespots widely separated from each other (Figs 2E–G; 36C, F–G).

Two species of *Eupolymnia* were previously known from Australian waters, *E. koorangia* Hutchings & Glasby, 1988 and *E. trigonostoma* (Schmarda, 1861). *Eupolymnia koorangia* was described from material from Kangaroo Island, SA, but has been found all around Australia, including Lizard Island (Hutchings & Glasby 1988), although in this paper we transfer these records to the new species described herein. Capa & Hutchings (2006) provide a table of the diagnostic characters of the 20 species of the genus currently recognised.

Eupolymnia trigonostoma was described from material from off NSW (no depth given but trawled), and Hessle (1917) synonymised the species with *Polymnia congruens* (Marenzeller, 1884) (Hessle 1917: 176), a species originally described from off Japan. However, Hutchings & Glasby (1988) could not locate the type material of *E. trigonostoma* or any modern description, Capa & Hutchings (2006) listed both species (*E. trignostoma* and *E. congruens*) in their table, but most characters are not scored for *E. trigonostoma*, because there is no information on these characters in the original description. So we suggest that *E. trigonostoma* is dubious,

unless material from the type locality is available for study, and that this species should not have been synonymised with *E. congruens*.

Key to the Australian species of *Eupolymnia*

1. Dorsal margins of lobes of segment 2 aligned with dorsal edges of neuropodia, dorsal margins of lobes of segments 3 and 4 almost at same level, aligned with notopodia . . . . . *Eupolymnia chlorobranchiata* n. sp.
- Dorsal margins of lobes of segment 2 aligned with ventral edges of neuropodia, dorsal margins of lobes of segments 3 and 4 inserted progressively more laterally, those of segment 4 aligned with dorsal edges of neuropodia . . . . *Eupolymnia koorangia*

Eupolymnia chlorobranchiata n. sp.

(Figs 2E–G, 36–38)

Eupolymnia koorangia.—Hutchings & Glasby 1988: 13 (in part).

Type material. Holotype: AM W.47716, CReefs, LI–10–018, MI QLD 2193, Mermaid Cove (buoy), 14°38'46"S, 145°27'13"E, complete specimen, in 2 pieces, anterior end 6 mm long, 1 mm wide, posterior part 8 mm long, 1 mm wide. Paratypes: AM W.47801, CReefs, LI–10–018, MI QLD 2193, same locality as holotype; AM W.47717, CReefs, LI–10–062, MacGillivray Reef, deep reef slope, 14°39'25"S, 145°28'22"E, 2 posteriorly incomplete specimens 12 mm long, 2 mm wide; 6 mm long, 2 mm wide; AM W.47718, CReefs, LI–10–42, MI QLD 2204, North Point, 14°38'40"S, 145°27'17"E, complete specimen, 73 segments, ~16 mm long, 1.3 mm wide; AM W.45454, MI QLD 2446, mounted on 2 SEM pins; AM W.45455, MI QLD 2446 (photographed); AM W.47722, CReefs, LI–10–072, MI QLD 2209; AM W.47719, CReefs, LI–10–039, MI QLD 2203, incomplete specimen, more or less in good state of preservation, with 35 segments; AM W.47720 (2), CReefs, LI–10–047, MI QLD 2205, incomplete, with 23 segments, other incomplete, with 30 segments; AM W.47723, CReefs, LI–10–127, MI QLD 2232, incomplete specimen, with 30 segments, 9 mm long, 1.7 mm wide.

Other material examined. AM W.47760, CReefs, LI–10–035, Martin Reef, back reef, 14°45'22"S, 145°21'46"E, Aug 2010; AM W.44268, MI QLD 2340; AM W.45456, MI QLD 2446 (2); AM W.44525, MI QLD 2387; AM W.44515, MI QLD 2380; AM W.44969, MI QLD 2437 (4); AM W.44517, MI QLD 2381; AM W.44948, MI QLD 2413; AM W.44623, MI QLD 2413; AM W.200728–200739, all from Lizard Island.

Comparative material examined. Holotype of *Eupolymnia koorangia* Hutchings & Glasby, 1988, AM W.14028. Paratypes of *Eupolymnia koorangia*, AM W.14027, AM W.200726.

Description. In life, colourless body and buccal tentacles, except for conspicuous row of prostomial eyespots and green branchiae (Fig. 2E–G). Transverse prostomium attached to dorsal surface of upper lip; basal part with continuous row of eyespots without mid-dorsal gap, but with a single eyespot wide line instead mid-dorsally, with eyespots widely separated from each other (Figs 2E–G; 36C, F–G); distal part shelf-like (Figs 36A–C, E–G; 37A–J). Peristomium forming lips; hood-like upper lip, almost circular, about as wide as long; lower lip small, swollen, restricted to oral area (Figs 36A–C, E–G; 37A–J). Segment 1 conspicuous all around, dorsally short, almost inconspicuous, ventrally developed, forming ventral lobe below lower lip; segment 2 with one pair of triangular, relatively wide ventro-lateral lobes, dorsal margins aligned with ventral edges of neuropodia; segments 3 and 4 with progressively shorter, triangular to semi-circular lobes, those of segment 3 almost same length as those of segment 2; both dorsal margins inserted very slightly progressively more laterally, almost aligned to each other and to line of notopodia (Figs 36A–C, E–G; 37A–C, E–I). Paired dorso-lateral arborescent branchiae present on segments 2–4, first pair slightly dorsal to following pairs, which are longitudinally aligned; all dorsal to line of notopodia, with short branchial filaments branching dichotomously in few levels from short basal stem; first pair longer, about half body width of segment 2, other pairs about half size of first pair, slightly progressively shorter (Figs 2E–G; 36A–C, E–G; 37A–J). Anterior segments with glandular, rectangular, smooth to slightly corrugated anteriorly mid-ventral shields, on segments 2–16, last shield distinctly shorter; mid-ventral groove extending posteriorly from segment 17 (Figs 36A–B, E; 37A–C, E–I). Short and conical notopodia beginning from segment 4, extending for 17 segments, until segment 20, those of segments 4–9 originating progressively more laterally, then laterally aligned, notopodia of first 2 pairs, on segments 4–5, slightly shorter (Figs 36A–G; 37A–K). Narrowly-winged notochaetae in both rows

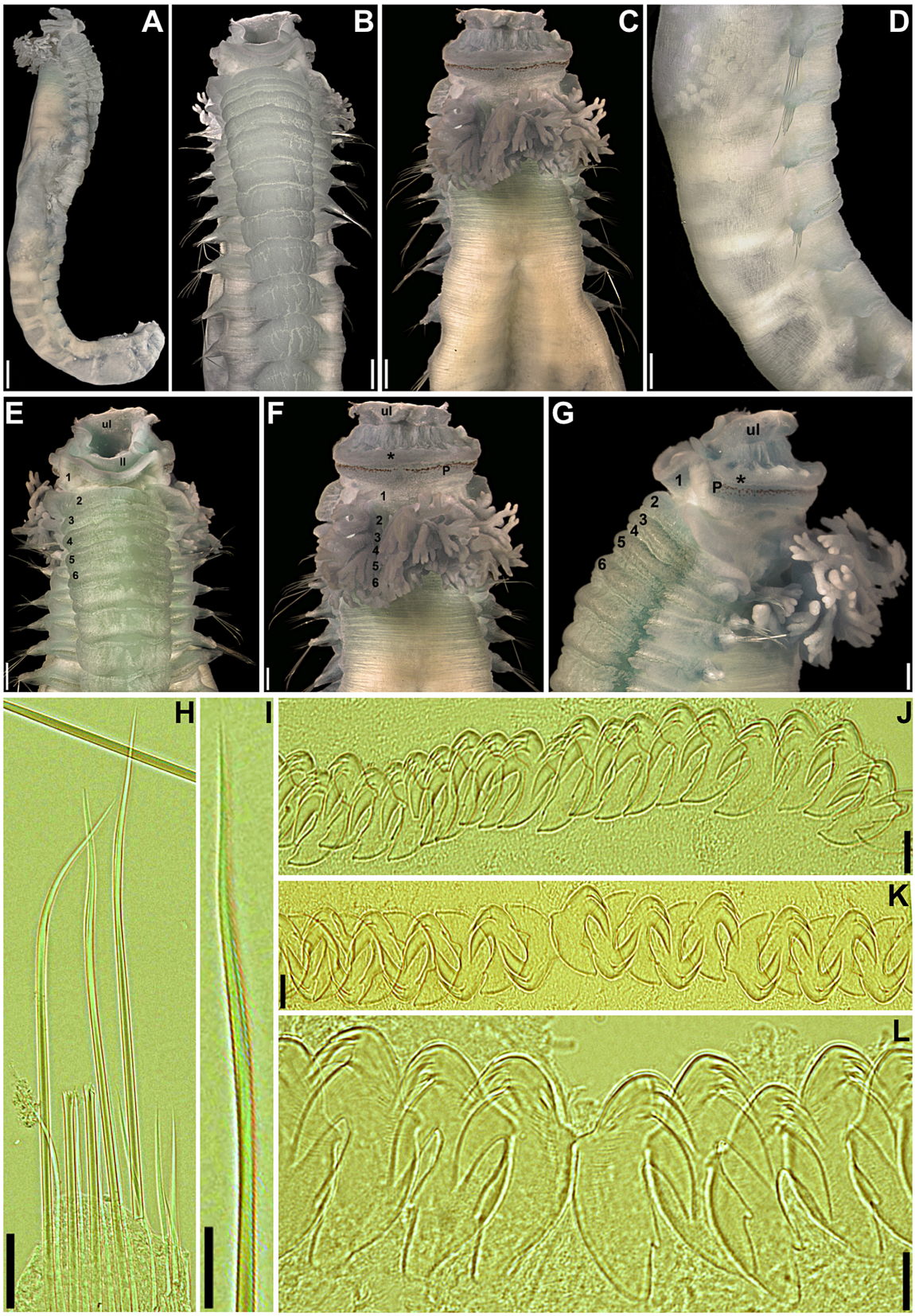


FIGURE 36. *Eupolymnia chlorobranchiata* n. sp. holotype AM W.47716: A. Incomplete worm, right lateral view; B–C. Anterior end, ventral and dorsal views, respectively; D. Transition between anterior and posterior body, right lateral view; E–G. Close ups of the anterior end, ventral, dorsal and left lateral views, respectively; H–I. Notochaetae, segment 19, general and chaetae from anterior row; J–L. uncini, segments 6, 18, 23, respectively. Numbers refer to segments. Abbreviations: ll = lower lip, P = basal part of prostomium, ul = upper lip, * = distal part of prostomium. Scale bars: A = 0.8 mm, B = 0.4 mm, C–E = 0.3 mm, F–G = 0.2 mm, H = 80 µm, I = 40 µm, J–K = 15 µm, L = 10 µm.

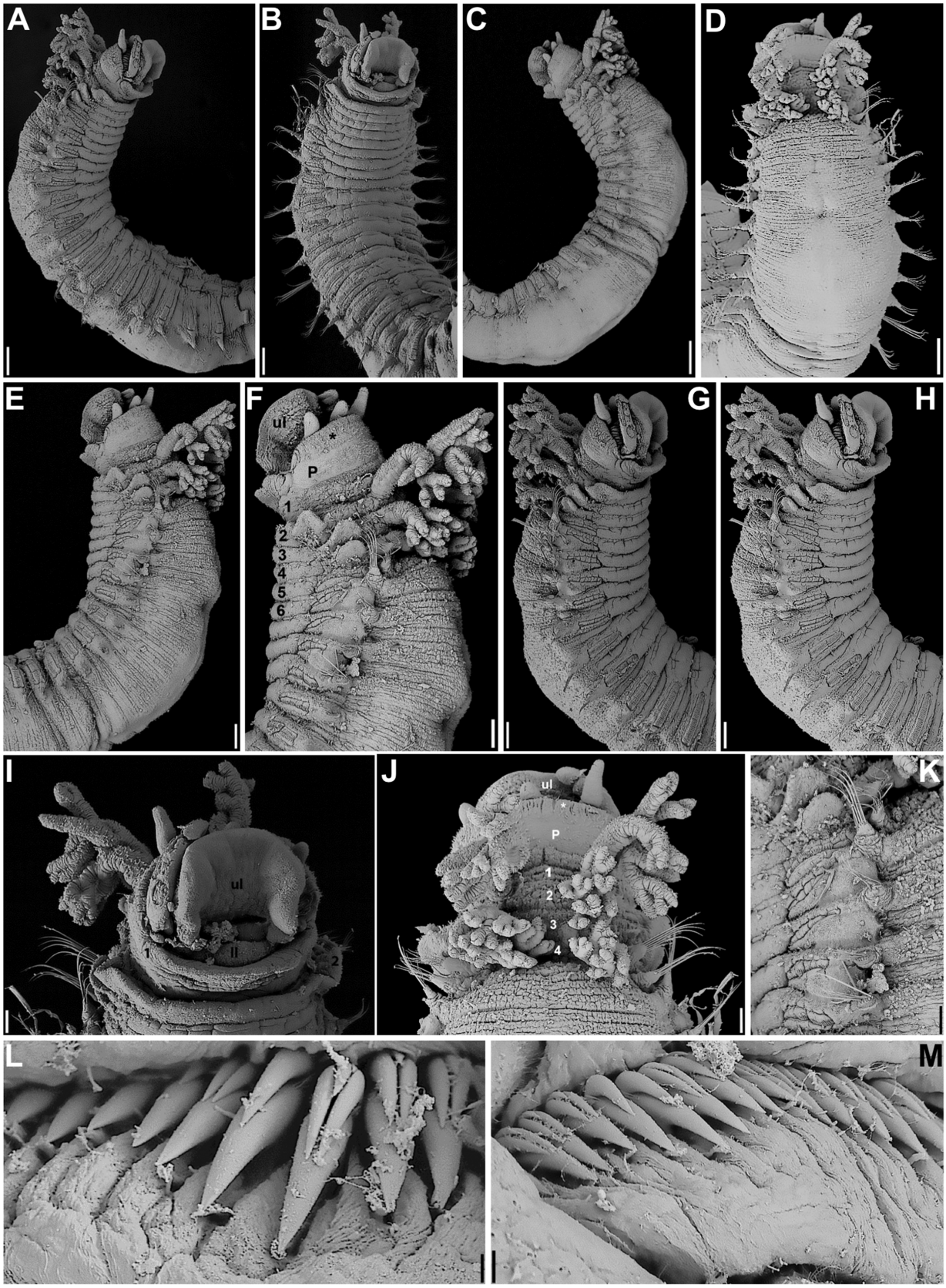


FIGURE 37. *Eupolymnia chlorobranchiata* n. sp. AM W.45454: A–D. Anterior end, right lateral, ventral, left lateral and dorsal views, respectively; E–H. Anterior end under higher magnifications, left and right lateral views, respectively; I–J. Close ups of the anterior end, ventral and dorsal views; K. Close up of segments 3–9, left lateral view; L–M. Anterior uncini. Numbers refer to segments. Abbreviations: ll = lower lip, P = basal part of prostomium, ul = upper lip, * = distal part of prostomium. Scale bars: A, C = 400 µm, B, D, = 300 µm, E, G = 200 µm, F, H = 150 µm, I–K = 100 µm, L = 3 µm, M = 5 µm.

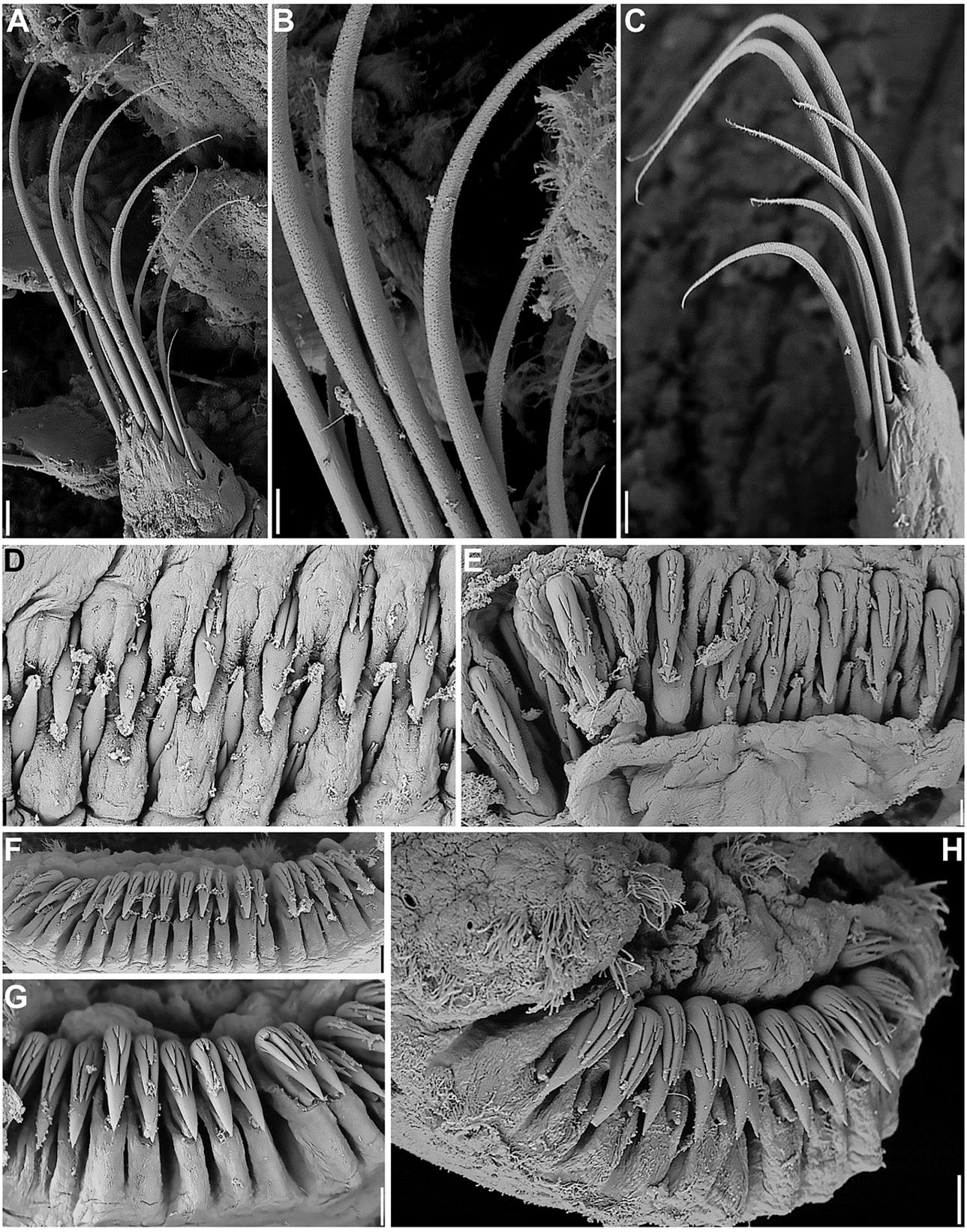


FIGURE 38. *Eupolymnia chlorobranchiata* n. sp. AM W.45454: A–B. Notochaetae, segment 6, under higher magnifications; C. Notochaetae from posterior notopodium; D–E. Uncini from posterior segment with notopodia; F–H. Uncini, posterior body. Scale bars: A–B = 20 µm, C = 15 µm, D–E = 5 µm, F = 10 µm, G–H = 7 µm.

throughout, those of posterior row with wings on distal half (Figs 36H–I; 38A–C). Neuropodia present from segment 5, as low ridges until termination of notopodia, on segment 20, as rectangular pinnules thereafter (Figs 36A–B, D–E, G; 37A–C, E–H, K). Neurochaetae throughout as short-handled avicular uncini, arranged in completely intercalated double rows on segments 11–20; uncini throughout with elongate base, dorsal button at mid-length of base and crest with 2 transverse rows of secondary teeth, distal row with irregularly sized teeth; crest with more teeth per row after termination of notopodia (Figs 36J–L; 37L–M; 38D–H). Nephridial papillae on segment 3, between bases of lobes and branchiae, genital papillae on segments 6–8, as round swellings between parapodial lobes, posteriorly (Figs 36G; 37A–C, E–H, K). Pygidium papillate. Tube unknown.

Remarks. Capa & Hutchings (2006) provided a comparative table for all the species of this genus, which makes it clear that for many species data are inadequate available to really define them.

Three species, *E. dubia* (Caullery, 1944), *E. intoshi* (Caullery, 1944), *E. robustus* (Caullery, 1944) have been described from Indonesia, *E. koorangia* Hutchings & Glasby, 1988 was described from SA and *E. congruens* (Marenzeller, 1884) was from Japan. *Eupolymnia chlorobranchiata* n. sp. can be distinguished from *E. congruens* by the shape of the lateral lobes on segment 3, which in the latter species have a prolonged margin, absent in the former. *Eupolymnia dubia* and *E. robustus* have double rows of uncini on segments 10–20 whereas in *E. chlorobranchiata* n. sp. uncini are in double rows on segments 11–20. The other two species *E. intoshi* and *E. koorangia* differ from the *E. chlorobranchiata* n. sp. by the shape and arrangement of lateral lobes, which are arranged obliquely, and also their branchiae are not vertically aligned, while in *E. chlorobranchiata* n. sp. the branchiae of segments 3 and 4 are aligned longitudinally, as are the dorsal margins of lobes. For this reason we describe *E. chlorobranchiata* n. sp. as a new species, but a major revision of this genus is needed, with a revised description of the type species of the genus, *E. nesidensis* (Delle Chiaje, 1828). Clearly, the shape and position of dorsal margins insertion of lobes are important in this genus, but descriptions of most species do not mention them. As apparently Delle Chiaje never deposited type material, the designation of a neotype for the type species should be a priority.

Type locality. Lagoon, 14°41'14"S, 145°27'18"E, Lizard Island, GBR, Australia.

Distribution. Widely distributed around the Lizard Island region.

Genus *Lanicola* Hartmann-Schröder, 1986

Lanicola.—Hutchings & Glasby 1988: 24; Capa & Hutchings 2006: 14.
Paraeupolymnia Young & Kritzler 1987: 687.—Londoño-Mesa 2006: 23–24.

Type-species. *Lanicola lobata* Hartmann-Schröder, 1986, by monotypy.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part sometimes with eyespots; distal part shelf-like. Buccal tentacles shorter than body. Peristomium forming lips; hood-like upper lip; small, swollen lower lip, restricted to oral area. Segment 1 reduced dorsally, developed ventrally, with ventral lobe inserted marginally to mouth. Anterior margins of anterior segments, beginning from segment 2, as swollen crests ventrally, more developed on segment 2; pair of lobes shared by segments 2–3, originally from segment 3, dorsal margins originating from segment 3, ventral margins fused to ventral shield of segment 2, with conspicuous scar at line of fusion extending until segment 3. Paired dorso-lateral arborescent branchiae present on segments 2 and 3, 2 pairs. Anterior segments with glandular, rectangular to trapezoidal, smooth to slightly corrugated mid-ventral shields; mid-ventral groove extending posteriorly from termination of mid-ventral shields. Short and conical notopodia beginning from segment 4, extending for 17 segments, until segment 20. Narrowly-winged notochaetae in both rows throughout. Neuropodia present from segment 5, as low ridges throughout, or only until termination of notopodia and as low pinnules thereafter. Neurochaetae throughout as short-handled avicular uncini, arranged in partially to completely intercalated double rows from segment 11 until termination of notopodia, on segment 20; uncini with dorsal button at mid-length of base, conspicuous at least until termination of notopodia, and crest with several transverse rows of secondary teeth. Nephridial papillae on segments 3 and 4, genital papillae on segments 6 and 7, posterior to notopodia and dorsal. Pygidium smooth to slightly crenulate (Capa & Hutchings 2006).

Remarks. Capa & Hutchings (2006) emended the diagnosis of *Lanicola* after the study of type material, described two additional species, and synonymized *Paraeupolymnia*, with three more species, with *Lanicola*.

Therefore, this genus currently includes six species and we describe herein a seventh species from Lizard Island, the second occurring in Australian waters.

Key to the Australian species of *Lanicola*

1. Lobes of segment 3 rectangular, with straight lateral margins, dorsal margins inserted near line of notopodia . . . . . *Lanicola rectangulata* n. sp.
- Lobes of segment 3 triangular, distally rounded, dorsal margins not reaching dorsal edges of neuropodia. . . . . *Lanicola lobata*

Lanicola rectangulata n. sp.

(Figs 39–40)

Type material. Holotype: NTM W.023131, Day Reef, Outer Barrier, 14°28'35"S, 135°32'38"E, 12 m, 13 mm long, 2 mm wide, posteriorly incomplete. Paratype: AM W.44604, MI QLD 2399.

Comparative material examined. Non types of *Lanicola lobata* Hartmann-Schröder, 1986, MV F.91199, NTM W.3667.

Description. Transverse prostomium attached to dorsal surface of upper lip; basal part without eyespots, distal part shelf-like (Fig. 39A–G, I–K). Peristomium forming lips, hood-like upper lip, short, wider than long; short and swollen lower lip, button-like (Fig. 39A, C, G, J–K). Segment 1 dorsally narrow, developed ventrally with high ventral lobe marginal to mouth; anterior margins of segments 2–6 as progressively lower protruding crests ventrally; segment 3 with pair of low rectangular lobes, with straight lateral and distal margins, ventral margins fused to mid-ventral shield of segment 2, with conspicuous scar at line of fusion extending until anterior margin of segment 3, dorsal margins inserted near line of notopodia; from segment 4, lobes absent (Fig. 39A–G, I–K). Anterior segments slightly inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–3, dorsal to line of notopodia, with branchial filaments branching dichotomously at few levels from short basal stems; first pair longer, more than half of body width of segment 2, dorsally aligned to second pair (Fig. 39A–F, I, K). Mid-ventral shields present on segments 2–19, rectangular, compact on anterior segments, progressively longer on segments 6–11, then of uniform length until segment 18, last shield shorter; all shields slightly crenulate (Fig. 39A, C, G, J–K). Notopodia beginning on segment 4, extending until segment 20; notopodia short, rectangular, first pair shorter, notopodia of segments 4–7 inserted progressively more laterally, then longitudinally aligned (Fig. 39A–I). Narrowly-winged notochaetae in both rows throughout, those from posterior row with wings at distal half (Fig. 40A–C). Neuropodia present from segment 5, as low, almost sessile ridges until termination of notopodia, as low, rectangular pinnules thereafter (Fig. 39A–D, G–K). Short-handled uncini throughout, with dorsal button at mid-length, distally rounded prow and 3 transverse rows of secondary teeth, on anterior segments, and 2 rows from segment 11 (Fig. 40D–F). Nephridial papillae on segments 3 and 4, posterior to notopodia, genital papillae on segments 6 and 7, dorsal to notopodia (Fig. 39B, D–F, I). Pygidium and tube unknown.

Remarks. *Lanicola rectangulata* n. sp. is the second species of this genus found in Australian waters; the other species is *L. lobata*, the type species of the genus, which was described from SA. These species differ because *L. lobata* is a distinctly larger species, with triangular, distally rounded lobes on segment 3, while in *L. rectangulata* n. sp. these lobes are rectangular and proportionally longer than in *L. lobata*.

Etymology. We name this species after the rectangular shape of the lobes of segment 3.

Type locality. Day Reef, 14°28'35"S, 135°32'38"E, Outer Barrier, GBR, Australia.

Distribution. Known only from the type locality.

Genus *Loimia* Malmgren, 1866

Loimia.—Hutchings & Glasby 1988: 26; Carrerette & Nogueira 2015: 3–7.

Type-species. *Terebella medusa* Savigny, 1818, by monotypy.

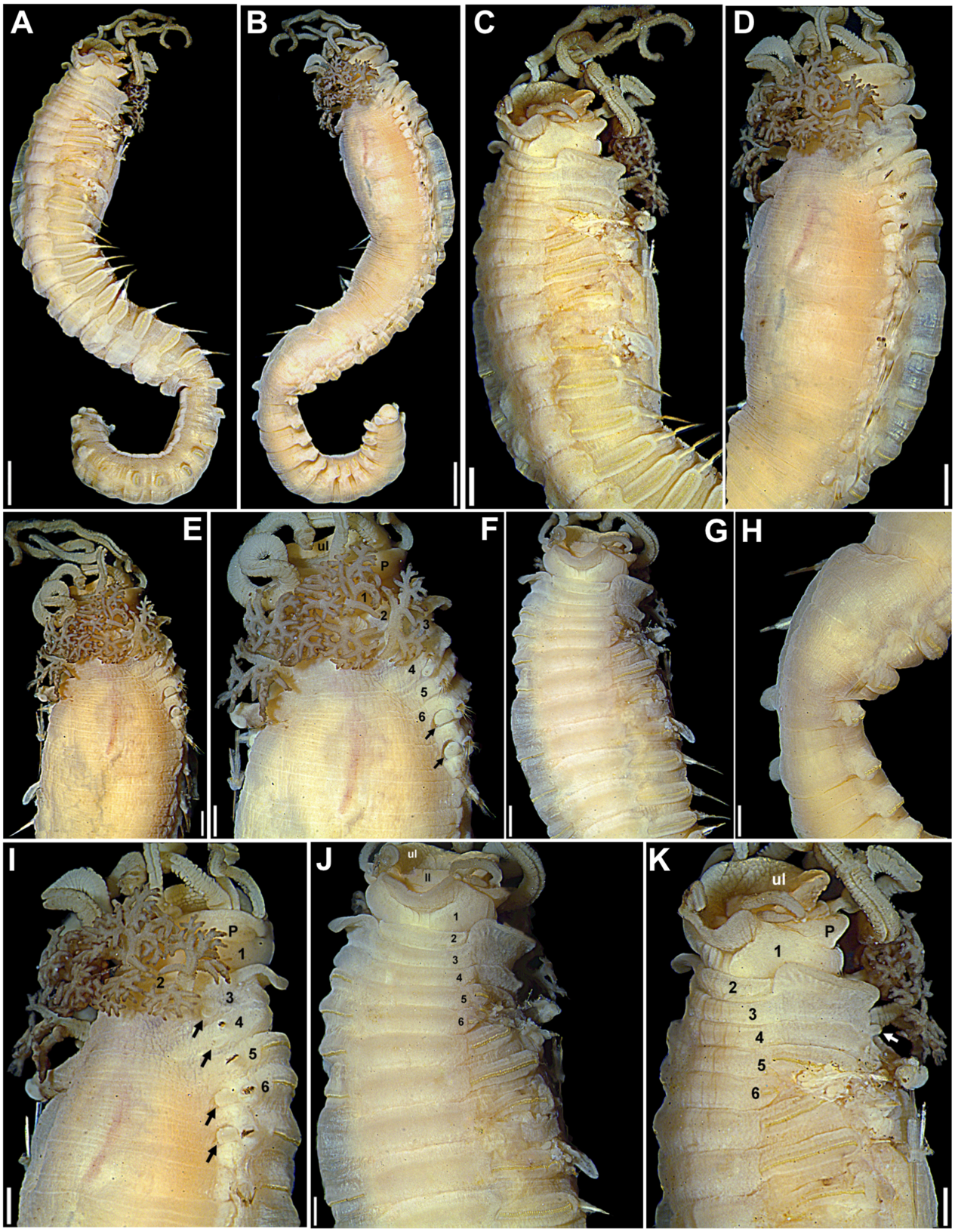


FIGURE 39. *Lanicola rectangulata* n. sp. NTM W.023131: A–B. Incomplete worm, left ventro-lateral and right dorso-lateral views, respectively; C–G. Anterior end, left ventro-lateral, right dorso-lateral, dorsal (2) and ventral views, respectively; H. Transition between anterior and posterior body, right dorso-lateral view; I–K. Close ups of the anterior end, right dorso-lateral, ventral and left ventro-lateral views, respectively. Numbers refer to segments, unspecified arrows point to nephridial and genital papillae. Abbreviations: ll = lower lip, P = prostomium, ul = upper lip. Scale bars: A–B = 1 mm, C–D, G = 0.5 mm, E = 0.4 mm, F, H–K = 0.3 mm.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part sometimes with eyespots; distal part shelf-like. Buccal tentacles usually about same length as region with notopodia, or slightly longer. Peristomium forming lips; hood-like upper lip; small, swollen lower lip, restricted to oral area. Segment 1 reduced dorsally, with pair of large lobes directed anteriorly and covering upper lip, mid-ventrally fused to each other and indented anteriorly, partially exposing lower lip; lobes of segment 1 originating at variable position from dorsal to ventral sides of body. Segment 2 usually only conspicuous dorsally, laterally covered by lobes of segment 3 and fused to segment 3 mid-ventrally, forming anterior part of single, protruding mid-ventral shield between segments 2–3 or 2–4. Segment 3 with pair of large lateral lobes, of variable size and shape; segment 4 rarely with pair of shorter lobes. Paired dorso-lateral arborescent branchiae present on segments 2–4, 3 pairs. Anterior segments with glandular, rectangular to trapezoidal, smooth to slightly corrugated mid-ventral shields; mid-ventral groove extending posteriorly from termination of mid-ventral shields. Short, rectangular to conical notopodia beginning from segment 4, extending for 17 segments, until segment 20. Narrowly-winged notochaetae in both rows throughout. Neuropodia present from segment 5, as low ridges until termination of notopodia, as elongate pinnules thereafter. Neurochaetae throughout as pectinate short-handled avicular uncini, arranged in partially intercalated to completely separate double rows, in back to back arrangement, from segment 11 until termination of notopodia, on segment 20; uncini with short base, dorsal button closer to base of main fang, frequently inconspicuous, and crest with single vertical series of progressively shorter secondary teeth, main fang not always clearly marked. Nephridial papillae on segment 3, genital papillae on segments 6–8, posterior to notopodia and dorsal; short papillae, not always conspicuous. Pygidium smooth to papillate (Carrerette & Nogueira 2015).

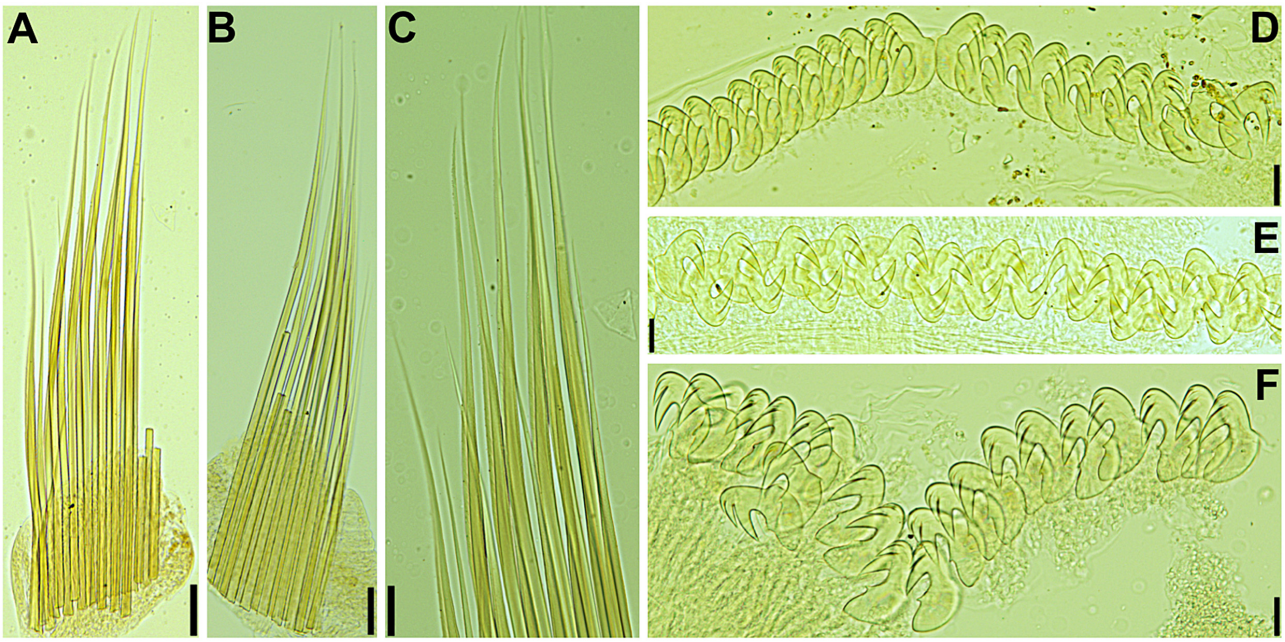


FIGURE 40. *Lanicola rectangulata* n. sp. NTM W.023131: A, C. Notochaetae under higher magnifications, segment 9, general and chaetae from posterior row, respectively; B. Notochaetae, segment 17; D–F. Uncini from the segments 5, 11, 23, respectively. Scale bars: A–B = 50 µm, C = 30 µm, D–F = 20 µm.

Remarks. *Loimia* is a well known genus of Terebellidae. Live specimens are frequently large and brightly coloured. This genus is easily recognized by the presence of pectinate uncini, a feature unique among terebellids. However, the distinction between the species of *Loimia* is much more difficult, especially because most descriptions do not provide details of the morphology of the lobes and other important characters (Carrerette & Nogueira 2015).

Live specimens of members of *Loimia* have a remarkable character, which is the presence of a bright, blood red region at the termination of mid-ventral shields (Figs 2J–L; 3A–B, D–F). Similar blood red ventral regions are also observed among members of at least some species of *Lanice* (Fig. 3G), *Lanicides* (Fig. 2C) and *Pista*. Although this region seems to be a blood sinus, we could not confirm this after examining live material and

apparently the bright red colour is due only to pigmentation, as there is no particular concentration of blood in this area. After preservation, some pigmentation may remain, as a dark mid-ventral spot extending for several segments, or completely fade. Although it is not visible in live material due to the blood red colour, this region still has mid-ventral shields, but those are deeply grooved transversely, instead of smooth to slightly crenulate, as anterior shields.

Four species of *Loimia* are known from Australian waters, *L. batilla* Hutchings & Glasby, 1988, *L. ingens* Grube, 1878, *L. ochracea* Grube, 1878, and *L. triloba* Hutchings & Glasby, 1988. Of those, *L. batilla* was described from material collected in QLD, and *L. ingens* and *L. triloba* have been previously found in the GBR, although these species have not been found at Lizard Island (Hutchings & Glasby 1988). In the present study, we found four species of *Loimia*, all new to science, described below.

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

1. Dorsum with one transverse row of round tubercles per segment at least after notopodia terminate; lobes present on segments 1 and 3 only 2
- Dorsum smooth to weakly wrinkled; lobes present on segments 1, 3 and 4. 3
2. (1) Lobes of segment 3 with tips wider than bases; row of tubercles present from immediately after termination of branchiae, on segment 5; tubercles of irregular size . . . . . *Loimia tuberculata* n. sp.
- Lobes of segment 3 with tips about same width as bases; row of tubercles only present after notopodia terminate, from segment 21; tubercles small, all about same size . . . . . *Loimia keablei* n. sp.
3. (1) Dorsal margins of lobes of segment 4 reaching level of notopodia . . . . . *Loimia juani* n. sp.
- Dorsal margins of lobes of segment 4 at level of mid-length of neuropodia . . . . . *Loimia pseudotriloba* n. sp.

Loimia tuberculata n. sp.

(Figs 2J–L, 41–44)

Type material. Holotype: AM W.44280, MI QLD 2359, 30 mm long, 3 mm wide, complete. Paratypes: AM W.44285, MI QLD 2371, mounted on 2 SEM pins; AM W.47724, CReefs, LI–10–022, MI QLD 2196, Watson's Bay, 14°38'45.7"S, 145°27'13"E, in *Halimeda*, complete, 57 segments, regenerating last 9, 38 mm long, 3 mm wide, in relatively good state of preservation; AM W.47725, CReefs, LI–10–028, MI QLD 2197, MacGillivray Reef, deep reef slope, 14°39'24"S, 145°29'34"E, incomplete specimen, with 43 segments; AM W.47726 (3), CReefs, LI–10–87, High Rock, 14°49'25.0"S, 145°33'9.4"E, one specimen complete (but with posterior part of abdomen almost broken), with 83 segments plus at least 5 regenerating, 50 mm long, 5 mm wide at posterior thorax, other specimens incomplete, one of which large, with 36 segments, the other much shorter, with 30 segments.

Other material examined. AM W.44524, MI QLD 2387; AM W.47727, CReefs, LI–10–004, MI QLD 2185, Lizard Island, channel bommies, 14°41'19"S, 145°27'50"E; AM W.47731, Creefs, LI–10–018, MI QLD 2193, Mermaid Cove (buoy), 14°38'46"S, 145°27'13"E; AM W.47732, CReefs, LI–10–009, MI QLD 2188, North Direction Island, 14°44'43"S, 145°30'18"E; AM W.47821, Creefs, LI–10–109, MI QLD 2227, Bommie Bay, 14°39'35"S, 145°28'16"E.

Comparative material examined. Holotype of *Loimia batilla* Hutchings & Glasby, 1988, AM W.5162. Paratypes of *Loimia batilla*, AM W.7097, AM W.7098; AM W.7106, AM W.7107. Non-types of *Loimia ingens* (Grube, 1878), NTM W.6764, NTM W.6775, NTM W.17330. Holotype of *Loimia ochracea* (Grube, 1878), ZMB 906, MPW 583. Holotype of *Loimia triloba* Hutchings & Glasby, 1988, BMNH ZB 1986.97.

Description. In life, body anteriorly pale to reddish, with dark stripes at intersegmental grooves and discontinuous bands of dark pigmentation, body greenish after mid-body, with rings of white tubercles; mid-ventral shields terminating with blood red region; colourless buccal tentacles with pairs of pink spots all along their length (Fig. 2J–L); after preservation, some specimens with relatively well preserved pigmentation, fading over time. Transverse prostomium attached to dorsal surface of upper lip; basal part without eyespots; distal part shelf-like (Figs 41G, K–L; 42B–D, G). Peristomium forming lips, hood-like upper lip, short, almost circular, almost completely hidden by lobes of segment 1; short and swollen lower lip, button-like (Figs 41C–D, I; 42B–D, G). Segment 1 dorsally narrow, with pair of large lobes directed anteriorly and reaching slightly beyond mid-length of

upper lip; lobes rounded, almost circular, dorsal margins inserted laterally to first pair of branchiae; lobes higher ventro-laterally at level of neuropodia, mid-ventrally indented to partially expose lower lip. Segment 2 reduced, dorsally conspicuous, covered by lobes of segment 3 laterally and partially fused to it mid-ventrally. Segment 3 with pair of large lobes, almost rectangular, rounded at corners, reaching slightly beyond base of lobes of segment 1; lobes bases narrower than tips, ventral edges fused to mid-ventral shield, dorsal margins not reaching dorsal edges of neuropodia, tips extending dorsally in relation to base, reaching bases of branchiae; lobes of segment 4 absent (Figs 41A–L; 42A–G). Anterior segments not inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–4, dorsal to line of notopodia, with short branchial filaments branching dichotomously from secondary stems originating in a spiral from short basal stems; first pair slightly longer, branchiae of second pair inserted slightly laterally to other pairs (Figs 41A–B, E–H, J–L; 42B–D, G–I). Mid-ventral shields present on segments 2–15, last shield almost inconspicuous, those of segments 2–4 almost completely fused into single crenulated structure, following shields progressively smoother; dark spot corresponding to blood red region on segments 12–15; anterior shields rectangular, then trapezoidal, indented posteriorly by tori (Figs 41B–D, I; 42A, D–F). From segment 5 to posterior body, each segment with row of irregularly sized rounded tubercles dorsally, aligned with parapodia (Figs 41A–B, E–H, J–K; 42B–D, G, K; 44M). Notopodia beginning on segment 4, extending until segment 20; notopodia short, rectangular, first pair slightly shorter, notopodia of segments 4–7 inserted progressively more laterally, then longitudinally aligned (Figs 41A–K; 42A–G, J–K; 44A–B). Narrowly-winged notochaetae in both rows throughout, those from posterior row with wings at distal half (Figs 43A–D; 44A–E). Neuropodia present from segment 5, as low, almost sessile ridges until termination of notopodia, as elongate and thin, rectangular pinnules, from segment 21 (Figs 41A–F, H–J; 42A, C–G, J–K). Pectinate, short-handled avicular uncini, arranged in partially intercalated to completely separate double rows, in back to back arrangement, from segment 11 until termination of notopodia, on segment 20; uncini with short base, almost inconspicuous dorsal button at mid-length of base, and crest with single vertical series of 7 progressively shorter secondary teeth, on anterior segments, 6 teeth from segment 11 onwards; main fang larger but not clearly defined, line of teeth aligned with tip of prow; under SEM, series of teeth with lateral fringe of minute teeth (Fig. 43E–K; 44F–L). Nephridial papillae on segment 3, between dorsal margins of lobes and bases of branchiae, genital papillae on segments 6–8, posterior to notopodia; all papillae minute (Fig. 41E–F, H, J; 42C–D). Pygidium slightly crenulate. Tube mucous, with small stones and shell fragments embedded.

Remarks. *Loimia tuberculata* n. sp. differs from all previously known Australian species of *Loimia* in possessing a dorsal ring of round tubercles per segment from segment 5 until the last segments. The only other species with similar tubercles is *L. keablei* n. sp. described below, but members of that species only have tubercles after the termination of notopodia (see below).

Loimia tuberculata n. sp. has very large and circular lobes on segments 1 and 3, which clearly distinguishes it from *L. batilla* Hutchings & Glasby, 1988, only known from Moreton Bay, in southern QLD. In addition, the lobes of segment 3 are larger and oblique in *L. batilla*, connected to each other by low collar across the ventrum, instead of rectangular, rounded at corners, and completely separated as in *L. tuberculata* n. sp.

We examined the types of *L. ochracea* (Grube, 1878), described from Mermaid Cove, WA, and found that they are not in good condition, lacking all branchiae, while buccal tentacles and all notochaetae are damaged. The types of *L. ochracea* lack lobes on segment 1, segment 2 has small rounded ventro-lateral lobes connected mid-ventrally, and segment 3 has small semi-spherical lobes directed dorso-laterally. This arrangement of lobes differs from *Loimia tuberculata* n. sp.

Another species, *L. ingens* (Grube, 1878), was recorded from several locations on the GBR by Hutchings & Glasby (1988), but the authors were unable to examine any material from the type locality, the Philippines, and we suspect this was wrongly identified. Hutchings & Glasby (1988) suggested that species may represent a complex of species, as they noticed considerable variation in several characters which we regard as important. Therefore all their material should be rechecked and it may be that some of these new species from Lizard Island occur elsewhere in tropical Australia. *Loimia ingens* also has the lobes of segment 3 fused to each other by low collar across the ventrum, but this is not found in *L. tuberculata* n. sp. or any of the other new species from Lizard Island described in this paper.

Etymology. We name this species after the characteristic ring of tubercles, present at level of parapodia of each segment, beginning from segment 5.

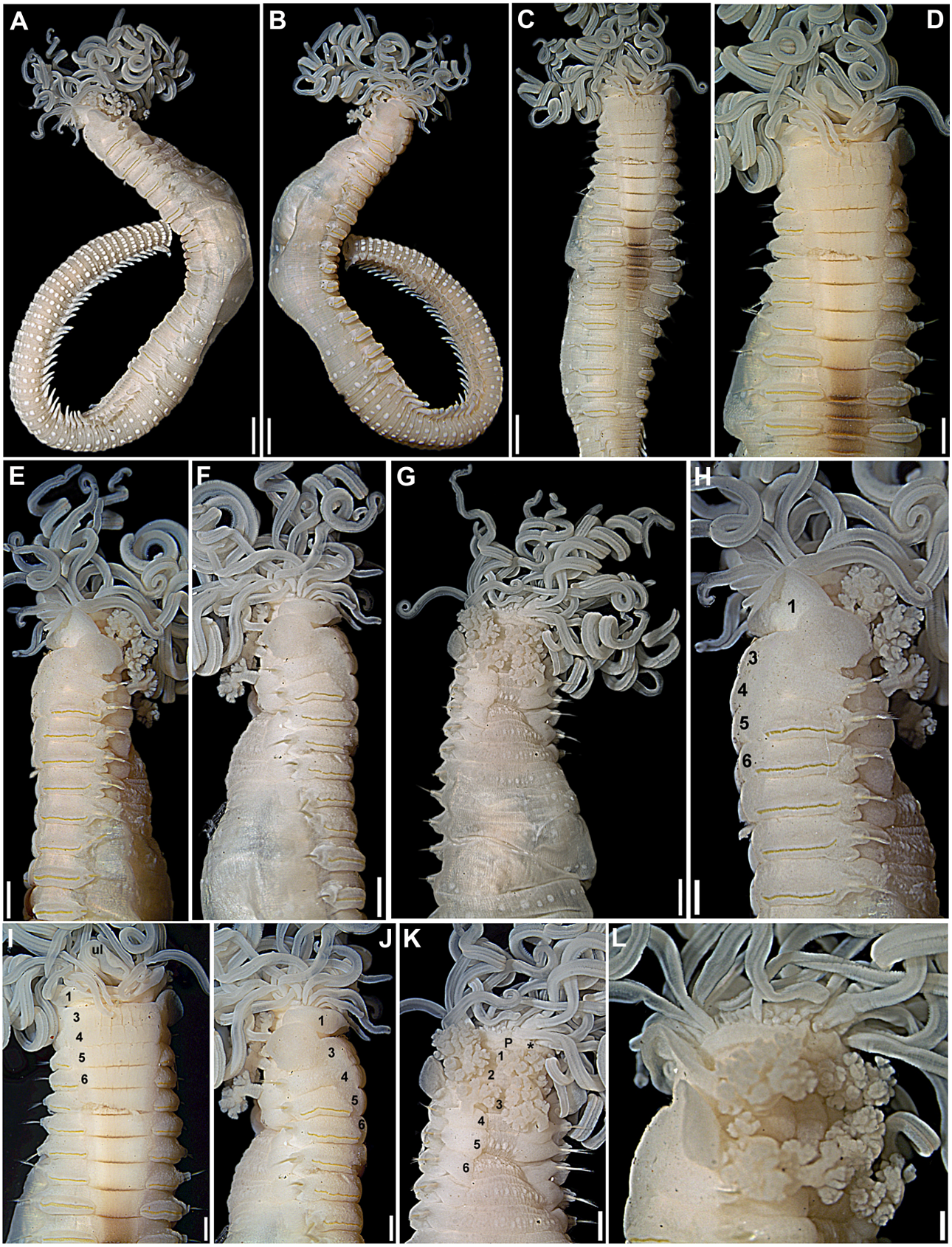


FIGURE 41. *Loimia tuberculata* n. sp. AM W.44280: A–B. Entire incomplete worm, left and right lateral views; C–G. Anterior end, ventral (2), left and right lateral, and dorsal views, respectively; H–L. Close ups of the anterior end, left lateral, ventral, right lateral and dorsal (2) views, respectively. Numbers refer to segments; P = basal part of prostomium; ul = upper lip; * = distal part of prostomium. Scale bars: A–B = 1.5 mm; C–E = 0.8 mm; F, I, K = 0.6 mm; G = 1 mm; H, J = 0.5 mm; L = 0.3 mm.

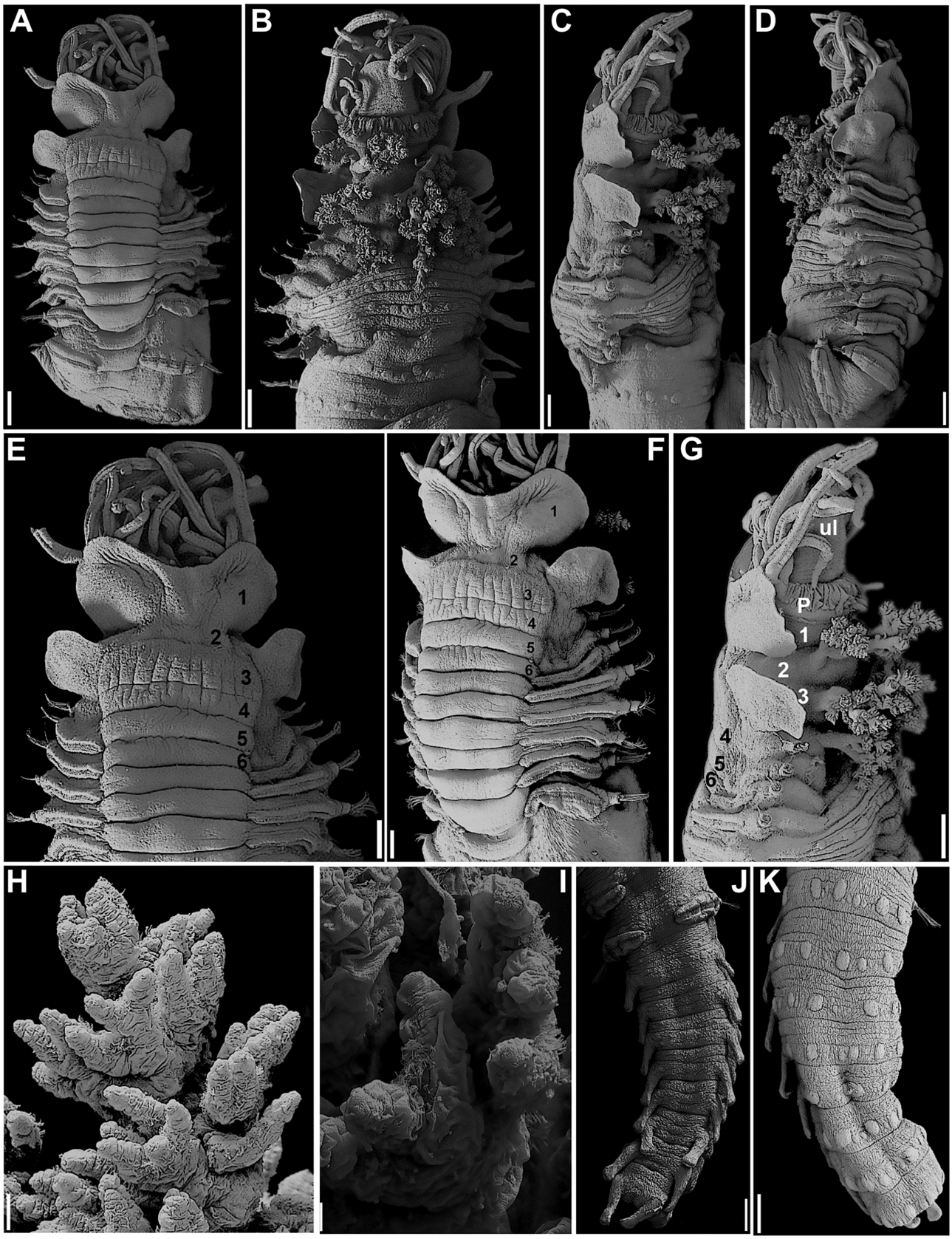


FIGURE 42. *Loimia tuberculata* n. sp**.** AM W.44285: A–D. anterior end, ventral, dorsal, left and right lateral views, respectively; E–G. Close ups of the anterior end, ventral, left ventro-lateral and left lateral views, respectively; H–I. Closer views of the branchiae; J–K. Transition between anterior between anterior and posterior body, ventral and dorsal views, respectively. Numbers refer to segments. Abbreviations: P = prostomium; ul = upper lip. Scale bars: A = 1 mm, B, D = 800 µm, C, E, G, J = 700 µm, F = 500 µm, H = 400 µm, I = 15 µm, K = 200 µm.

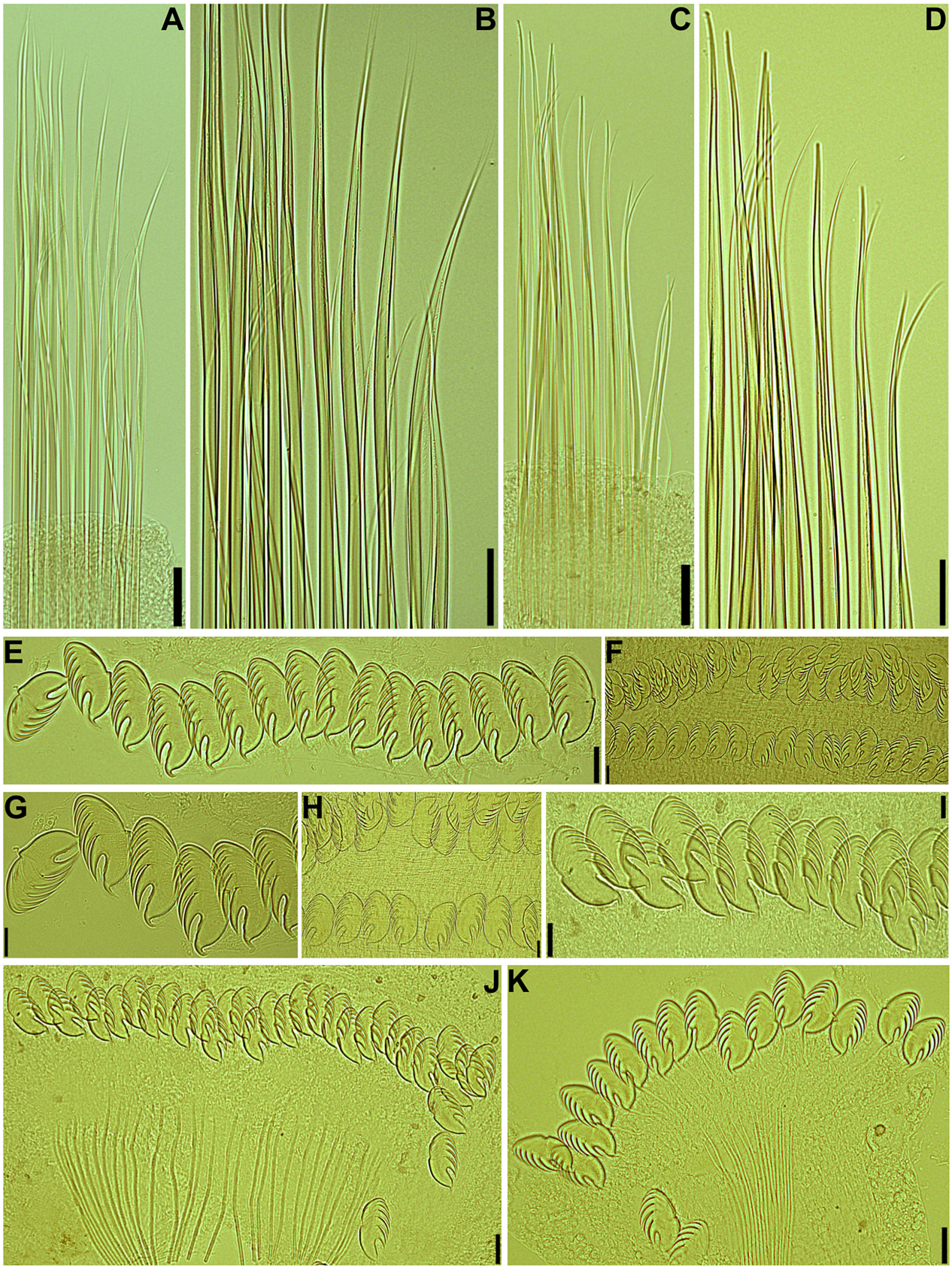


FIGURE 43. *Loimia tuberculata* n. sp. AM W.44285: A–D. Closer views of the notochaetae of segments 5 and 18, respectively; E, G. Uncini from the segment 5 under different magnifications; F, H. Closer views of the uncini from the segment 18, under different magnifications; I–J. Uncini, segment 23, under different magnifications; K. Posterior uncini, segment 73. Scale bars: A = 100 µm, B = 70 µm, C = 80 µm, D = 50 µm, E–F, J–K = 30 µm, G–I = 20 µm.

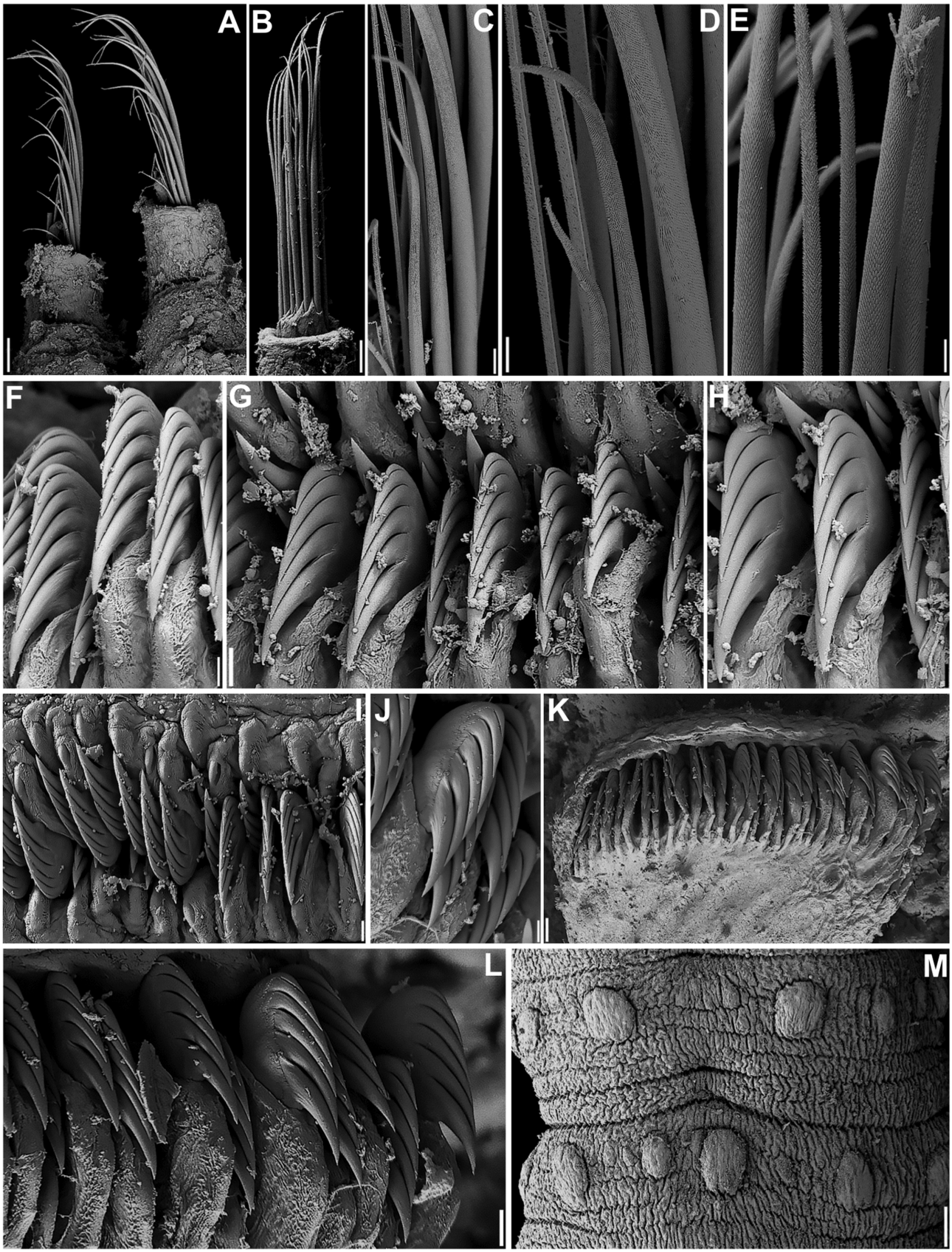


FIGURE 44. *Loimia tuberculata* n. sp. AM W.44285: A. Notopodia from segments 5 and 6; B–E. Closer views of the notochaetae of segment 6; F. Uncini, segment 10; G–J. Uncini from the segments 11 (2), 16, 24, respectively; K–L. Closer views of the uncini of the segment 25; M. Papillae from the posterior body, dorsal view. Scale bars: A = 80 µm, B = 70 µm, C, E–F, H = 8 µm, D, G, I, L = 10 µm, J = 6 µm, K = 20 µm, M = 200 µm.

Type locality. South east of Lizard Island, 14º44'35.6"S, 145º30'20.4"E, reef on north west side of North Direction Island, GBR, Australia.

Distribution. Widely distributed along Lizard Island region.

***Loimia keablei* n. sp.**
(Figures 45–48)

Type material. Holotype: AM W.47733, CReefs, LI–10–62, MacGillivray Reef, 14°39'25"S, 145°28'22"E, 14.5 mm long, 1.5 mm wide. Paratypes: AM W.47787 (on 2 SEM pins), CReefs 2008, Linnet Reef, southwest of Lizard Island, 14°47'30"S, 145°20'12"E; AM W.47788, CReefs, LI–10–009, MI QLD 2188, North Direction Island, 14°44'43"S, 145°30'18"E, large complete specimen, in excellent state of preservation, in two pieces, total of 81 segments, 26 mm long, 4 mm wide; AM W.47734, CReefs, LI–10–074, MI QLD 2213, Day Reef, outer GBR, northeast of Lizard Island, 14°28'20"S, 145°31'25"E, complete specimen, ~14 mm long, 2 mm wide; NTM W.023134, 14°38'44"S 146°27'11"E; AM W.47735 (3), CReefs, LI–10–62, MacGillivray Reef, 14°39'25"S, 145°28'22"E; AM W.47721, CReefs, LI–10–136, MI QLD 2245, High Rock, 14°49'34"S, 145°33'08"E.

Comparative material examined. Holotype of *Loimia batilla* Hutchings & Glasby, 1988, AM W.5162. Paratypes of *Loimia batilla*, AM W.7097, AM W.7098; AM W.7106, AM W.7107. Non-types of *Loimia ingens* (Grube, 1878), NTM W.6764, NTM W.6775, NTM W.17330. Holotype of *Loimia ochracea* (Grube, 1878), ZMB 906, MPW 583. Holotype of *Loimia triloba* Hutchings & Glasby, 1988, BMNH ZB 1986.97.

Description. Transverse prostomium attached to dorsal surface of upper lip; basal part with lateral eyespots extending from each lateral to level of branchiae; distal part shelf-like (Figs 45E, H; 46I, J, L–N). Peristomium forming lips, hood-like upper lip, short, almost circular, partially covered by lobes of segment 1; short and swollen lower lip, button-like (Figs 45B–D, G, I, L; 46B–D, I). Segment 1 dorsally narrow, with pair of large lobes directed anteriorly and reaching around ¾ of of upper lip length; lobes distally straight, laterally rounded, dorsal margins inserted at level of first pair of notopodia, laterally to first pair of branchiae; lobes higher ventro-laterally, laterally to mouth, mid-ventrally indented to partially expose lower lip. Segment 2 short reduced, dorsally conspicuous, covered by lobes of segment 3 laterally and partially fused to it mid-ventrally. Segment 3 with pair of relatively short, almost squared lobes, rounded at corners, reaching mid-length of lobes of segment 1; lobes with narrow base, ventral edges fused to upper corners of first mid-ventral shield, almost at mid-length of anterior neuropodial tori, dorsal margins inserted at level of dorsal edges of neuropodia; bases and tips of lobes about same width; lobes of segment 4 absent (Figs 45A–I, L–M; 46A–D, G, I, K–N). Anterior segments slightly inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–4, dorsal to line of notopodia, with short branchial filaments branching dichotomously from secondary stems originating in a spiral from short basal stems; first pair slightly longer, about half body width at segment 2; pairs all longitudinally aligned (Figs 45B–I, L–M; 46E–G, J, L–N). Trapezoidal mid-ventral shields present on segments 2–15, those of segments 2–3 almost completely fused into single crenulated structure, following shields progressively smoother, slightly crenulate until last; blood red region on segments 13–15; first 2 shields, on segments 2–3 and 4, much wider than those of following segments, then about same width, indented posteriorly by tori, last 2 shields, almost inconspicuous (Figs 45B–D, G, I, L; 46B–D, I, M–N). From termination of notopodia, on segment 20, each segment with row of rounded tubercles of relatively uniform size, aligned with parapodia (Figs 45J–K; 46A–B, O–Q; 47A). Notopodia beginning on segment 4, extending until segment 20; notopodia short, cylindrical to oblong, notopodia of segments 4–7 inserted progressively more laterally, then longitudinally aligned (Figs 45A–I, L–M; 46A–H, K–N; 47B–D, F, I). Narrowly-winged notochaetae in both rows throughout, those from posterior row with wings at distal half (Figs 45N–P; 47B–J). Neuropodia present from segment 5, as low, almost sessile ridges until termination of notopodia, as elongate and thin, rectangular pinnules, from segment 21, inserted progressively more ventrally, lateral to mid-ventral groove on posterior segments (Figs 45A–D, F–G, I, K–M; 46A–B, D–E, H, L–O, Q). Pectinate short-handled avicular uncini, arranged in partially intercalated to completely separate double rows, in back to back arrangement, from segment 11 until termination of notopodia, on segment 20; uncini with short base, dorsal button at mid-length of base, and crest with single vertical series of 6 progressively shorter secondary teeth, on first pairs of neuropodia, 4–5 teeth from beginning of double rows to posterior body segments; main fang larger but not clearly defined, line of teeth aligned with tip of prow; under SEM, series of teeth with lateral fringe of minute teeth (Figs 45Q–T; 47K–L; 48A–E). Nephridial papillae on segment 3, between dorsal margins of lobes and bases of branchiae, genital papillae on segments 6–8, posterior to notopodia; all papillae minute (Figs 45E–H, L–M; 46H, L–N). Pygidium crenulate (Figs 45A–B, J–K; 46A–B, O–Q; 47A). Tube unknown.

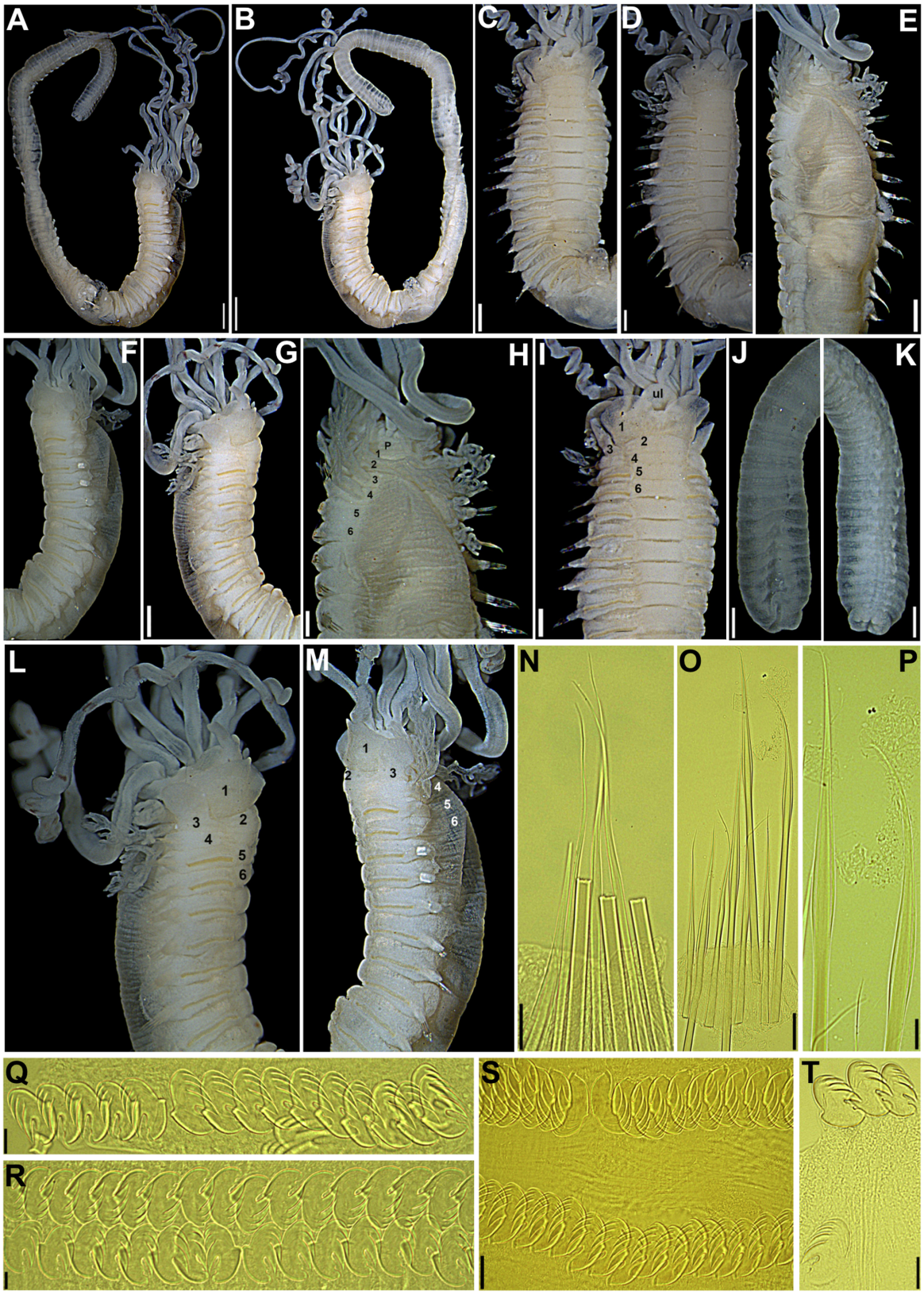


FIGURE 45. *Loimia keablei* n. sp. AM W.47733: A–B. Entire worm, left and right lateral views, respectively; C–G. Anterior end, ventral, ventro-lateral, dorsal, left and right lateral views, respectively; H–I, L–M. Close ups of the anterior end, dorsal, ventral, right and left lateral views, respectively; J–K. Posterior end, left lateral and ventral views, respectively; N. Notochaetae, segment 8; O–P. Notochaetae, segment 16, general and chaetae from posterior row; Q–T. Uncini from segments 8, 16, 17, 59, respectively. Numbers refer to segments. Abbreviations: P = prostomium, ul = upper lip. Scale bars: A–B = 0.6 mm, C, E, G = 0.4 mm, D, F, H–I, L–M = 0.3 mm, J–K = 0.2 mm, N = 30 µm, O = 50 µm, P = 20 µm, Q = 15 µm, R, T = 10 µm, S = 30 µm.

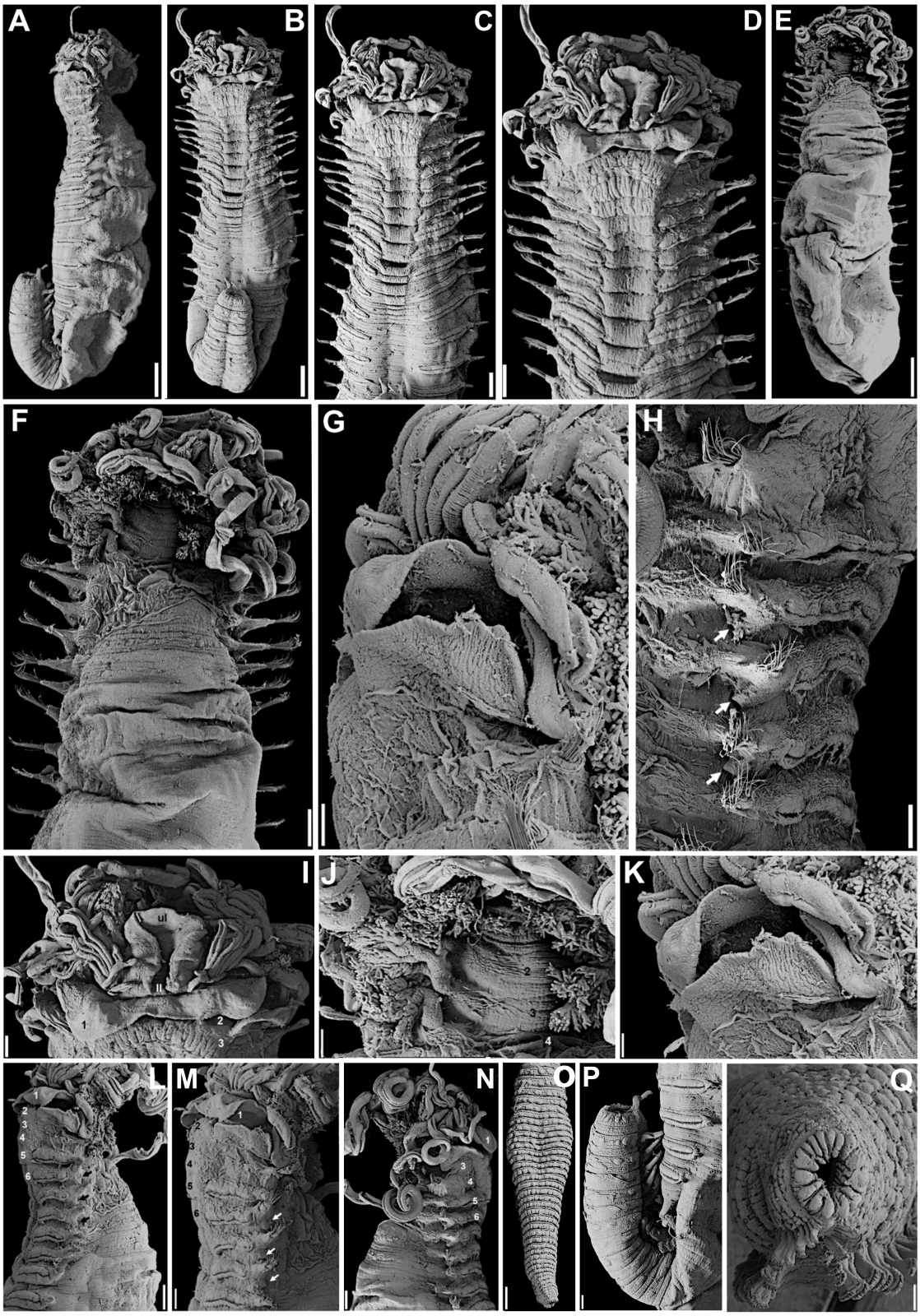


FIGURE 46. *Loimia keablei* n. sp. AM W.47787: A–B. Entire worm, left lateral and ventral views, respectively; C–F. Closer views of the anterior end, ventral and dorsal views, respectively; G–H. Close ups of the lobes of segments 1 and 3, left lateral view, and parapodia of segments 4–9, right lateral view, respectively; I–K. Close ups of the anterior end, ventral and dorsal views, and lobes of segments 1 and 3, left lateral view, respectively; L–N. Anterior end, left (2) and right lateral views, respectively; O–Q. Closer views of the posterior end, dorsal, left lateral and frontal views, respectively. Numbers refer to segments, unspecified arrows point to genital papillae. Abbreviations: ll = lower lip, ul = upper lip. Scale bars: A–C = 2 mm, D, F = 1 mm, E = 0.8 mm, G–H = 0.3 mm, I–J, L, N–O = 0.4 mm, K, Q = 0.2 mm, M, P = 0.5 mm.

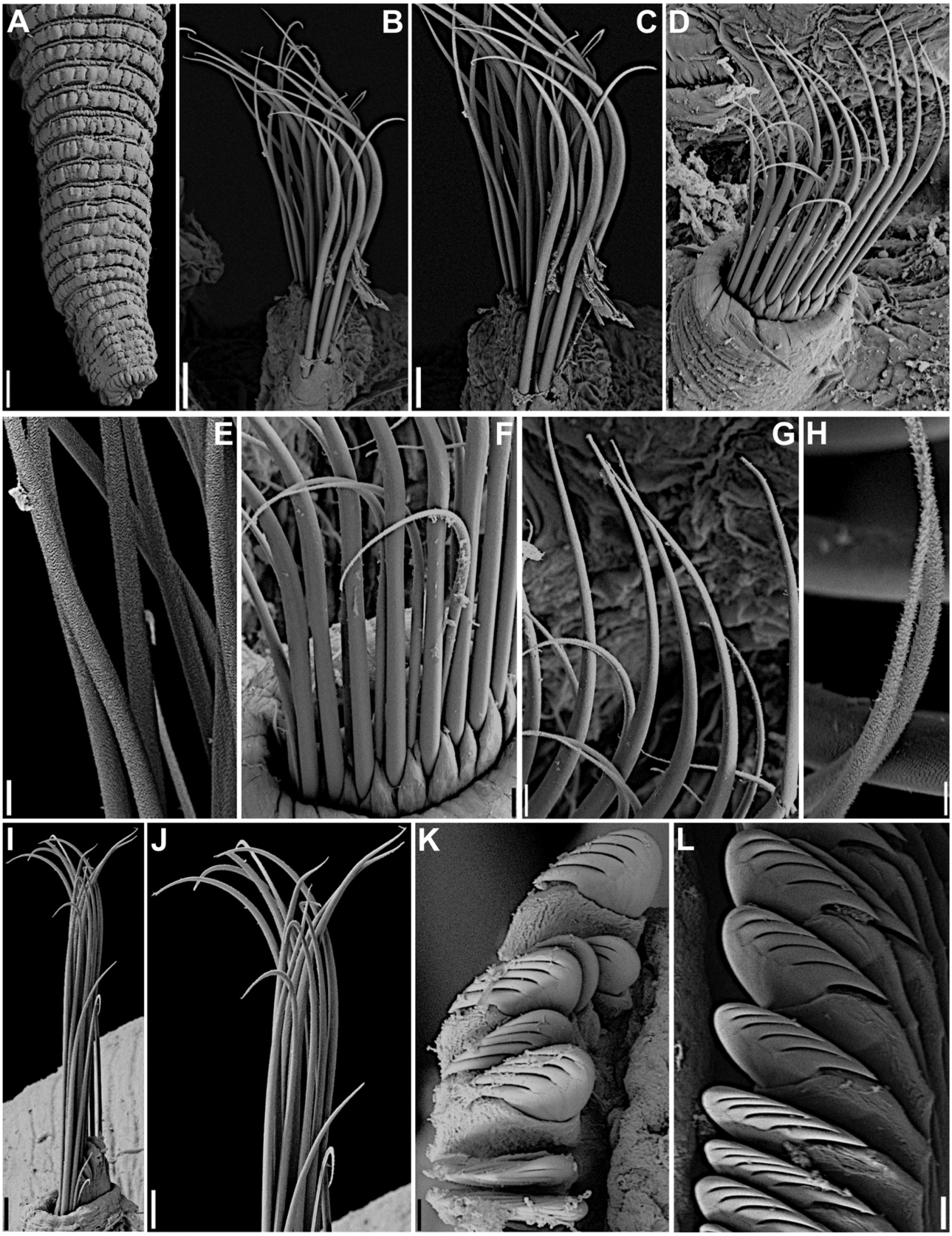


FIGURE 47. *Loimia keablei* n. sp. AM W.47787: A. Posterior end, dorsal view; B–C, E. Notochaetae of segment 10, under higher magnifications; D, F–H. Notochaetae of segment 11, general view, chaetae from anterior and posterior (2) rows, respectively; I–J. Notochaetae, segment 16, under increasing magnifications; K–L. Posterior uncini. Scale bars: A = 400 µm, B–C = 60 µm, D, I = 50 µm, E, L = 10 µm, F–G = 20 µm, H, K = 7 µm, J = 30 µm.

Variation. The number of eyespots and size of branchiae seem to be variable in this species, possibly due to artifacts of fixation as eyespots may fade or not, and branchiae may be contracted or relaxed at fixation.

Remarks. As also occurs in *L. tuberculata* n. sp**.** described above, *L. keablei* n. sp. also differs from all previously known Australian species of *Loimia* by the presence of a dorsal ring of round tubercles per segment, but in this species such a ring is only present after notopodia terminate, from segment 21, while in *L. tuberculata* n. sp. tubercles are found from segment 5. In addition to the different distribution of tubercles, *L. keablei* n. sp. differs from *L. tuberculata* n. sp. in having prostomial eyespots, uncini with fewer teeth (6 on anterior-most neuropodia, then 4–5), while in *L. tuberculata* n. sp. the uncini have 7 teeth anteriorly, then 6 teeth until posterior body and the lobes of segments 1 and 3 have different morphology between these species. The lobes of segment 1 are almost circular in *L. tuberculata* n. sp**.**, only covering the base of the upper lip, and those of segment 3 have tips much wider than bases, extending laterally from dorsal margins. In *L. keablei* n. sp**.**, in contrast, the lobes of segment 1 are distally straight and cover most extension of the upper lip, while the lobes of segment 3 are shorter, with bases and tips about same width, not extending laterally from bases.

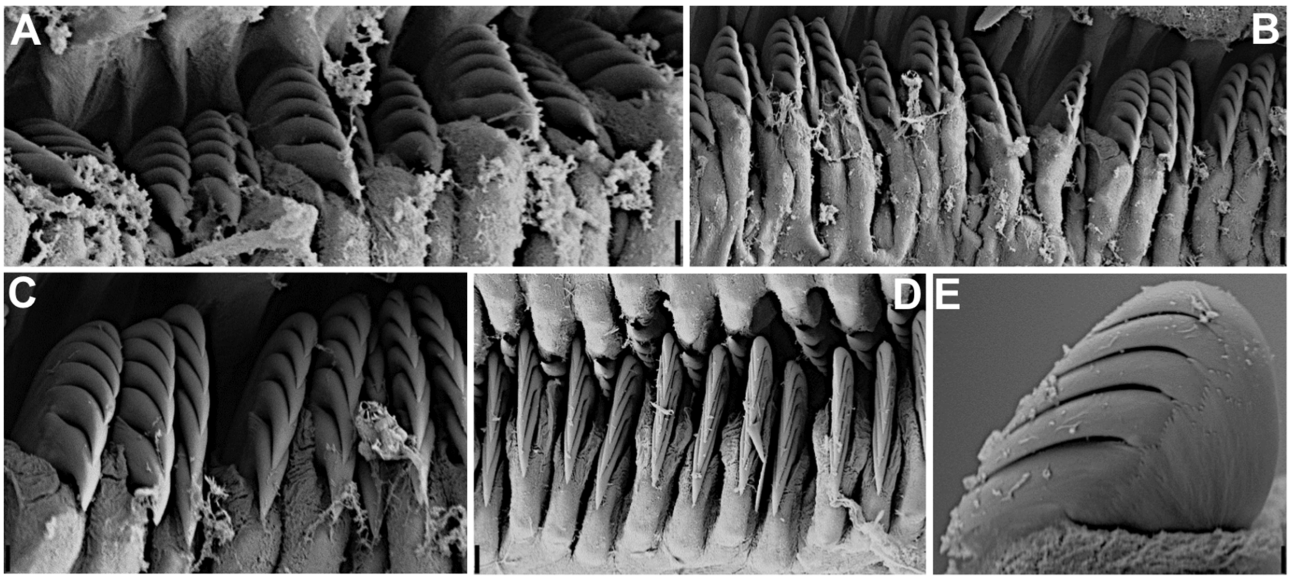


FIGURE 48. *Loimia keablei* n. sp. AM W.47787: A. Uncini, segment 7; B–C. Uncini under different magnifications, segment 10; D. Uncini, segment 13; E. Posterior uncinus. Scale bars: A = 8 µm, B, D = 10 µm, C = 5 µm, E = 2 µm.

Loimia keablei n. sp. can be easily distinguished from two other Australian species, *L. batilla* Hutchings & Glasby, 1988 and *L. ingens* (Grube, 1878) (which may represent a species complex-see Remarks under *L. tuberculata* n. sp.), because in both these species the lobes of segment 3 are connected to each other by a low collar across the ventrum, whereas in *L. keablei* n. sp. the lobes of segment 3 are completely separated. *Loimia triloba* Hutchings & Glasby, 1988 has angular lobes on segment 3, whereas in *L. keablei* n. sp. these lobes are almost rectangular to squared; in addition, *L. triloba*, as also occurs in *L. pseudotriloba* n. sp., has one pair of short lobes on segment 4, which are absent in *L. keablei* n. sp.

Etymology. We have named this species after Dr Steve Keable, Collection Manager of Marine Invertebrates, Australian Museum, who greatly assisted in all the loans associated with the workshop.

Type locality. Deep reef slope, MacGillivray Reef, 14°39'24"S, 145°29'34"E, Lizard Island, GBR, Australia.

Distribution. Widely distributed along Lizard Island region.

***Loimia juani* n. sp.**
(Figs 3D–F, 49–50)

Type material. Holotype: AM W.44961, MI QLD 2429, Casuarina Beach, 14°40'46"S, 145°26'49"E. Paratypes: AM W.47825, MI QLD 2336; AM W.44518, MI QLD 2381; AM W.44261, MI QLD 2335; AM W.44263, MI QLD 2336.

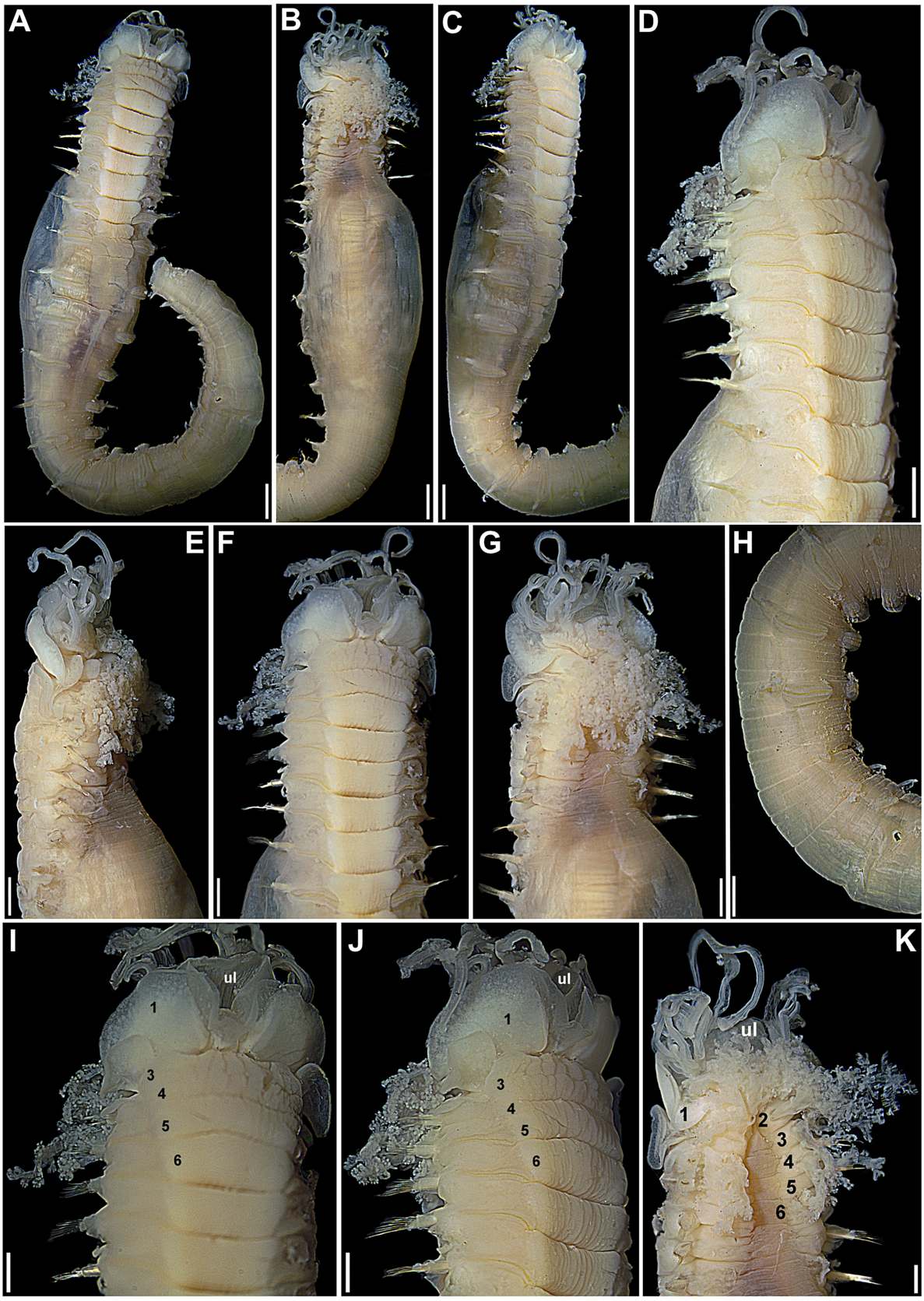


FIGURE 49. *Loimia juani* n. sp. AM W.44961: A. Incomplete worm, ventral view; B–C. Thorax, dorsal and right ventro-lateral views, respectively; D–G. Anterior end, right ventro-lateral, left lateral, ventral and dorsal views, respectively; H. Close up of the transition between anterior and posterior body, right ventro-lateral view; I–K. Close ups of the anterior end, ventral, right ventro-lateral and dorsal views, respectively. Numbers refer to segments. Abbreviations: ul = upper lip. Scale bars: A–C = 1.5 mm, D–H = 1 mm, I–J = 0.7 mm, K = 0.6 mm.

Comparative material examined. Holotype of *Loimia batilla* Hutchings & Glasby, 1988, AM W.5162. Paratypes of *Loimia batilla*, AM W.7097, AM W.7098; AM W.7106, AM W.7107. Non-types of *Loimia ingens* (Grube, 1878), NTM W.6764, NTM W.6775, NTM W.17330. Holotype of *Loimia ochracea* (Grube, 1878), ZMB 906, MPW 583. Holotype of *Loimia triloba* Hutchings & Glasby, 1988, BMNH ZB 1986.97.

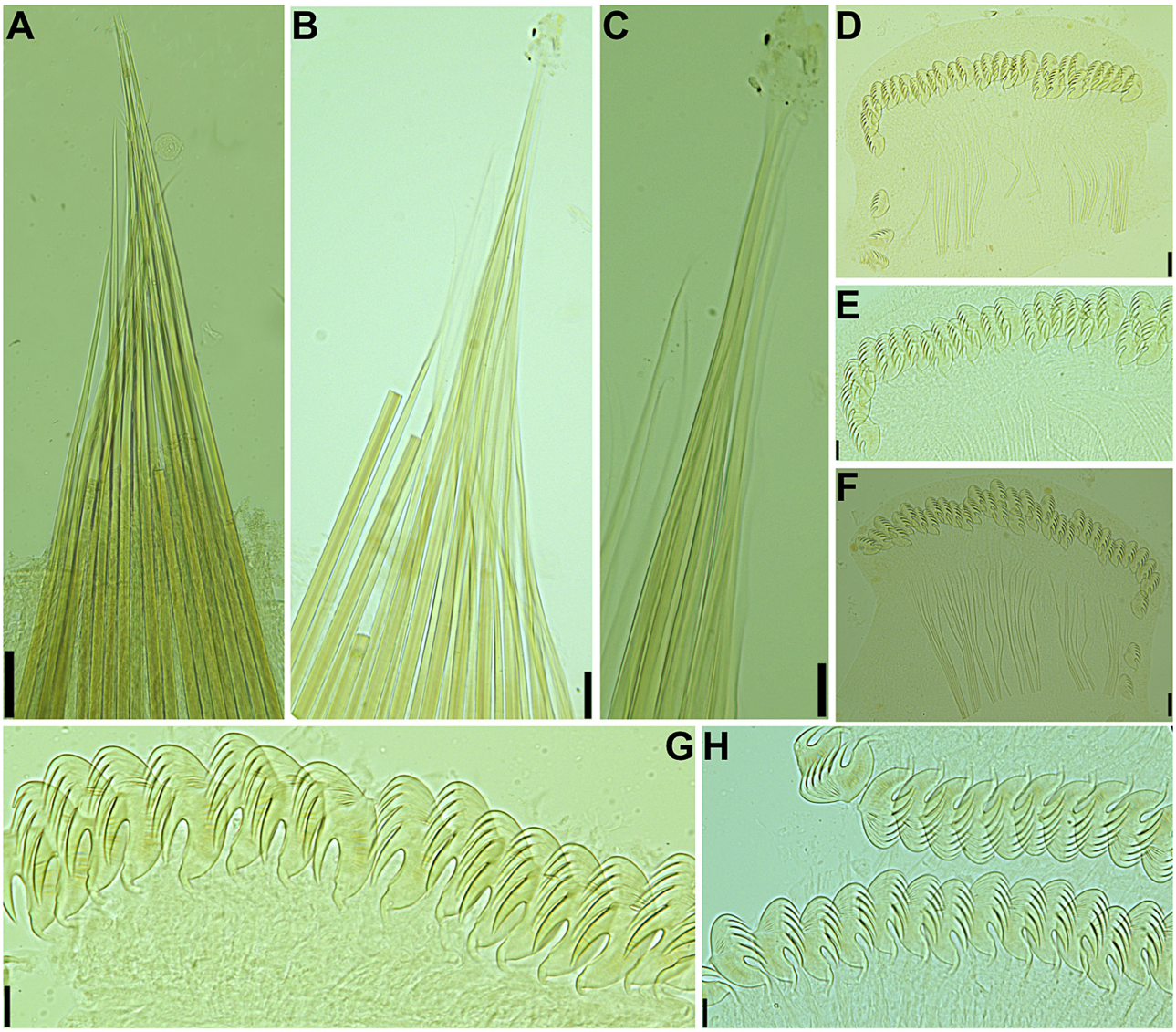


FIGURE 50. *Loimia juani* n. sp. AM W.44961: A–C. Notochaetae of segments 6 and 17 (2), respectively; D–H. Uncini, segments 23 (2), posterior body, 5, 11, respectively. Scale bars: A–B = 50 µm, C = 30 µm, D, F = 40 µm, E, G–H = 20 µm.

Description. In life, body anteriorly reddish with paler, yellowish mid-ventral shields, buccal tentacles frequently with iridescent red and yellow inclusions (Fig. 3D–F). Transverse prostomium attached to dorsal surface of upper lip; basal part without eyespots, distal part shelf-like (Fig. 49B, E, G, K). Peristomium forming lips, hood-like upper lip, short, almost circular, partially covered by lobes of segment 1; short and swollen lower lip, button-like (Fig. 49A, C–F, I–K). Segment 1 dorsally narrow, with pair of large lobes directed anteriorly and almost reaching tip of upper lip; lobes almost circular, dorsal margins inserted at level of branchiae; lobes higher laterally to mouth, mid-ventrally indented to partially expose lower lip. Segment 2 reduced, dorsally conspicuous, covered by lobes of segment 3 laterally and fused to it ventrally. Segment 3 with pair of almost circular lobes, almost same length as lobes of segment 1 laterally; lobes with narrow base, ventral edges fused to upper corners of first mid-ventral shield, far from level of ventral edge of neuropodia, dorsal margins inserted at level of midlength of neuropodia; lobes of segment 4 shorter than lobes of segment 3, with distinctly narrow bases, ventral margins

inserted at mid-length of neuropodial tori, dorsal margins at level of notopodia (Fig. 49A–G, I–K). Anterior segments laterally swollen. Paired dorso-lateral arborescent branchiae present on segments 2–4, dorsal to line of notopodia, with short branchial filaments branching dichotomously from secondary stems originating in a spiral from short basal stems; first pair slightly longer, about half body width at segment 2; pairs inserted progressively more laterally (Fig. 49A–G, I–K). Trapezoidal mid-ventral shields present on segments 2–13, those of segments 2–4 almost completely fused into single crenulated structure, following shields slightly crenulated; blood red region on segments 12 to 15–16 (Fig. 3E–F); first 2 shields, on segments 2–4 and 5, much wider than those of following segments, then about same width, indented posteriorly by tori (Fig. 49A, C–D. F, I–J). Dorsum smooth throughout, rows of rounded tubercles absent. Notopodia beginning on segment 4, extending until segment 20; notopodia short, cylindrical to oblong, notopodia of segments 4–7 inserted progressively more laterally, then longitudinally aligned (Fig. 49A–K). Narrowly-winged notochaetae in both rows throughout, those from posterior row with wings at distal half (Fig. 50A–C). Neuropodia present from segment 5, as low, almost sessile ridges until termination of notopodia, as elongate and thin, rectangular pinnules, from segment 21, inserted progressively more ventrally, lateral to mid-ventral groove on posterior segments (Fig. 49A, C–F, H–J). Pectinate short-handled avicular uncini, arranged in partially intercalated to completely separate double rows, in back to back arrangement, from segment 11 until termination of notopodia, on segment 20; uncini with short base, poorly defined dorsal button at mid-length of base, prow distally curved downwards, and crest with single vertical series of 5–6 progressively shorter secondary teeth throughout; main fang larger but not clearly defined, line of teeth aligned with tip of prow (Fig. 50D–H). Nephridial papillae on segment 3, between dorsal margins of lobes and bases of branchiae, genital papillae on segments 6–8, posterior to notopodia; all papillae minute. Pygidium crenulate to slightly papillate (Fig. 3D). Tube mucous, with small stones and shell fragments embedded.

Remarks. *Loimia juani* n. sp. is characterized by the presence of lateral lobes on segment 4. Such lobes are also present in the Australian species *L. triloba* Hutchings & Glasby, 1988 and *L. pseudotriloba* n. sp., described below, but the morphology of these lobes varies, as in *L. pseudotriloba* n. sp., they extend to the level of mid-length of neuropodia, whereas in both the other species they extend to the level of notopodia. *Loimia juani* n. sp. can be distinguished from *L. triloba* by the absence of prostomial eyespots and the shape of the ventral pads of segments 2–4, almost completely fused to form a single crenulated structure, in the former species, which differs to that found in *L. triloba*, where all the pads are clearly separated. The habitats occupied by these two species also differ as *L. juani* n. sp. is associated with the reef, whereas *L. triloba* was dredged from inter-reefal sediments. For more detailed comparisons, see Carrerette & Nogueira (2015).

Etymology. We have named this after Juan Gonzalez-Vallarino, our wonderful chef during LIRS workshop, who provided us with wonderful food throughout the workshop, and his two young children provided an endless source of amusement.

Type locality. Casuarina Beach, 14°40'46"S, 145°26'49"E, Lizard Island, GBR, Australia.

Distribution. Only known from Lizard Island.

Loimia pseudotriloba n. sp.

(Figs 3A–C, 51–54)

Type material. Holotype: AM W.47810, MI QLD 2336, complete, 25 mm long, 3 mm wide. Paratypes: AM W.47736 (4), CReefs, LI–10–018, MI QLD 2193, Mermaid Cove (buoy), 14°38'46"S, 145°27'13"E, complete specimen, with 86 segments, 31 mm long, 3.5 mm wide, in good state of preservation; AM W.47737, CReefs, LI–10–004, MI QLD 2185, channel bommies, 14°41'19"S, 145°27'50"E, complete specimen in 2 pieces, anterior 17 mm long, 3 mm wide, 18 mm long, 2 mm wide; AM W.44594, MI QLD 2393, mounted on SEM pin.

Comparative material examined. Holotype of *Loimia batilla* Hutchings & Glasby, 1988, AM W.5162. Paratypes of *Loimia batilla*, AM W.7097, AM W.7098; AM W.7106, AM W.7107. Non-types of *Loimia ingens* (Grube, 1878), NTM W.6764, NTM W.6775, NTM W.17330. Holotype of *Loimia ochracea* (Grube, 1878), ZMB 906, MPW 583. Holotype of *Loimia triloba* Hutchings & Glasby, 1988, BMNH ZB 1986.97.

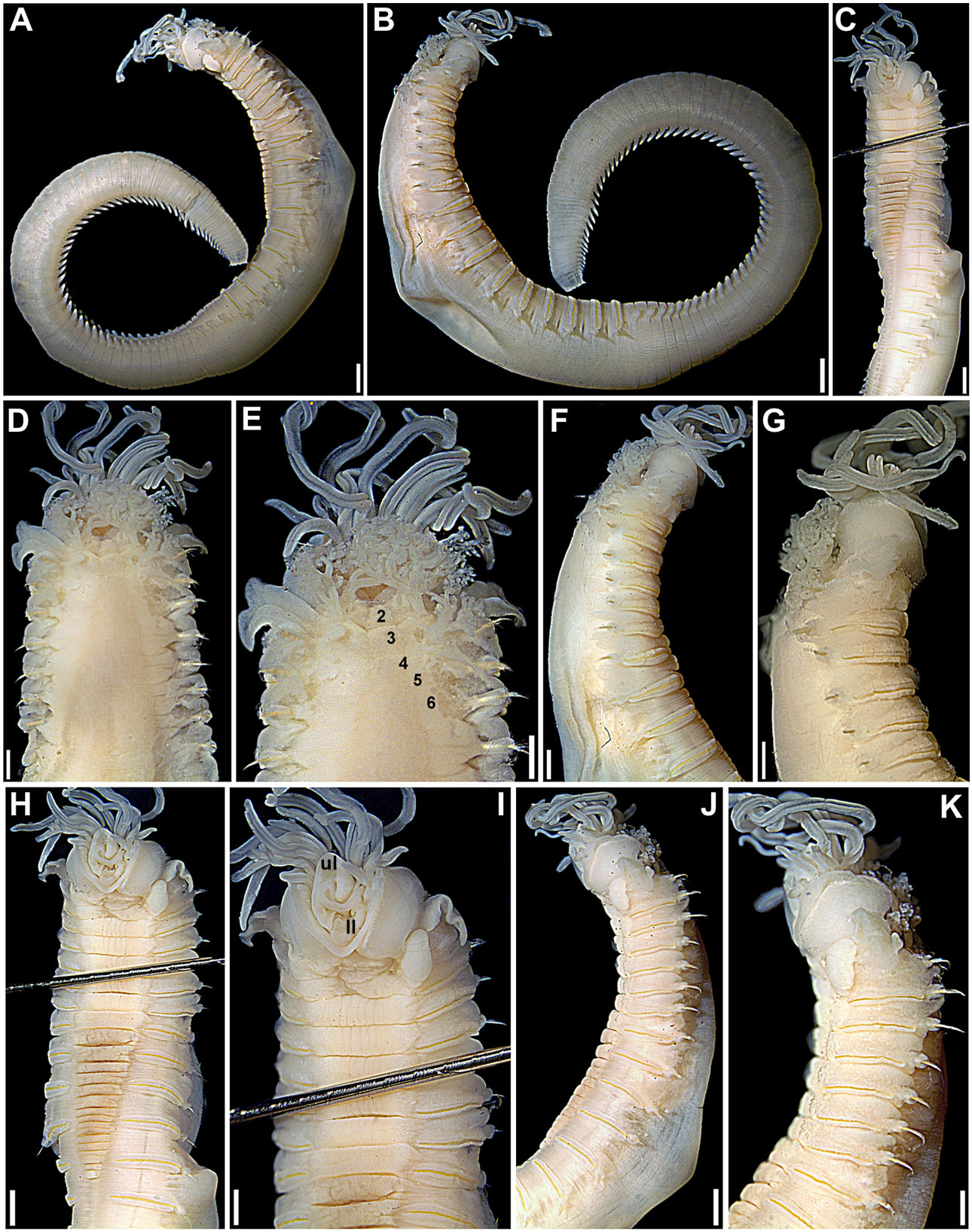


FIGURE 51. *Loimia pseudotriloba* n. sp. AM W.47810: A–B. Entire worm, left and right lateral views, respectively; C. Thorax, ventral view; D–K. Progressively higher magnifications of the anterior end, dorsal, right lateral, ventral and left lateral views, respectively. Numbers refer to segments. Abbreviations: ll = lower lip, ul = upper lip. Scale bars: A–C = 1 mm, D–E, G, I, K = 0.5 mm, F = 0.6 mm, H, J = 0.8 mm.

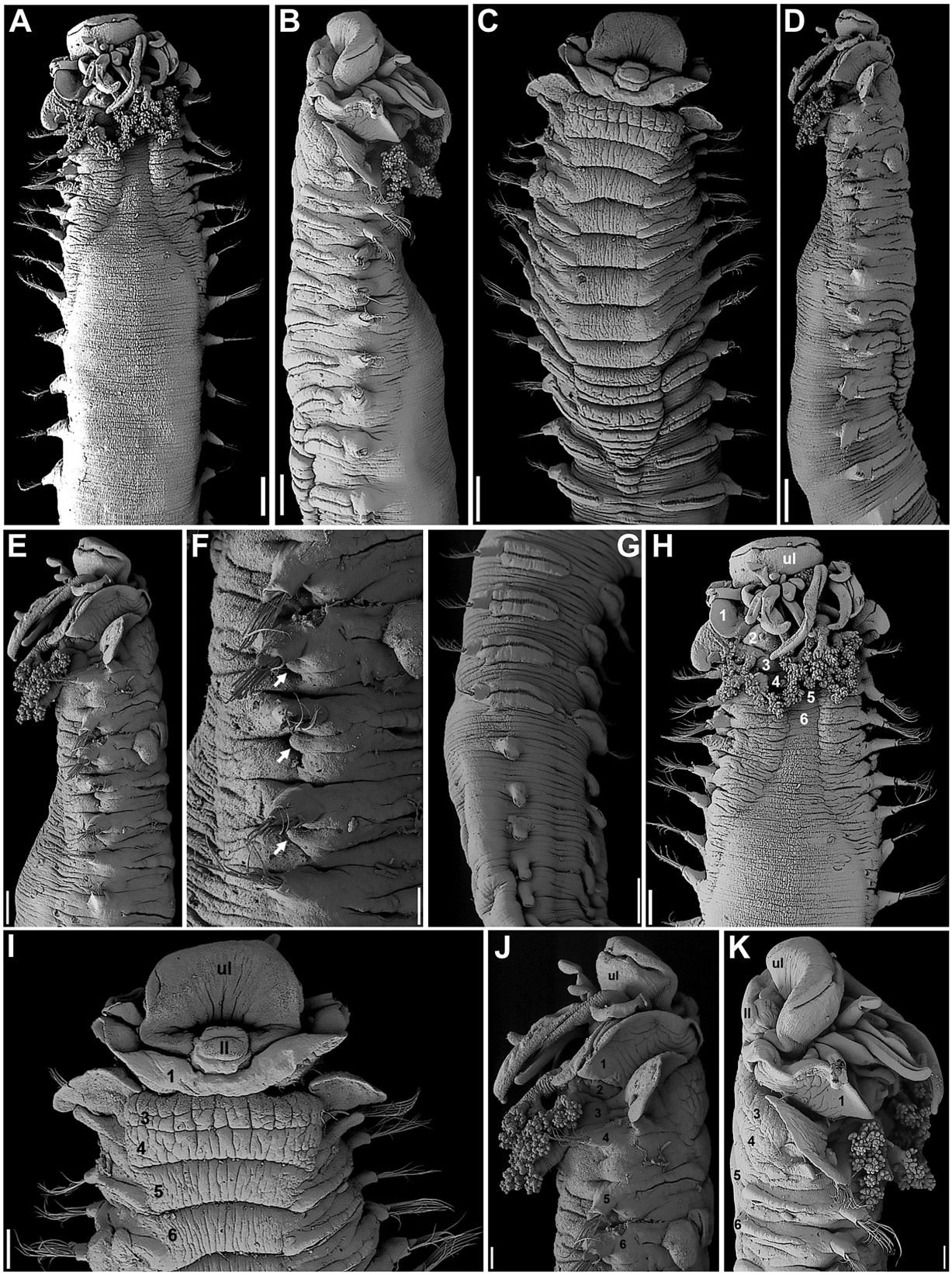


FIGURE 52. *Loimia pseudotriloba* n. sp. AM W.44594: A–E. Anterior end, dorsal, left lateral, ventral and right lateral (2) views, respectively; F. Close up of the notopodia of segments 5–9, arrows point to genital papillae; G. Transition between anterior and posterior body; H–K. Close ups of the anterior end, dorsal, ventral, right and left lateral views, respectively. Numbers refer to segments. Abbreviations: ll = lower lip, ul = upper lip. Scale bars: A, C = 700 µm, B, H = 500 µm, D = 800 µm, E = 400 µm, F, J–K = 200 µm, G = 600 µm, I = 300 µm.

Description. In life, body anteriorly yellow with reddish mid-ventral shields, green after termination of notopodia, speckled with large dark spots (probably internal contents) (Fig. 3A–C). Transverse prostomium attached to dorsal surface of upper lip; basal part without eyespots, distal part shelf-like (Fig. 52A, H). Peristomium forming lips, hood-like upper lip, short, almost circular, partially covered by lobes of segment 1; short and swollen lower lip, button-like (Figs 51C, H–K; 52A–E, H–K). Segment 1 dorsally narrow, with pair of large lobes directed anteriorly and reaching around mid-length of upper lip; lobes almost circular, dorsal margins inserted at level of first pair of notopodia, laterally to first pair of branchiae; lobes higher laterally, at level of neuropodia, mid-ventrally indented to partially expose lower lip. Segment 2 reduced, dorsally conspicuous, covered by lobes of segment 3 laterally and fused to it ventrally. Segment 3 with pair of elongate and distally rounded lobes, almost triangular, with narrow bases tapering to distally rounded tips, reaching beyond tips of lobes of segment 1; base with ventral edges fused to upper corners of first mid-ventral shield, at mid-length of anterior neuropodial tori, dorsal margins inserted at level of dorsal edges of neuropodia; lobes of segment 4 shorter than lobes of segment 3, rectangular, longer than wide, laterally straight and distally rounded, with distinctly narrow bases, ventral margins inserted at upper corners of second mid-ventral shield, dorsal margins at level of mid-length of anterior neuropodial tori, aligned to ventral margins of lobes of segment 3 (Figs 51A–K; 52A–E, H–K). Anterior segments slightly inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–4, dorsal to line of notopodia, with short branchial filaments branching dichotomously from secondary stems originating in a spiral from short basal stems; first pair slightly longer, about half body width at segment 2; pairs all longitudinally aligned (Figs 51A–B, D–G, J–K; 52A–B, D–E, H, J–K). Trapezoidal mid-ventral shields present on segments 2–15, those of segments 2–3 completely fused into single crenulated structure, following shields progressively smoother, slightly crenulate until last; blood red region on segments 12–15; first 2 shields, on segments 2–3 and 4, much wider than those of following segments, then about same width, indented posteriorly by tori, last shield almost inconspicuous (Figs 51A, C, H–K; 52C, I). Dorsum smooth throughout, rows of rounded tubercles absent. Notopodia beginning on segment 4, extending until segment 20; notopodia short, cylindrical to oblong, notopodia of segments 4–7 inserted progressively more laterally, then longitudinally aligned (Figs 51A–K; 52A–K). Narrowly-winged notochaetae in both rows throughout, those from anterior row finely serrated under SEM, chaetae of posterior row with wings at distal half (Figs 53E–J; 54F–H). Neuropodia present from segment 5, as low, almost sessile ridges until termination of notopodia, as elongate and thin, rectangular pinnules, from segment 21, inserted progressively more ventrally, lateral to mid-ventral groove on posterior segments (Figs 51A–C, F–K; 52B–E, G, I–K; 53A, D). Pectinate short-handled avicular uncini, arranged in partially intercalated to completely separate double rows, in back to back arrangement, from segment 11 until termination of notopodia, on segment 20; uncini with short base, dorsal button at mid-length of base, rounded prow, and crest with single vertical series of 5–6 progressively shorter secondary teeth throughout; main fang larger but not clearly defined, line of teeth aligned with tip of prow; under SEM, series of teeth with lateral fringe of tiny teeth (Figs 53K–M; 54A–E, I–L). Nephridial papillae on segments 3 and 4, between dorsal margins of lobes and bases of branchiae, genital papillae on segments 6–8, posterior to notopodia; all papillae minute (Fig. 52A–B, D–F, H). Pygidium with digitiform papillae (Figs 51A–B; 53A–C). Tube mucous, with small stones and shell fragments embedded.

Remarks. The only other known Australian species of *Loimia* with lobes also on segment 4 are *L. triloba* Hutching & Glasby, 1988 and *L. juani* n. sp., this latter species also found in Lizard Island and described above. These species differ from *L. pseudotriloba* n. sp., however, because *L. juani* n. sp. has lobes of segment 1 almost reaching the tip of the upper lip and with dorsal margins inserted at the level of branchiae; lobes of segment 3 almost circular and not reaching the tips of lobes of segment 1, with dorsal margins inserted at mid-length of neuropodial tori; and lobes of segment 4 with dorsal margins reaching the level of notopodia. In contrast, in *L. pseudotriloba* n. sp. the lobes of segment 1 do not reach beyond mid-length of upper lip and the dorsal margins are inserted at the level of notopodia, laterally to branchiae; lobes of segment 3 are almost triangular, with narrow bases and elongate tips, reaching beyond the tips of the lobes of segment 1 and inserted dorsally at the level of the dorsal edges of neuropodia; while the dorsal margins of the lobes of segment 4 are fused to the body wall at mid-length of anterior neuropodial tori. In addition, *L. juani* n. sp. has mid-ventral shields extending to segment 13, while in *L. pseudotriloba* n. sp. the mid-ventral shields extend to segment 15, and the uncini of *L. juani* n. sp. have distally pointed prow, with ligaments continuing downwards, while in *L. pseudotriloba* n. sp., the uncinial prow is rounded. However the most striking differences between members of these species are easily seen in the different body colour patterns of live specimens (compare Fig. 3A–C and D–F).

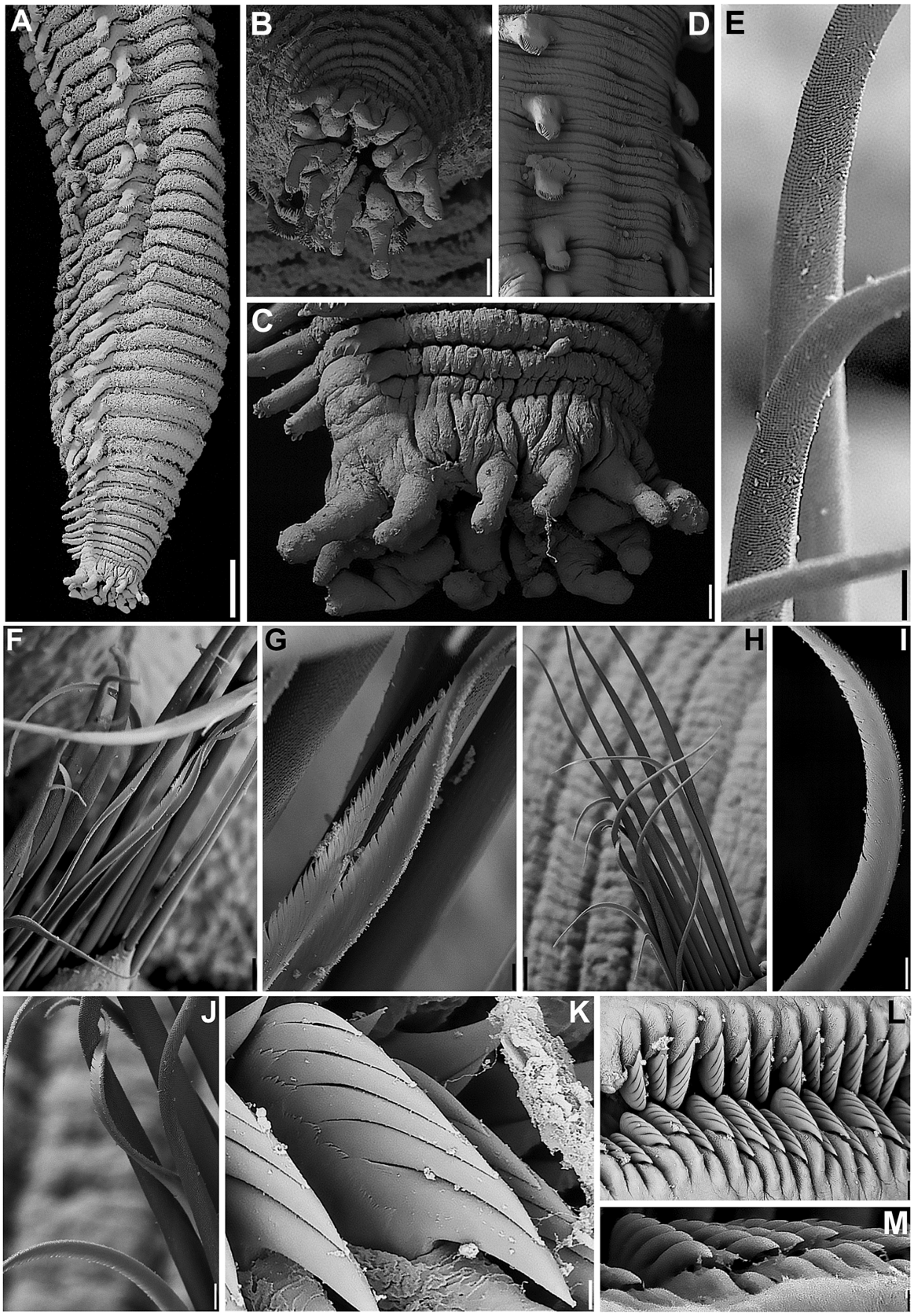


FIGURE 53. *Loimia pseudotriloba* n. sp. AM W.44594: A–C. Posterior end in progressively higher magnifications, left ventro-lateral, frontal and dorsal views, respectively; D. Posterior body, ventro-lateral view; E, H–J. Notochaetae of segment 17; F–G. Notochaetae of segment 5 under increasing magnifications; K–L. Uncini of segment 16 under different magnifications; M. Uncini, segment 9. Scale bars: A = 400 µm, B = 200 µm, C = 100 µm, D = 7 µm, E = 50 µm, F = 20 µm, G = 5 µm, H = 40 µm, I = 6 µm, J, M = 10 µm, K = 3 µm, L = 4 µm.

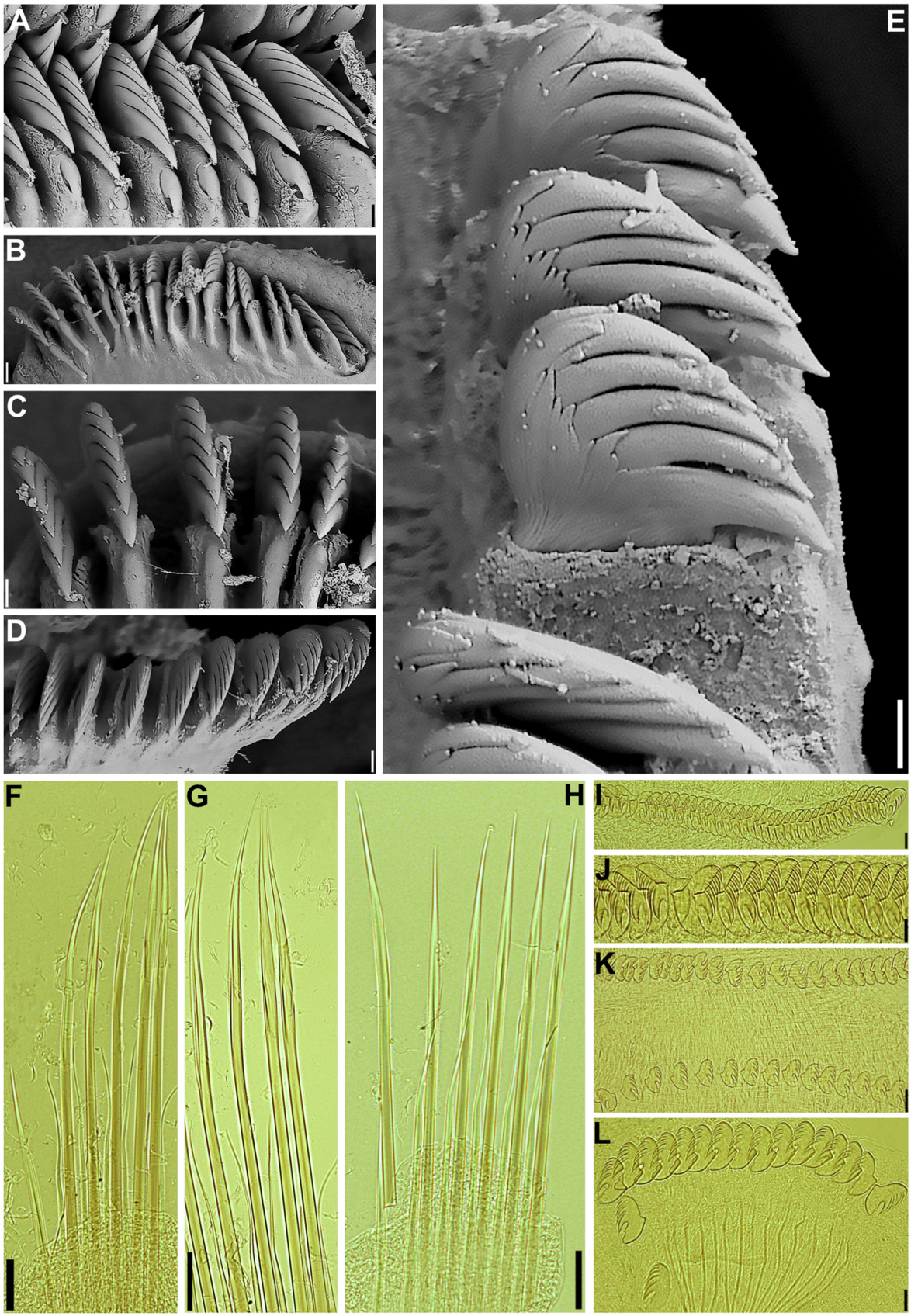


FIGURE 54. *Loimia pseudotriloba* n. sp. AM W.44594: A. Uncini, segment 7; B–E. Posterior uncini. AM W.47810: F–G. Notochaetae of segment 5, general and chaetae from posterior row, respectively; H. Notochaetae, segment 19; I–J. Uncini under higher magnification, segment 5; K–L. Uncini, segments 19 and 26, respectively. Scale bars: A = 7 µm, B = 10 µm, C–D = 5 µm, E = 3 µm, F, H = 80 µm, G = 70 µm, I = 30 µm, J, L = 20 µm, K = 40 µm.

The other Australian species with lobes on segment 4 besides *L. juani* n. sp., described above, *L. triloba*, differs from *L. pseudotriloba* n. sp. because in that species prostomial eyespots are present laterally and all lobes are shorter, those of segment 1 not reaching mid-length of the upper lip; lobes of segment 3 rectangular, not reaching mid-length of lobes of segment 1 and with bases extending from the level of mid-length of the neuropodial tori to the level of notopodia (see Carrerette & Nogueira 2015).

Etymology. We name this species as "*pseudotriloba*" due to the similarities with *L. triloba*, both species having lobes on segment 4.

Type locality. Big Vicki's reef, 14°41'10"S, 145°26'32"E, Lizard Island, GBR, Australia.

Distribution. Widely distributed along Lizard Island region.

Genus *Lanice* Malmgren, 1866

Lanice.—Hutchings & Glasby 1988: 17–18.

Type-species. *Nereis conchilega* Pallas, 1766, by monotypy.

Diagnosis. Transverse prostomium attached to dorsal surface of upper lip; basal part sometimes with eyespots; distal part shelf-like. Buccal tentacles frequently longer than body. Peristomium forming lips; hood-like upper lip; small, swollen lower lip, restricted to oral area. Segment 1 reduced dorsally, with pair of large lobes directed anteriorly and covering upper lip, mid-ventrally fused to each other and indented anteriorly, partially exposing the lower lip; lobes of segment 1 originating at variable position from dorsal to ventral sides of body. Segment 2 usually only conspicuous dorsally, laterally covered by lobes of segment 3 and fused to segment 3 mid-ventrally, as anterior part of single, protruding mid-ventral shield between segments 2–3 or 2–4. Segment 3 with pair of large lateral lobes, of variable size and shape. Three pairs of arborescent dorso-lateral branchiae present from segment 2. Anterior segments with glandular, rectangular to trapezoidal, smooth to corrugated mid-ventral shields; blood red region present at posterior region with mid-ventral shields; mid-ventral groove extending posteriorly from termination of mid-ventral shields. Short and conical notopodia beginning from segment 4, extending for 17 segments, until segment 20. Notochaetae distally winged in both rows. Neuropodia present from segment 5, as low ridges until termination of notopodia, as low pinnules thereafter. Neurochaetae throughout as short-handled avicular uncini, arranged in completely separated double rows, in back to back arrangement, from segment 11 until termination of notopodia, on segment 20; uncini with poorly defined dorsal button at mid-length of base and crest with several transverse rows of secondary teeth. Nephridial and genital papillae usually poorly developed, almost inconspicuous, of variable position and distribution. Pygidium smooth to papillate. Tube frequently with distal ornamentation (Hutchings & Glasby 1988).

Remarks. *Lanice* is very similar to *Loimia*, differing from this genus in having uncini with transverse rows of secondary teeth, instead of teeth being arranged pectinately.

Two species of *Lanice* were previously known from Australian waters, *L. bidewa* Hutchings & Glasby, 1988, described from VIC, and *L. sinata* Hutchings & Glasby, 1990, described from SW Australia. The former has been recorded from all around Australia including Lizard Island, although we suggest that this needs to be rechecked; the latter species is known only from WA and NT. A third species described herein is from Lizard Island.

Key to the Australian species of *Lanice*

1.	Segment 4 without lobes	2
-	Segment 4 with dorsal lobes, forming deep sinus	*Lanice sinata*
2. (1)	Lobes of segment 3 with narrow bases, from level of notopodia to mid-length of anterior neuropodial tori	*Lanice bidewa*
-	Lobes of segment 3 with broad bases, from level of notopodia to mid-ventral shield	*Lanice viridis* n. sp.

***Lanice viridis* n. sp.**
(Figs 3G–I, 55–59)

Type material. Holotype: NTM W.023148, 14°44'37"S, 145°30'43"E, 5 m, incomplete, 12 mm long, ~1.5 mm wide. Paratype: AM W.44967, MI QLD 2436, mounted on SEM pin; AM W.47714, mounted on 2 SEM pins, AM W.44611, MI QLD 2400 (photographed alive); AM W.47791, MI QLD 2436; AM W.44281, MI QLD 2367 (2); AM W.47738, CReefs, LI–10–062, MacGillivray Reef, deep reef slope, 14°39'25"S, 145°28'22"E; AM W.47739, CReefs, LI–10–009, MI QLD 2187, North Direction Island, 14°44'43"S, 145°30'18"E.

Comparative material examined. Holotype of *Lanice bidewa* Hutchings & Glasby, 1988, AM W.200764. Paratype of *Lanice bidewa*, AM W.200687. Holotype of *Lanice sinata* Hutchings & Glasby, 1990, AM W.203513. Paratype of *Lanice sinata*, AM W.203514. Non-types of *Lanice sinata*, AM W.21846, AM W.21847, AM W.21851, AM W.21862, AM W.21866.

Description. In life, bright green body, with buccal tentacles regularly striped with brown and white bands (Fig. 3G–I); brown spots on buccal tentacles frequently visible in preserved material. Transverse prostomium attached to dorsal surface of upper lip; basal part with few eyespots laterally; distal part shelf-like (Figs 55C, E–F, I–J, L; 56A, E, K). Buccal tentacles shorter than body, but longer than region with notopodia (Fig. 3G–I). Peristomium forming lips, hood-like upper lip, short, circular, densely ciliated; short and swollen lower lip, button-like (Figs 55A, G, K–L; 56A–B, E, G–I, K). Segment 1 dorsally narrow, with pair of large lobes directed anteriorly and reaching around 2/3 of upper lip length; lobes almost circular, with thinner membrane at tip ventrally, dorsal margins inserted at level of first pair of branchiae; lobes higher laterally to mouth, mid-ventrally indented to partially expose lower lip. Segment 2 reduced, dorsally conspicuous, covered by lobes of segment 3 laterally and fused to it ventrally. Segment 3 with pair of large, rectangular lobes, lateral and distal margins straight, rounded at corners, reaching around mid-length of lobes of segment 1 laterally; lobes with wide bases, ventral edges fused to upper corners of first mid-ventral shield, dorsal margins inserted at level between dorsal edges of neuropodia and line of notopodia; lobes absent from segment 4 (Figs 3I; 55A–G, I–L; 56A–B, D–E, G–H, J–K). Anterior segments slightly inflated dorsally. Paired dorso-lateral arborescent branchiae present on segments 2–4, dorsal to line of notopodia, with short branchial filaments branching dichotomously in several levels from secondary stems, and short basal stems; first pair slightly longer, about half body width at segment 2; branchiae inserted progressively more laterally (Figs 3G–I; 55B–C, E–G, I–J, L; 56A, C–F, J–L). Trapezoidal mid-ventral shields present from segments 2–14 or 15, those of segments 2–4 almost completely fused into single crenulated structure, following shields progressively smoother, slightly crenulate until last; blood red region on segments 12–15; first 2 shields, on segments 2–3 and 4, much wider than those of following segments, progressively narrowing until segment 10, then of uniform width, indented posteriorly by tori, last shield almost inconspicuous (Figs 55A–B, D, G, K; 56B, G–H). Notopodia beginning on segment 4, extending until segment 20; notopodia short, cylindrical to oblong, notopodia of segments 4–7 inserted progressively more laterally, then longitudinally aligned (Figs 55A–L; 56A–G, J–K, M; 57A–C). Narrowly-winged notochaetae in both rows throughout, under SEM wings with thin, smooth marginal blade, chaetae of posterior row with wings at distal half (Figs 57A–C, E–I; 59A–F). Neuropodia present from segment 5, as low, almost sessile ridges until termination of notopodia, as elongate and thin, rectangular pinnules from segment 21, inserted progressively more ventrally, lateral to mid-ventral groove on posterior segments (Figs 55A–E, G–K; 56A–B, D–E, G–H, J–K, M; 57D). Short-handled avicular uncini, arranged in partially intercalated to completely separate double rows, in back to back arrangement, from segment 11 until termination of notopodia, on segment 20; uncini with elongate base, almost inconspicuous dorsal button at mid-length of base, distally pointed prow curved downwards, and crest with 3 rows of secondary teeth, on segments of region with notopodia, 4 rows after notopodia terminate and 5 rows on posterior segments; stouter uncini on first 3 pairs of neuropodia, on segments 5–7, with more teeth per row, and typically 3 teeth on first row above main fang, middle tooth shorter, following segments with shorter and less teeth per row of secondary teeth (Fig. 57D); after notopodia terminate, uncini with more teeth per row of secondary teeth (Figs 58A–G; 59G–L). Nephridial papillae on segments 2 and 3, between dorsal margins of lobes and branchiae, on segment 3, minute genital papillae on segments 6–8, posterior to notopodia (Figs 55L; 56D–E, J–K, M). Pygidium unknown. Tube unknown.

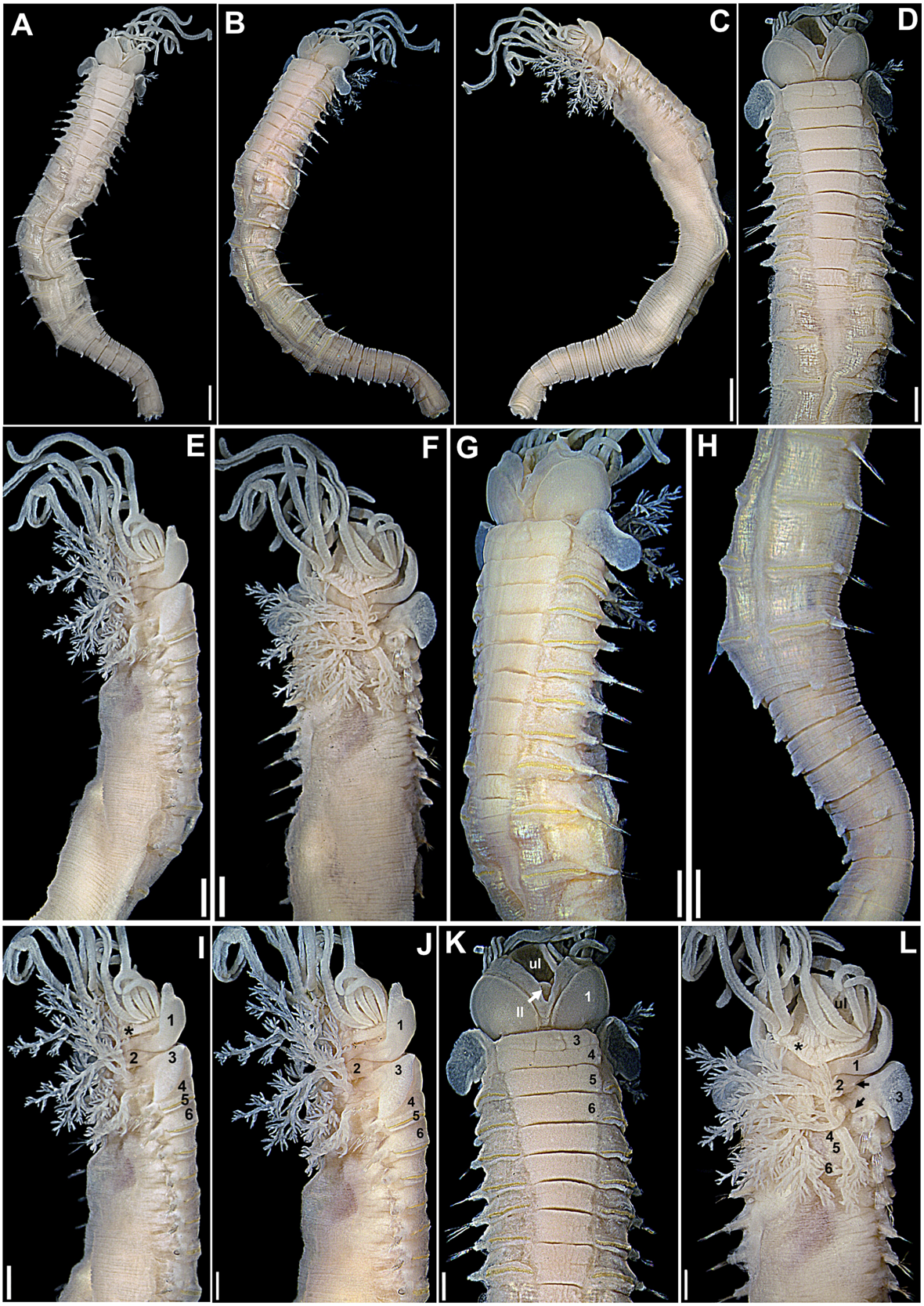


FIGURE 55. *Lanice viridis* n. sp. NTM W.023148: A–C. Incomplete worm, ventral, left ventro-lateral and right dorso-lateral views, respectively; D–G. Anterior end, ventral, right dorso-lateral (2) and left ventro-lateral views, respectively; H. Transition between anterior and posterior body; I–L. Close ups of the anterior end, right dorso-lateral (2), ventral and dorsal views, respectively; arrows point to nephridial papillae. Numbers refer to segments. Abbreviations: ll = lower lip, ul = upper lip, * = distal part of prostomium. Scale bars: A–C = 1 mm, D–H = 0.5 mm, I, K–L = 0.3 mm, J = 0.4 mm.

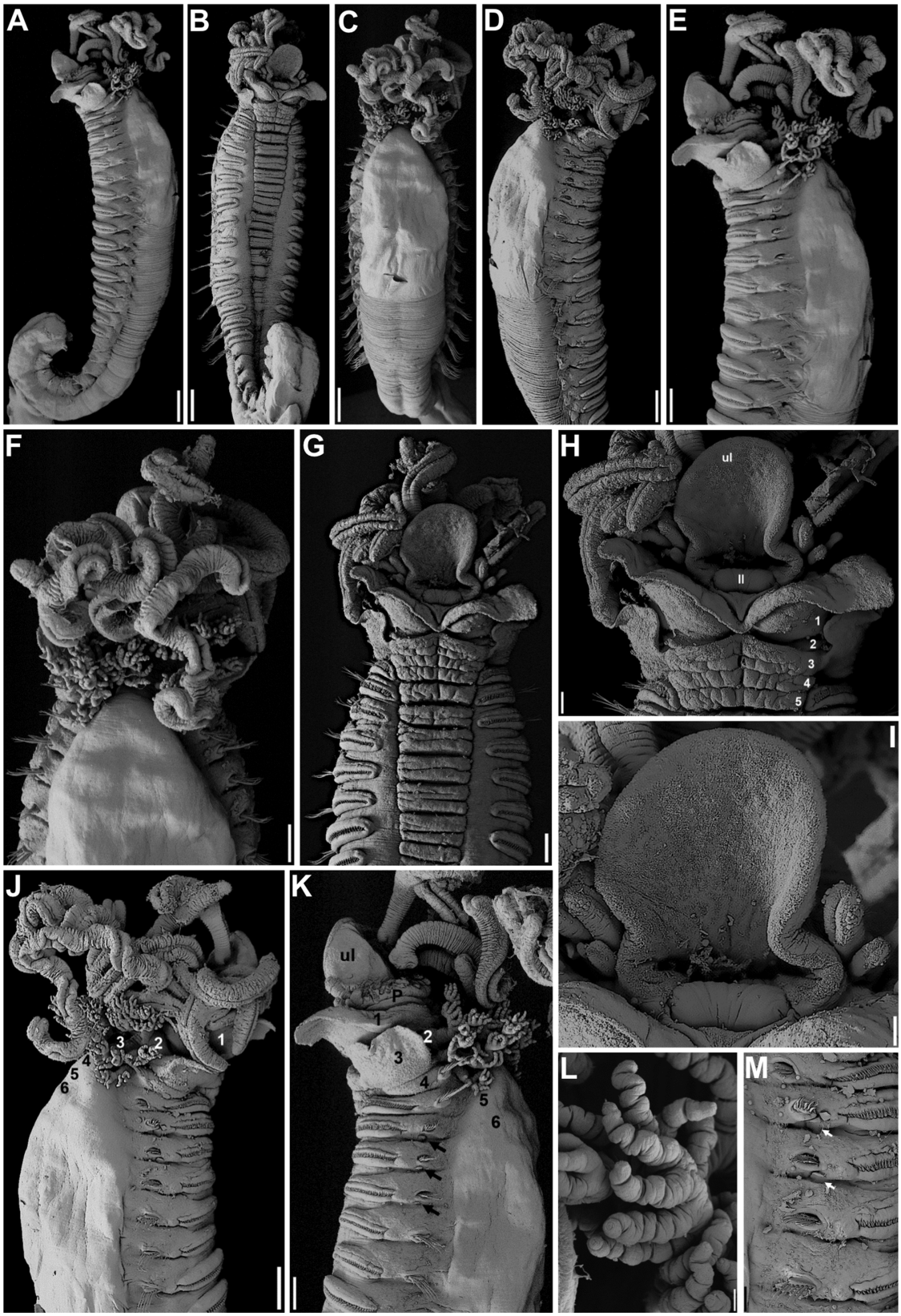


FIGURE 56. *Lanice viridis* n. sp. AM W.44967: A–B. Incomplete worm, left lateral and ventral views, respectively; C–E. Anterior end, dorsal, right and left lateral views, respectively; F, J–K. Close ups of the anterior end, dorsal, right and left lateral views, respectively; G–I. Closer views of the anterior end, ventral view; L–M. Close ups of the branchiae and notopodia of segments 5–9, respectively. Numbers refer to segments. Abbreviations: ll = lower lip, P = prostomium, ul = upper lip. Scale bars: A–B = 0.5 mm, C–D = 0.4 mm, E = 0.15 mm, F–G, K = 0.2 mm, H, M = 0.1 mm, I = 70 μm, J = 0.3 mm, L = 20 μm.

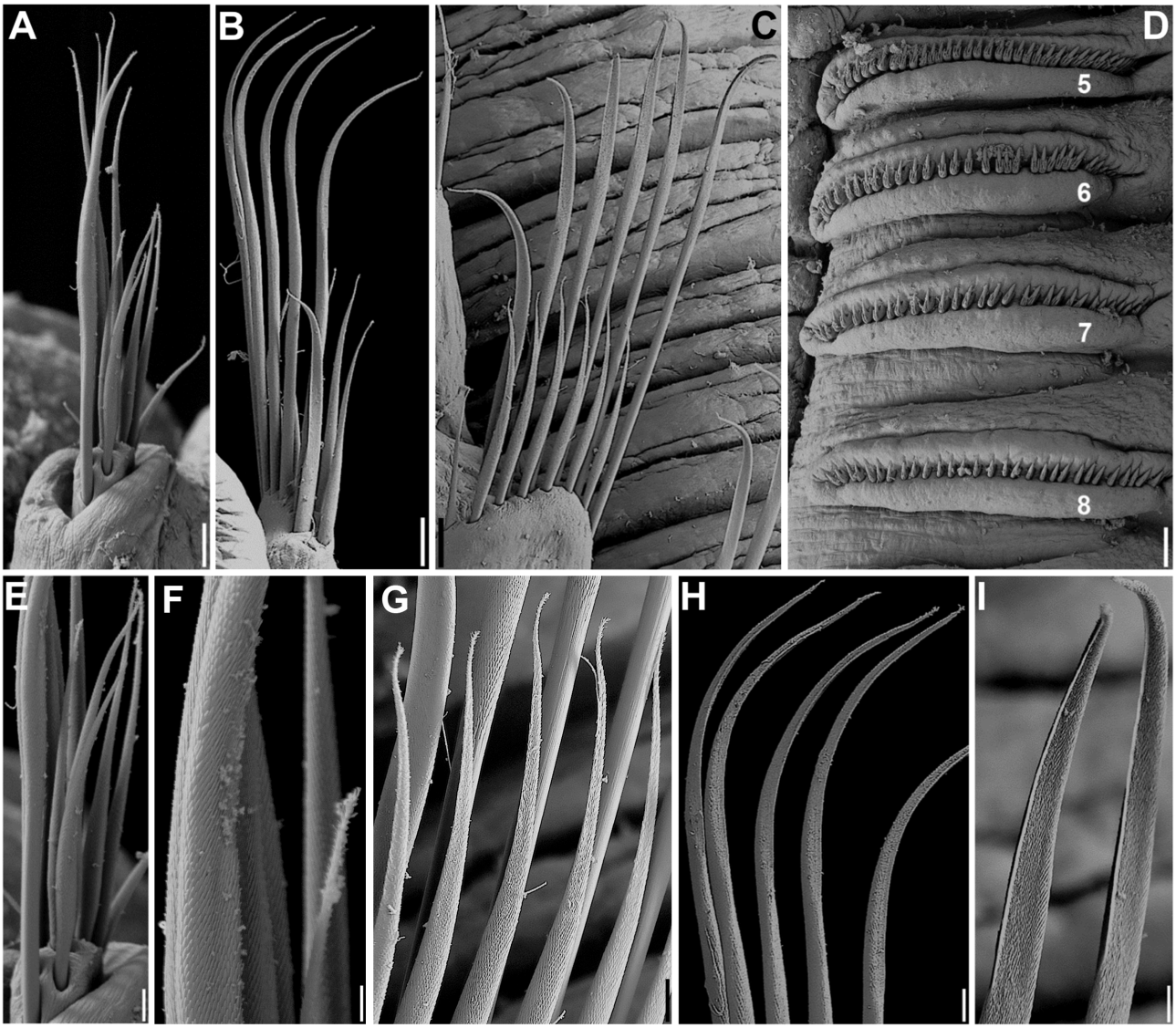


FIGURE 57. *Lanice viridis* n. sp. AM W.44967: A–C. Notochaetae, segments 6, 17, and 18, respectively; D. Close up of the neuropodia of segments 5–8; E–F. Notochaetae of segment 6, chaetae from anterior and posterior rows, respectively; G, I. Notochaetae of segment 18, chaetae from anterior and posterior rows, respectively; H. Notochaetae of posterior row, segment 17. Scale bars: A = 20 µm, B–C = 30 µm, D = 50 µm, E, G–H = 10 µm, F = 4 µm, I = 7 µm.

Remarks. *Lanice viridis* n. sp. closely resembles *L. bidewa* Hutchings & Glasby, 1988 as both species lack lobes on segment 4, however members of *L. bidewa* have lobes of segment 3 with narrower bases, extending from the level of notopodia to mid-length of anterior neuropodial tori, while in *L. viridis* n. sp. the bases of lobes of segment 3 extend from near the level of notopodia to the mid-ventral shield. The tubes of the new species were not retained, so unknown if the opening to the tube is smooth as in *L. bidewa,* as often species in this genus have ornamented entrances to their tubes.

Etymology. We name this species after the bright green colour of living specimens (Fig. 3G–I), from the Latin word "*viridis*" = green.

Type locality. Off North Direction Island, near Lizard Island, GBR, Australia.

Distribution. Known only from the Lizard Island region.

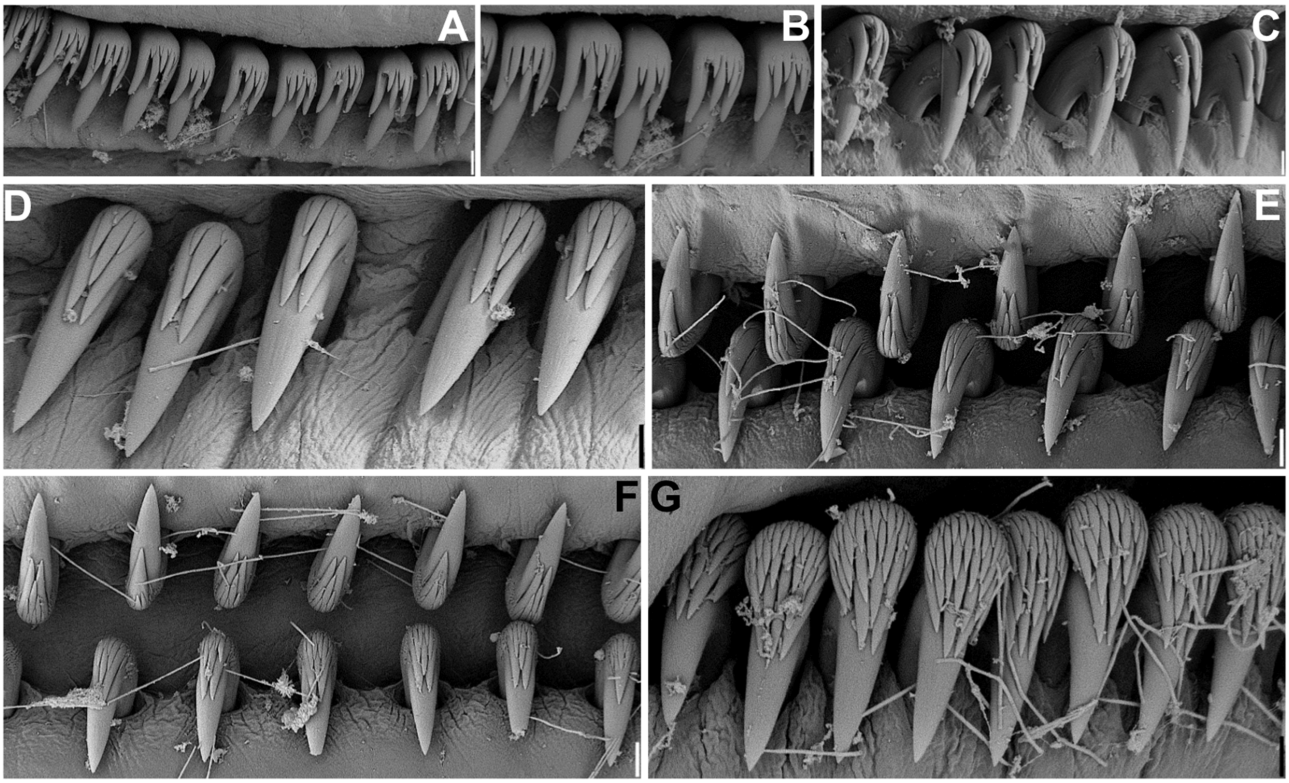


FIGURE 58. *Lanice viridis* n. sp. AM W.44967: A–B. Uncini, segment 5; C–G. Uncini of the segments 7, 8, 11, 14, and 28, respectively. Scale bars: A, E–F = 7 µm, B–D = 5 µm, G = 4 µm.

Discussion

The intensive sampling trip to Lizard Island combined with previous CReefs expeditions increased our knowledge of polychaete diversity within this region, with a new genus and 16 new species described, and also several new records of genera for the region. Further studies could provide more data on the habitats of each of the species and additional species are likely to be found if more habitats are sampled, as some of the environments present in the Lizard Island region were not well sampled, including inter-reefal areas. The expedition in 2013 also highlights the value of examining these polychaetes alive in order to document colour patterns which often fade after death.

Acknowledgments

We would like to thank the Lizard Island Reef Research Foundation for support, which enabled JMMN and PH to attend the workshop, and to Anne Hoggett and Lyle Vail, Co-Directors of Lizard Island Research Station, for their support during the workshop, as boat drivers and as dive buddies. Other participants at the workshop provided additional material and Alexander Semenov photographed live specimens. We also thank Sue Lindsay of the Australian Museum for her substantial help with the SEMs. Also many thanks to Steve Keable, Collection Manager of Marine Invertebrates, and Anna Murray; Anna was responsible for keeping station lists during the workshop and for registering all the collected material, which made compiling the sections on material examined very easy. Eunice Wong photographed the slides of *Pistella franciscana* and the holotype of *Eupolymnia chlorobranchiata*, for our Figures 35 and 36A–G, respectively. Hannelore Paxton kindly translated some German descriptions for us. Leslie Harris provided fruitful discussion on the *Pista* - *Pistella* problem. The visits of JMMN to Sydney in 2013 and 2014 were funded by FAPESP (procs 2010/52116–4 and 2014/11250–0, respectively).

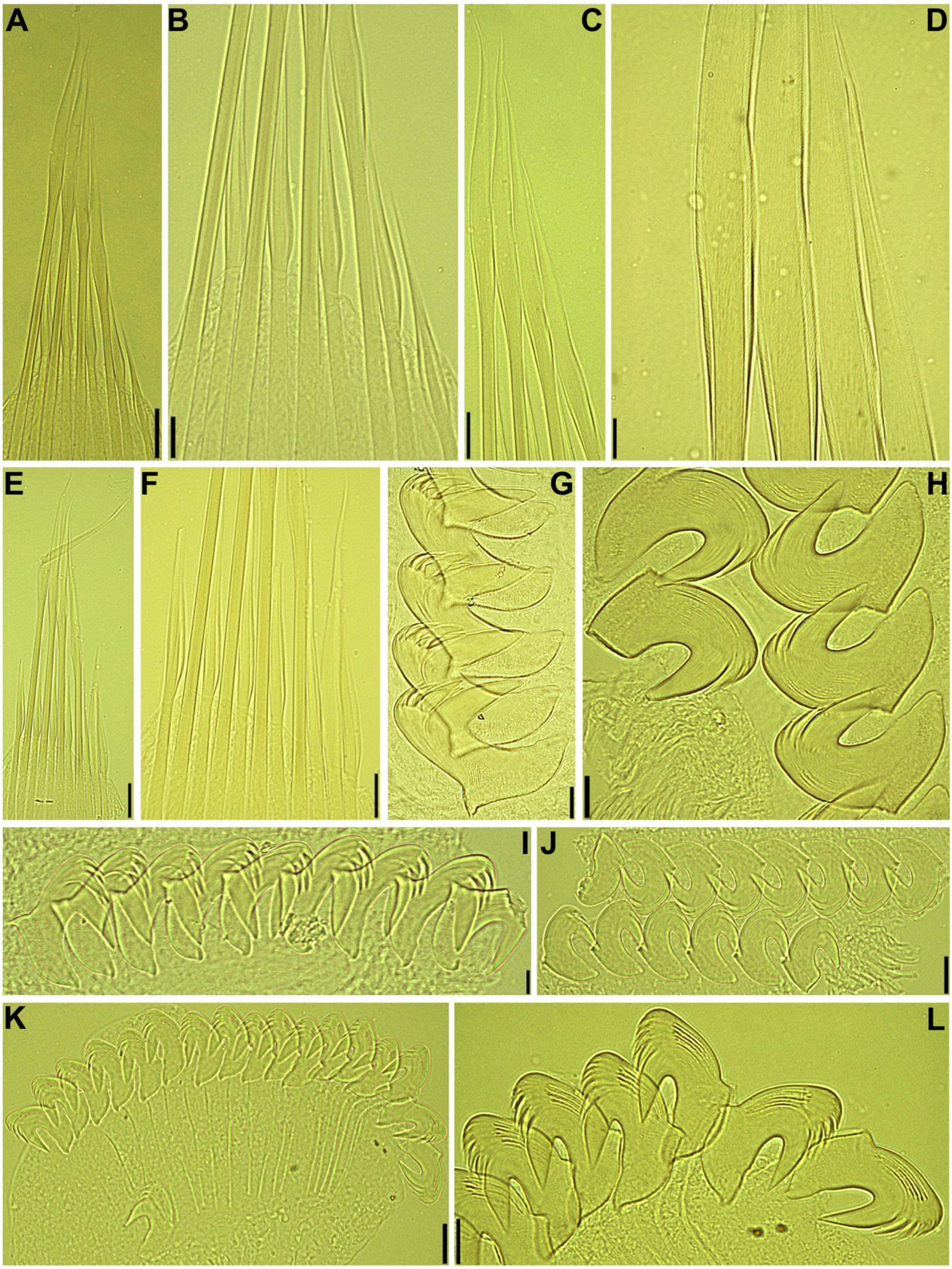


FIGURE 59. *Lanice viridis* n. sp. NTM W.23148: A–D. Notochaetae of the segment 7, general chaetae from anterior and posterior (2) rows, respectively; E–F. Notochaetae of the segment 17, general and chaetae from anterior row, respectively; G, I. Uncini, segment 6; H, J. Uncini, segment 17; K–L. Uncini, segment 28. Scale bars: A, E = 50 µm, B, J–K = 20 µm, C, F = 30 µm, D, G–I, L = 10 µm.

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