

The genus *Argathona* Stebbing, 1905 (Crustacea: Isopoda: Corallanidae) in Singapore marine waters, with description of two new species

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Abstract. The genus *Argathona* Stebbing, 1905 from Singapore waters is reviewed. Four species are reported, namely *Argathona rhinoceros* (Bleeker, 1857), *Argathona* aff. *macronema*, *Argathona lineata*, new species, and *Argathona trichota*, new species. The identity and synonymy of *Argathona macronema* (Bleeker, 1857) is briefly reviewed. *Argathona lineata*, new species, and *Argathona trichota*, new species, are both described and figured. An annotated list of all species in the genus *Argathona* is provided. *Argathona lineata*, new species, can be recognised by the elongate pentagonal frontal lamina 3.8 times longer than wide, posterior margins of pleonites 3–5 with transverse row of nodules, a sub-truncate pleotelson posterior margin and the dorsal surface of the pleotelson with two dense sub-median fields of acute hyaline setae, and the antennal flagellum extending to pereonite 4; fresh specimens show five or six longitudinal stripes of brown (or dark orange) chromatophores. *Argathona trichota*, new species, may be identified by the short frontal lamina (shorter than the posterior width), ovigerous females with the dorsum covered by dense hyaline setae, and the relatively short antennal flagellum extending to mid-pereonite 4.

Key words. *Argathona*, Corallanidae, Cymothoida, Isopoda, Singapore, marine, new species

INTRODUCTION

The status of the Corallanidae Hansen, 1890, a small family of six genera and 79 species (Boyko et al., 2008), was assessed by Bruce et al. (1982) and the family and genera were thoroughly reviewed by Delaney (1989). *Argathona* Stebbing, 1905 has 16 species (including the new species described herein), although some are doubtfully placed in the genus (see species list herein). *Argathona* has a primarily Indo-Pacific tropical distribution with a few species extending into the subtropics and cool waters such as South Australia (Hale, 1925) and Japan (Shiino, 1961). Corallanids are known to be micropredators of fish and ‘commensal’ in sponges, and *Argathona* is perhaps the genus most strongly associated with feeding on fish (e.g., Hale, 1925; Bruce, 1982b; Grutter & Lester, 2002; Chelladurai et al., 2016, 2017). Nonetheless, many specimens are taken from sediment samples, which is the case for the two new species described here.

Bruce & Wong (2015) in their review of the Isopoda of Singapore reported four species of *Argathona*, only one of which was provisionally identified to species level. Further examination of the collections derived from the Singapore Comprehensive Marine Biodiversity Survey (Tan & Goh, 2015, 2016) and subsequent collections revealed that there are four species of *Argathona* in Singapore marine waters: *Argathona rhinoceros* (Bleeker, 1857); the two new species described herein, i.e., *Argathona* cf. *setosa* (Richardson, 1910) listed by Bruce & Wong (2015) which proved to be the same as *Argathona* ‘species 1’ as listed there, and that is described here as *Argathona lineata* new species, and the second species, *Argathona trichota* new species; and the fourth species identified as *Argathona* aff. *macronema* (Bleeker, 1857), which was collected after the survey had been completed.

MATERIAL AND METHODS

Classification follows Brandt & Poore (2003), while terminology follows Keable (2006) and Bruce (2009) for pereopod orientation. Pencil drawings were made using a Nikon SMZ800 stereoscope for whole-animal drawings and an Olympus BX50 compound microscope for appendages, both fitted with a camera lucida. Appendages for microscopy were temporarily mounted in lactic acid. Figures were inked manually, digitised, and assembled as plates using Adobe Photoshop CS6 and Illustrator.

All specimen measurements are for total body length, in millimetres, to one decimal place, given at the start of the entry for each registered sample. The length was measured

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under a measuring scale eyepiece, from the tip of the rostrum (anterior) to the posterior margin of the pleotelson.

All Singaporean material is held at the Lee Kong Chian Natural History Museum, Singapore.

The following abbreviations are used: m = metre(s); mm = millimetre(s); MX = maxilliped 1; ovig. = ovigerous; P1 = pereopod 1; PMS = plumose marginal seta/e; QM = Queensland Museum, Brisbane, Australia; RS = robust seta(e); stn. = station (as in collection station or site); ZRC = Zoological Reference Collection, Lee Kong Chian Natural History Museum, National University of Singapore.

TAXONOMY

Order Isopoda Latreille, 1817

Suborder Cymothoida Wägele, 1989

Superfamily Cymothooidea Leach, 1814

Family Corallanidae Hansen, 1890

Argathona Stebbing, 1905

Restricted synonymy. — Delaney, 1989: 16.

Type species: *Argathona normani* Stebbing, 1905; by original designation.

Remarks. Corallanid genera, keyed by Delaney (1989), are identified primarily by characters of the buccal appendages. *Argathona* has a 4-articled or 5-articled maxilliped palp with broad articles that have convex margins, a single lobed quadrate or sub-quadrate maxilla and the maxillula has only one prominent falcate robust seta at the apex with some smaller falcate robust setae at the base of the major seta; typically, the mandible molar is relatively larger and wider than in the other genera (see Delaney, 1989) and may be tridentate. Both *Corallana* Dana, 1853 and *Excorallana* Stebbing, 1904 have a slender maxilliped with sub-quadrate palp articles. In *Alcirona* Hansen, 1890 the maxillula has two terminal falcate robust setae, the maxilla is distally distinctly rounded and the dactylus of pereopods 1–3 has a series of prominent spines giving it a comb-like appearance. In *Lanocira* Hansen, 1890, the maxillula is in the form of a large hook, while the maxilla is 2-articled and elongate (Delaney, 1989; Bruce & Sidabalok, 2011) rather than a single quadrate or sub-quadrate article. Species of *Argathona* are frequently moderately to heavily setose over the dorsal body surfaces, often with stiff ‘hyaline’ setae, particularly on the pleotelson, a character shared with *Alcirona* and to a lesser degree *Lanocira*.

It is clear when reviewing the history of the genus that assigning species to a genus has often been problematic, and the identification of species also similarly difficult. At present, at least two species held in combination with *Argathona* are

of doubtful generic placement, and one additional species is a likely junior synonym. The widely reported *Argathona macronema* (Bleeker, 1857) contains at least two species under that name and the status of this species will need to be resolved. The species are discussed under the annotated list of *Argathona* species.

Sexual dimorphism. It is usually reported that ornamentation such as rostrum development or pereonal and pleonal nodules is less developed in females. In *Argathona lineata* new species, and *A. trichota* new species, the ovigerous females are far more strongly setose than males and non-ovigerous females, with some non-ovigerous specimens having a largely or totally smooth pereon and presenting a rather different appearance. Other diagnostic characters, such as the shape of the pleotelson, uropods, frontal lamina shape, and also the pattern and number of robust setae on the appendages, allows for identification of both males and females in those species where there is some sexual variation as outlined above.

Distribution. *Argathona* occurs throughout the Indo-West Pacific, primarily within the tropics, and to date has not been reported from the Atlantic or East Pacific (Delaney, 1989).

Annotated list of *Argathona* species

1. *Argathona confine* Hale, 1925. Albany Passage, Queensland, Australia; ‘taken in a *Comatula*’; 0–30 metres. Supplementary figures given by Delaney (1989, figure 9).
2. *Argathona crenulata* Bruce, 1982b. A small species (up to 7.5 mm) with dorsal nodules on the posterior pereonites and pleon. Known from Halifax Bay, Townsville, Queensland; depth of 8 meters.
3. *Argathona hirsuta* Hobbins & Jones, 1993. Central Red Sea; 731–760 metres. The only relatively deep-water species in the genus.
4. *Argathona japonica* Shiino, 1961. Okinoyama, Japan; 85–95 metres. Although Shiino (1961) included Richardson (1910) in the references there is no text reference to that publication, nor was there a direct comparison of *A. japonica* to *Argathona setosa* Richardson, 1910. The general setosity and specifically the falcate shape of the uropodal endopod agrees with that of *A. setosa*, and the possibility must be considered that the two species are the same.
5. *Argathona kulai* (Bruce, 1982c). Subtidal; Perth region, Western Australia, Gulf of Carpentaria, and Great Barrier Reef, Queensland (Anil et al. 2022); recorded at depths of 110 to 150 metres. The species was recently transferred from the genus *Corallana* Dana, 1853 by Anil et al. (2022).
6. *Argathona macronema* (Bleeker, 1857). Java Sea (Bleeker, 1857). In need of redescription. This is a relatively much-recorded species—see species account below.
7. *Argathona muraena* Bal & Joshi, 1959. In need of redescription. The whereabouts of the type material is unknown [not stated by Bal & Joshi (1959)]. The generic status is uncertain as the pereopods are similar to those of *Alcirona*, while the mouthparts correspond with

- that of *Argathona*. Recorded from *Muraena tessellata* [now *Gymnothorax favagineus* Block & Schneider] Muraenidae; Bombay, India.
8. *Argathona normani* Stebbing, 1905. Type species. Sri Lanka; 55 metres; also, India (Barnard, 1936).
 9. *Argathona parca* Hale, 1940. A smooth-bodied species with a relatively long and slender frontal lamina. Known only 'from eye of Queensland Groper' [= grouper, Serranidae], Humocky Island [north of Gladstone], Queensland.
 10. *Argathona rhinoceros* (Bleeker, 1857). See present account; largely parasitic on fish, particularly the family Serranidae; recorded from India to eastern Australia; 1–90 metres.
 11. *Argathona rostrata* Bruce, 1982b. Southern and northern Great Barrier Reef, Queensland, from sponges, 8–11 metres; also, Motupore Island, Papua New Guinea, from sponges (Bruce, 1982a). This species has a prominent truncate rostrum.
 12. *Argathona setosa* Richardson, 1910. Linao Point, 7°02'00"N, 125°37'45"E, Philippines at a depth of 38 metres; in need of redescription.
 13. *Argathona stebbingi* Nierstrasz, 1931. Laiwui, Bisai Island; east of Pulau Obi, North Maluku, Indonesia. The pereopod and maxillule morphology is typical of *Alcirona*; while the setosity and uropodal exopod shape are closely similar to that of *Argathona setosa* Richardson, 1910. A redescription is needed to determine the generic and species status of this species.
 14. *Argathona sulcata* Richardson, 1910. East coast of Luzon, Legaspi Light, at a depth of 267 metres, Philippines. Pleotelson dorsal surface with four longitudinal carinae.

Argathona lineata, new species
(Figs. 1–5)

Argathona sp. 1.— Bruce & Wong, 2015: 160.
Argathona cf. *setosa*.— Bruce & Wong, 2015: 160.

Material examined (all Singapore). Holotype: Female (ovig. 9.9 mm), Southern Fairway near St. John's Island, 01°12.561–669'N, 103°51.322–460'E, 27 May 2013, rectangular dredge; depth 46.1–72.0 m, stn. DR91, SS-1971, coll. Lim Swee Cheng & party (ZRC.2020.0137). Paratypes: 4 females (ovig. 10.1 [uropod only], 9.7 [full dissection], 8.9; non-ovig. 10.2 [dissected P1, mxpd, mx1, mx2] mm), same data as holotype (ZRC.2020.0138). Female (ovig. 11.9 mm), off Eastern Bunkering A, 01°18.861–595'N, 104°05.128–197'E, 28 May 2013, beam trawl, depth 26.7–33.7 m, stn. TB99, SS-1966, coll. Lim Swee Cheng & party (ZRC.2020.0139). Female (non-ovig. 11.5 mm), Kusu Island, 01°13.274'N, 103°51.659'E, 03 Jun 2013, depth 19.1 m, SCUBA, stn. SD166, SS-4218, coll. Tan Heok Hui & party (ZRC.2020.0140). 2 females (non-ovig. 9.9, 8.2, mm; large specimen damaged), off Eastern Bunkering A, 01°18.861–595'N, 104°05.128–197'E, 28 May 2013, beam trawl, depth 26.7–33.7 m, stn. TB99, SS-1968, coll. S.C. Lim & party (ZRC.2020.0141). Female (non-ovig. 11.3 mm), off Eastern Bunkering A, 01°18.861–595'N,

104°05.128–197'E, 28 May 2013, beam trawl, depth 26.7–33.7 m, stn. TB99, SS-5397, coll. Lim Swee Cheng & party (ZRC.2020.0143). Female (ovig. 8.1 mm), imm. (5.1 mm), west of Pulau Pawai, 01°11.104–387'N, 103°42.061–185'E, 15 Oct 2014, rectangular dredge, depth 23.6–23.7 m, stn. DR506, SEA-9225, coll. Chim Chee Kong & party (ZRC.2022.0033). Female (non-ovig. 9.1 mm), Eastern Bunkering A, 01°18.861–595'N, 104°05.128–197'E, 28 May 2013, beam trawl, depth 33.7–26.7 m, stn. TB99, SS-1967, coll. Lim Swee Cheng & party (ZRC.2022.0034). Female (ovig. 7.5 mm), imm. (6.0 mm), near Eastern Bunkering A, 01°18.425–502'N, 104°04.607–844'E, 28 May 2013, beam trawl, depth 22.7–22.4 m, stn. TB97, SS-1970, coll. Lim Swee Cheng & party (ZRC.2022.0035).

Additional specimens. manca (6.7 mm), off Pulau Senang, 01°09.942–949'N, 103°43.458–471'E, 05 Jun 2013, beam trawl, depth 24.3–24.5 m, stn. TB185, SS-5409, coll. Lim Swee Cheng & party (ZRC.2020.0144). Female (pre-ovig. 9.0 mm), off Changi Naval Base 01°18.702–838'N, 104°03.234–479'E, 08 Apr 2014, rectangular dredge, depth 12.9–14.7 m, stn. DR363, SEA-6135, coll. Teresa Tay & party (ZRC.2020.0145). Female (non-ovig. 9.9 mm), off Changi Naval Base 01°18.702–838'N, 104°03.234–479'E, 08 Apr 2014, rectangular dredge, depth 12.9–14.7 m, stn. DR363, SEA-6137, coll. Teresa Tay & party (ZRC.2020.0146). Female (non-ovig. 7.2 mm), off Changi Naval Base, 01°18.522–874'N, 104°02.751–672'E, 08 Apr 2014, rectangular dredge, depth 10.9–17.5 m; stn. DR362, SEA-6700, coll. Teresa Tay & party (ZRC.2020.0147). Female (non-ovig. 7.9 mm), off Changi Naval Base 01°18.702–838'N, 104°03.234–479'E, 08 Apr 2014, rectangular dredge, depth 12.9–14.7 m, stn. DR363, SEA-6833, coll. Teresa Tay & party (ZRC.2020.0148). 2 imm. (6.6, 6.8 mm), 1 manca (5.2 mm), between Pulau Ubin and Pulau Tekong, 06 Mar 2012, rectangular dredge, depth 16 m, stn. CMBS-D06, coll. CMBS party (ZRC.2020.0149). 2 imm. (6.8, 7.0 mm), 1 manca (5.8 mm) between Pulau Ubin and Pulau Tekong, 06 Mar 2012, rectangular dredge, depth 16 m, stn. CMBS-D06, coll. CMBS party (ZRC.2020.0150).

Description of female. Body 3 times as long as greatest width, widest at pereonite 5, dorsal surfaces finely setose; lateral margins subparallel, coxae 4–7 and pleonites 3 and 4 laterally setose. Rostral point present, projecting anteriorly, minute. Eyes separated by about 46% width of head; eye colour black. Pereonite 1 and coxae 2–3 each with posteroventral angle rounded; coxae 5–7 with entire oblique carina; posterior margins of pereonites 7 with fine nodules laterally. Pleon with pleonite 1 largely concealed by pereonite 7; pleonites 3–5 posterior margin with continuous small nodules along posterior margin; posterolateral angles of pleonite 2 not visible, not posteriorly produced; pleonite 3 with posterolateral margins extending to posterior margin of pleonite 4, narrowly rounded; posterolateral margin of pleonite 4 sub-truncate with ventral point, not extending beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. Pleotelson 0.7 times as long as anterior width, dorsal surface with two sub-median fields of stiff hyaline setae; lateral margins weakly convex, margins smooth,

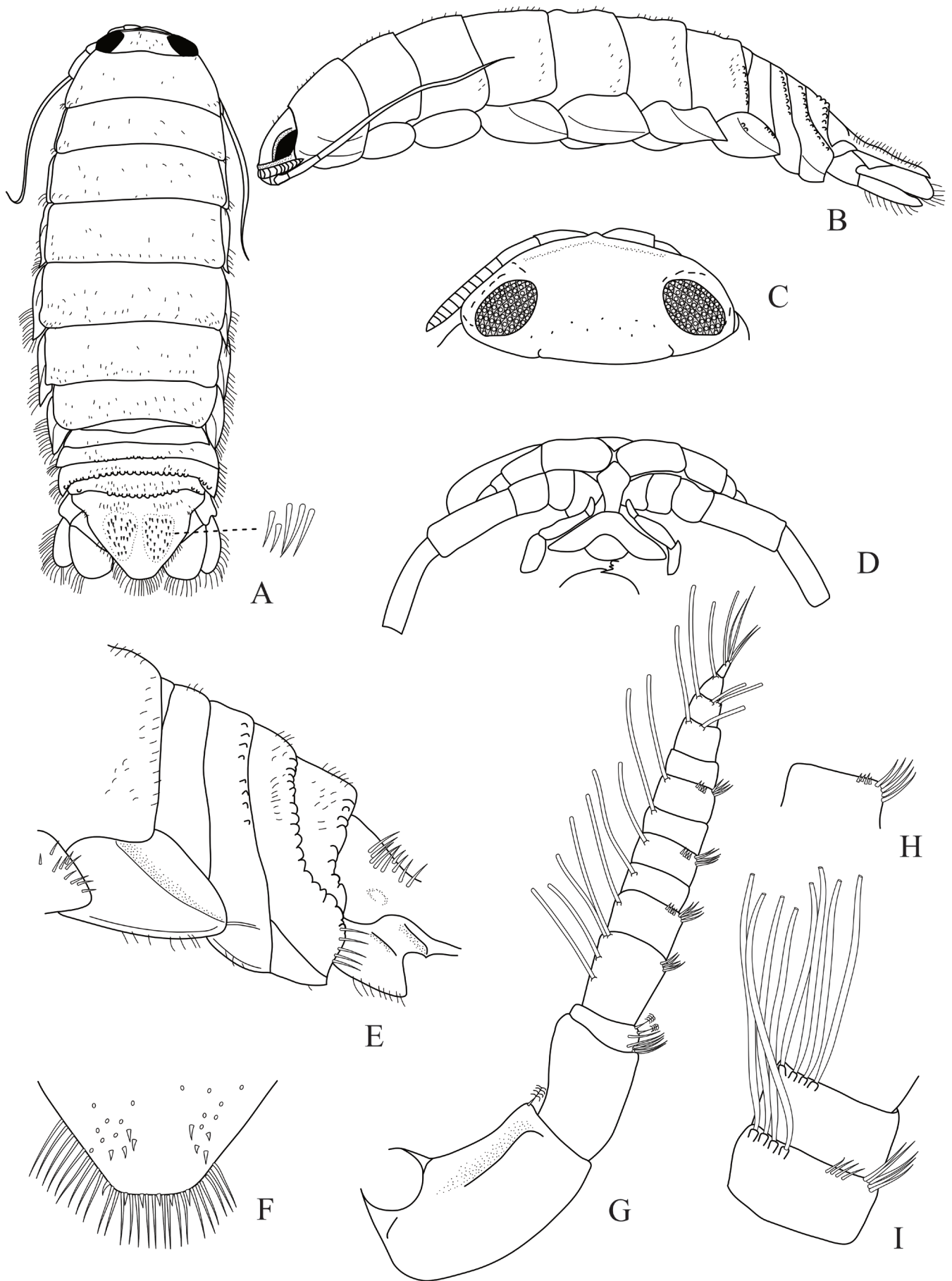


Fig. 1. *Argathona lineata*, new species, A–E, holotype, ZRC 2020.0137; F–I, female paratype, 9.7 mm, ZRC 2020.0138. A, dorsal view; B, lateral view; C, head, dorsal view; D, head and frons, ventral view; E, pleon, lateral view; F, pleotelson posterior margin; G, antennula; H, antennula, distolateral angle, article 6; I, antenna, articles 4 and 5.

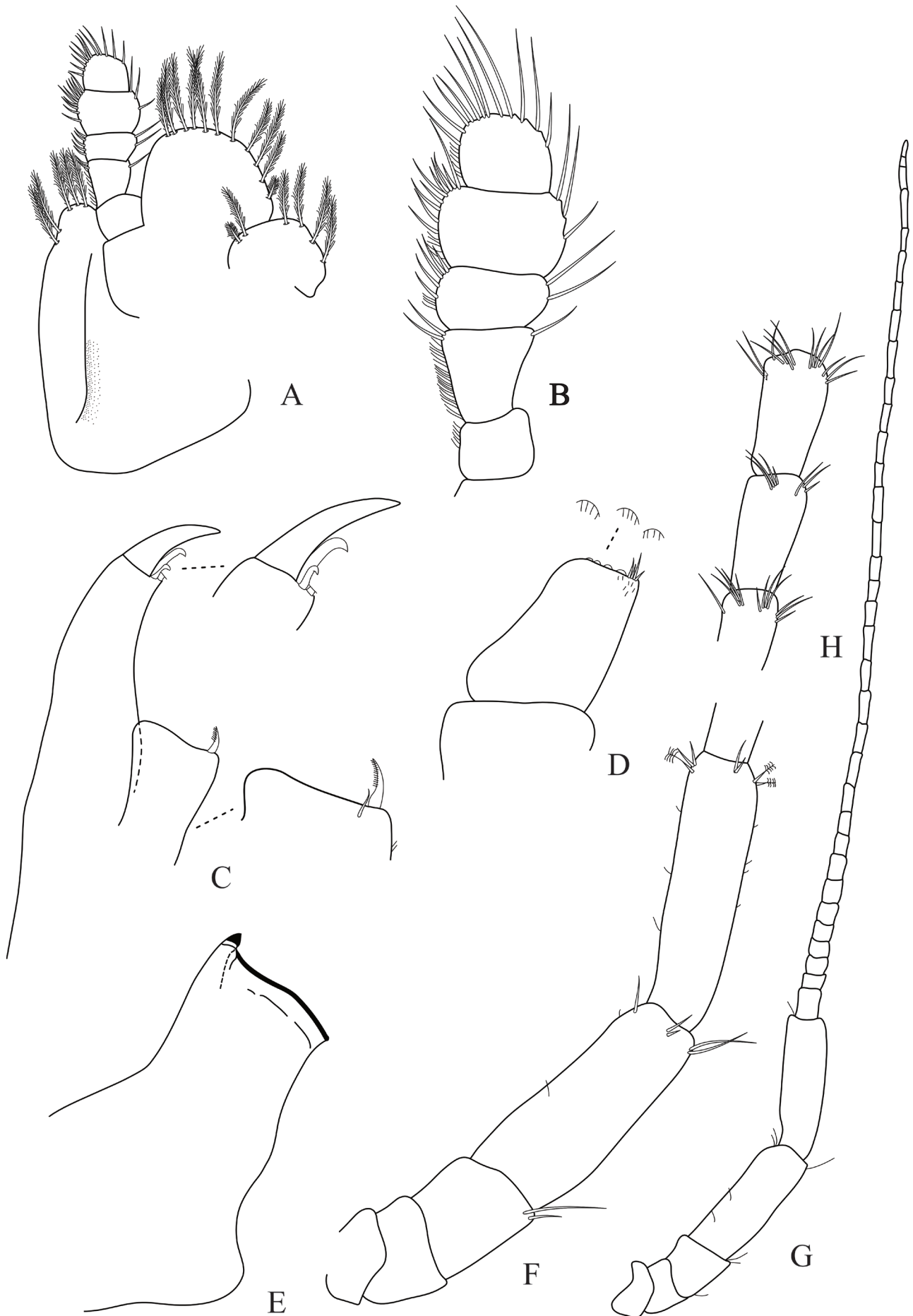


Fig. 2. *Argathona lineata*, new species, female paratype, 9.7 mm, ZRC 2020.0138. A, maxilliped, ovigerous female; B, maxilliped palp; C, maxillula; D, maxilla; E, mandible incisor; F, antenna peduncle; G, antenna; H, antenna flagellum articles 16–18.

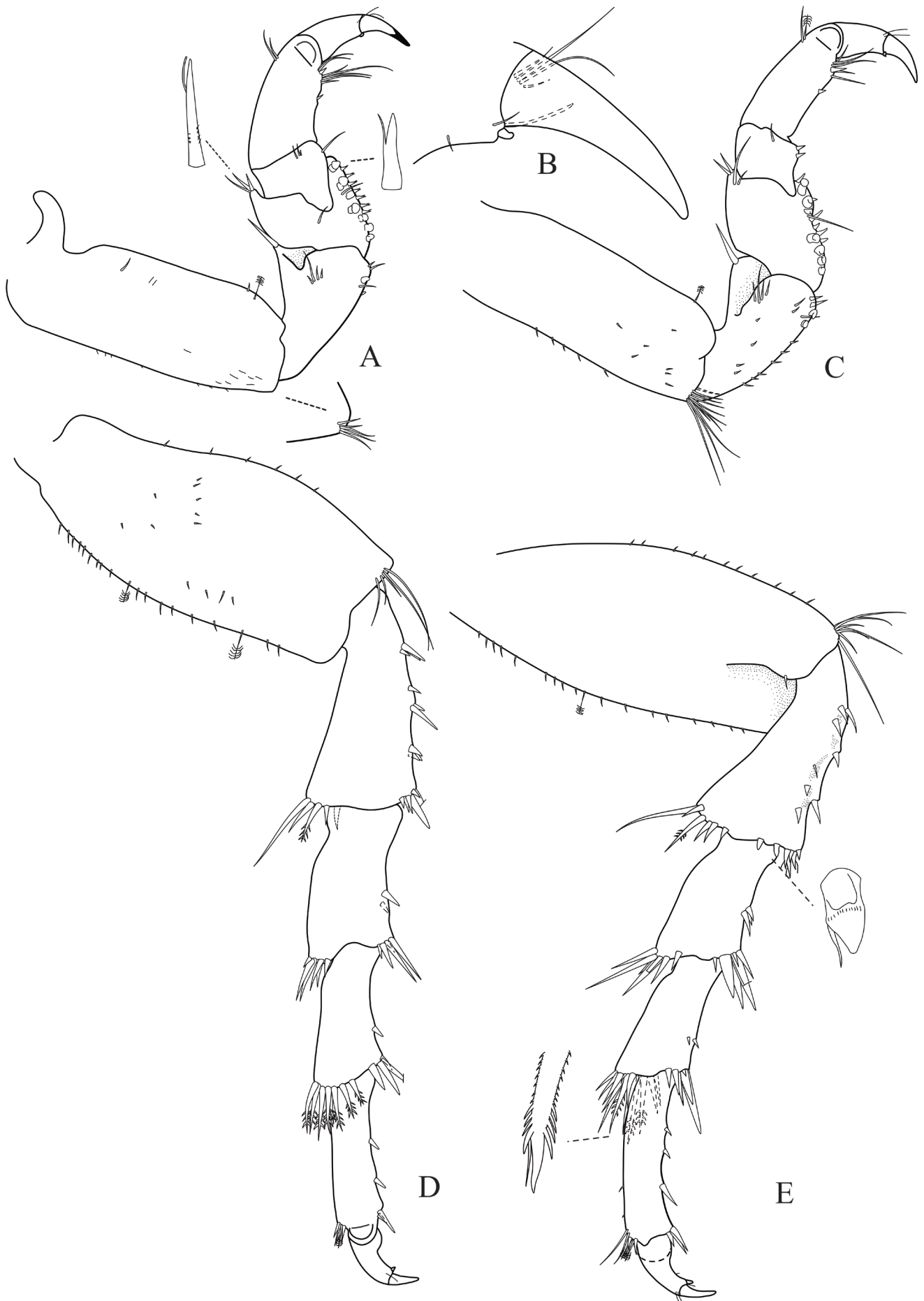


Fig. 3. *Argathona lineata*, new species, female paratype, 9.7 mm, ZRC 2020.0138. A, pereopod 1; B, pereopod 1, dactylus; C, pereopod 2; D, pereopod 6; E, pereopod 7.

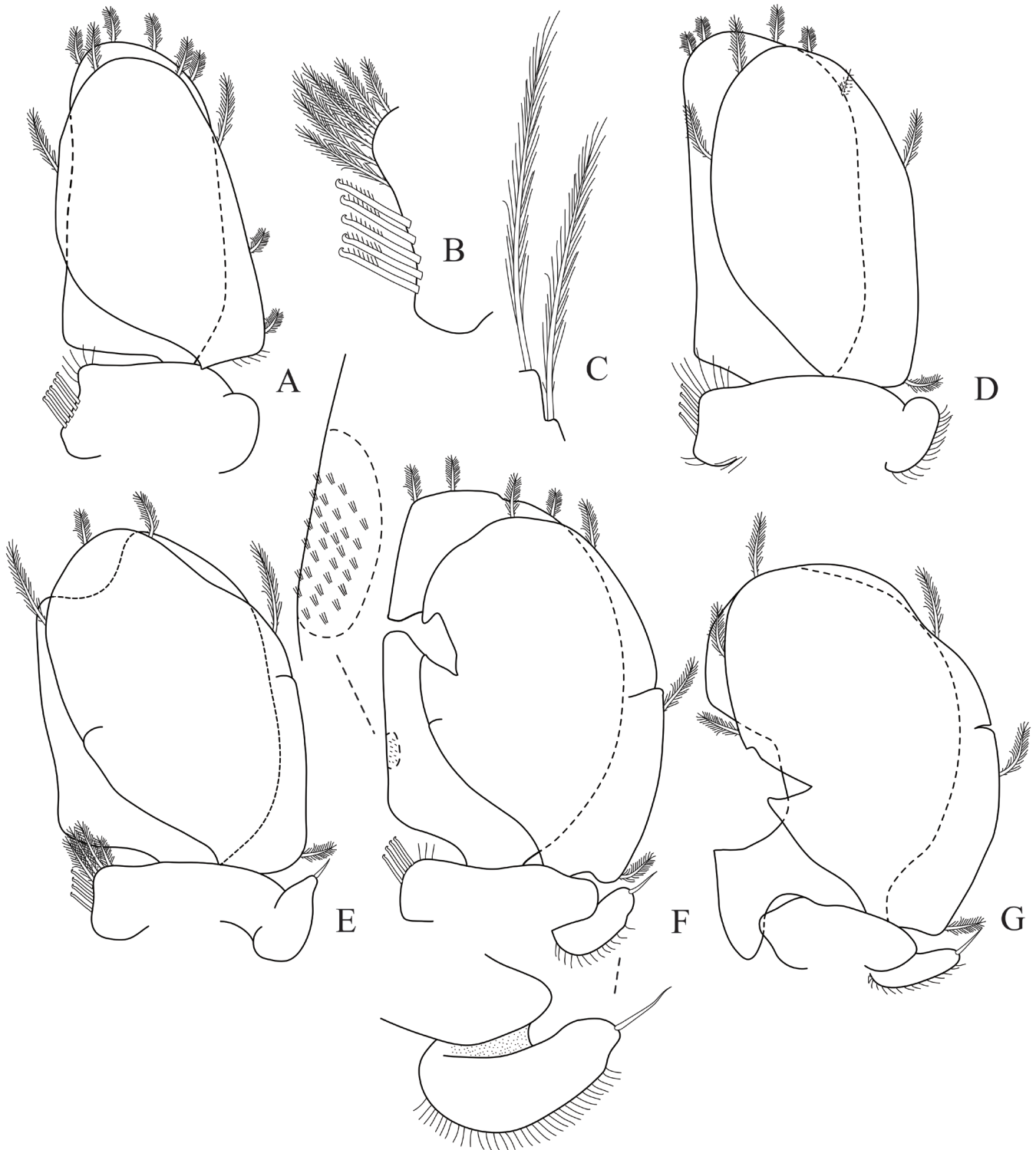


Fig. 4. *Argathona lineata*, new species, female paratype, 9.7 mm, ZRC 2020.0138. A, pleopod 1; B, pleopod 1 peduncle, mesial margin; C, pleopod 1, marginal setae; D–G, pleopods 2–5 respectively

posterior margin sub-truncate, without median point, with 6 robust setae.

Antennula peduncle articles 1 and 2 entirely fused; articles 3 and 4 0.6 times as long as combined lengths of articles 1 and 2; article 3 1.2 times as long as wide; flagellum with 11 articles, extending to anterior of pereonite 1. Antenna peduncle article 4 2.4 times as long as wide, 2.2 times as long as article 3, inferior margin with 2 short simple setae;

article 5 1.1 times as long as article 4, 3.5 times as long as wide, inferior margin with 1 pappose setae; anterodistal angle with cluster of 2 short simple setae; anterodistal angle with cluster of 2 pappose setae; flagellum with 37 articles, extending to posterior of pereonite 4.

Frontal lamina pentagonal, ventral surface entirely flat, 2.8 times as long as posterior width, lateral margins concave, anterior margin acute, without small median point.

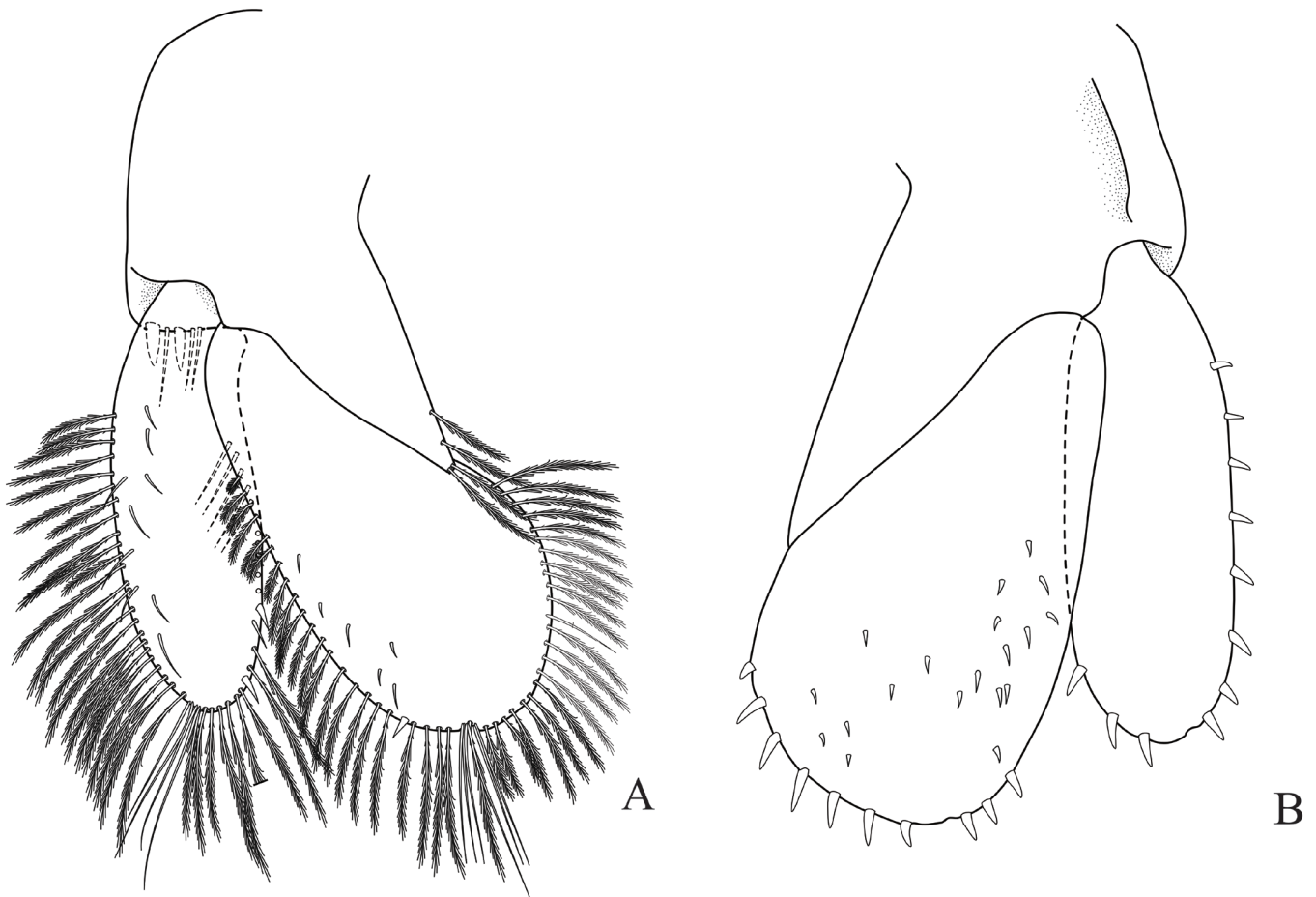


Fig. 5. *Argathona lineata*, new species, paratypes, A, female, 9.7 mm; B, female 10.1 mm; ZRC 2020.0138. A, uropod; B, uropod, showing marginal robust setae only.

Mandible palp article 2 with 16 distolateral setae; article 3 with 20 smooth RS, terminal seta serrate. Maxillula mesial lobe distally truncate with 1 serrate acute RS; lateral lobe with 1 large acute and 3 falcate RS. Maxilla lateral lobe distally truncate, with 4 short simple setae at distomesial angle. Maxilliped palp article 2 mesial margin with 2 slender setae, lateral margin distally with 1 slender setae; article 3 mesial margin with 5 slender setae, lateral margin with 2 slender setae; article 4 mesial margin with 10 slender setae, lateral margin with 3 slender setae; article 5 distal margin 9 setae, lateral margin with 3 setae.

Pereopod 1 basis 2.7 times as long as greatest width, superior distal angle without cluster of acute setae; inferior distal angle with cluster of 5 acute setae; ischium 0.5 times as long as basis, inferior margin with 3 setae, inferior distal margin with 1 molariform RS, superior distal margin with 1 RS; pereopod 1 merus inferior margin with 7 molariform RS, set as single row, inferior margin with 7 simple stiff acute setae, inferior distal margin with 0 RS, superior distal angle with 3 stiff setae; carpus inferior margin with 0 RS, and 1 simple setae; propodus 2.1 times as long as wide, inferior margin with 2 small RS, inferior margin with 0 simple setae, inferior distal margin with 1 large RS and 7 setae. superior distal with 2 simple setae; dactylus 0.8 times as long as propodus. Pereopod 2 ischium inferior margin with 6 short setae, inferodistal margin with 2 molariform

RS, and 2 acute RS, distolateral margin with 4 simple setae superior distal angle with 0 long simple setae and 1 RS; merus inferior margin with 7 stout molariform RS set as two groups, inferior distal margin with 0 stout RS, superior distal margin with 5 stout acute RS, superior distal margin with 4 acute RS; carpus inferior distal margin with 2 small RS; propodus 2.3 as long as wide, inferior margin with 1 small RS; inferior distal margin with 1 stout RS and 5 simple setae; dactylus 0.8 times as long as propodus. Pereopod 3 similar to pereopod 2. Pereopod 6 similar to pereopod 7, but ischium with 8 RS on inferior margin. Pereopod 7 basis 2.5 times as long as greatest width, superior margin weakly convex, inferior margin with 1 palmate setae and row of short simple setae; ischium 0.5 times as long as basis, inferior margin with 7 RS (set as 3+1+3), superior distal angle with 6 simple and biserrate RS, inferior distal angle with 7 RS; merus 0.6 times as long as ischium, 1.4 times as long as wide, inferior margin with 3 RS, superior distal angle with 7 RS, inferior distal angle with 7 RS; carpus 0.7 times as long as ischium, 1.9 times as long as wide, inferior margin with 2 small RS, superior distal angle with 14 simple and biserrate RS, inferior distal angle with 6 RS; propodus 0.9 times as long as ischium, 3.5 times as long as wide, inferior margin with 3 single RS, superior distal angle with 2 slender setae. 2 pappose setae and 2 acute RS, inferior distal angle with 3 RS; dactylus 0.5 times as long as propodus.

Pleopod 1 exopod 1.7 times as long as wide; lateral margin straight, distally broadly rounded, mesial margin strongly convex, with PMS from distal one-third, with ~54 PMS; endopod 2 times as long as wide, distally broadly rounded, convex, with PMS on distal margin only, mesial margin with PMS on distal margin only, pleopod 1 endopod with ~24 PMS; peduncle 1.8 times as wide as long; mesial margin with 4 coupling setae. Pleopod 2 exopod with ~66 PMS, endopod with ~27 PMS. Pleopod 3 exopod with ~74 PMS, endopod damaged. Pleopod 4 exopod and endopod damaged. Pleopod 5 exopod damaged. Pleopods 2–5 peduncle distolateral margin without prominent acute RS, 3–5 endopods with distomesial serrate scales.

Uropod peduncle ventrolateral margin with 2 RS, lateral margin without medial short acute robust seta, posterior lobe about two-thirds as long as endopod; rami extending to pleotelson apex (or just a little beyond), marginal setae in single dense tier, apices broadly rounded; dorso-lateral surfaces with sparse acute hyaline setae. Endopod apically not bifid; lateral margin weakly convex, proximal lateral margin with 0 RS; distal lateral margin with 3 RS, mesial margin strongly convex, with 7 RS. Exopod not extending to end of endopod, 2.9 times as long as greatest width, apically not bifid; lateral margin weakly convex, with 8 RS; mesial margin weakly convex, with 3 RS.

Size. Ovigerous females 8.8–11.9 mm (mean = 9.8 mm); non-ovigerous females 7.2–11.5 mm (mean = 9.4 mm); manca 5.2–6.7 (mean 5.9 mm); immature specimens (small, post-manca) 5.4–7.0 mm (mean = 6.5 mm).

Variation. The abundance of setae, particularly on the uropodal rami makes it difficult to count the number of robust setae. Of the specimens examined the range of marginal robust setae on the uropodal rami is (single extreme count in parentheses): uropodal endopod mesial margin 6–7 (0), uropodal endopod lateral margin 2–3 (1); uropodal exopod mesial margin 2–4, uropodal exopod lateral margin 7–8 (0).

Non-ovigerous specimens are almost entirely without setae on the dorsal surfaces, but are otherwise similar to ovigerous females. No males were present in the material examined.

Remarks. *Argathona lineata*, new species, can be recognised by the following combination of characters: a pentagonal frontal lamina 3.8 times longer than its posterior width, posterior margins of pleonites 3–5 with transverse row of nodules, rounded uropodal rami that only just extend past the pleotelson apex, a sub-truncate pleotelson posterior margin and the dorsal surface of the pleotelson with two dense sub-median fields of acute hyaline setae, with a few further hyaline setae on the dorsal surfaces of the uropodal rami. In fresh specimens there appear to be five or six longitudinal stripes of brown (or dark orange) chromatophores, but these fade with age, and that pattern is also present in some other species. Photos of this species can be seen at the website “The Biodiversity of Singapore” at the following link: <https://singapore.biodiversity.online/species/A-Arth-Crus-Isopoda-000006>

Argathona confine Hale, 1925 is similar, but lacks pleonal nodules, the uropodal endopod is distally more acute, the pleotelson apex is more narrowly and distinctly rounded, and the body surfaces are more dorsally setose than *A. lineata* new species

Argathona crenulata Bruce, 1982b is also similar but smaller (male mean length 6.6 mm; female mean length 7 mm), lacks dorsal setae, and also has posterior margins of pereonites 5 to 7 nodular. The shape of the pleotelson is less truncate and also has sub-lateral elongate ridges.

Argathona setosa Richardson, 1910 has an acute uropodal endopod with a falcate apex and strongly convergent pleotelson margins, and the body dorsal surfaces are more densely setose. The species is in need of redescription but is otherwise evidently very different to *A. lineata* new species

Argathona hirsuta Hobbs & Jones, 1993 is a deep-water species, has a differently shaped pleotelson, but notably has long robust setae on the pleotelson and uropodal margins; the pereonites and pleonites lack nodules and the frontal lamina is elongate-pentagonal with parallel lateral margins.

Argathona normani Stebbing, 1905 has dense setae over all of the dorsal body surfaces, has large widely separated nodules on posterior pereonites and pleonites (*A. lineata* has small and more numerous nodules), and a relatively short uropodal exopod (*A. lineata* has a longer uropodal exopod) and the uropodal exopod is narrowly rounded, with the uropodal endopod apex forming a distinct angle (*A. lineata* has both uropodal rami with broadly rounded apices).

Etymology. The epithet is derived from the Old English word ‘line’ and the old French word ‘ligne’ both meaning rope, cord or string; and also from the Latin ‘linum’ (flax) and ‘linea’ (fibre) (Brown, 1956); alluding to the dorsally lined chromatophore pattern of this species.

Argathona trichota, new species
(Figs. 6–10)

Argathona sp. 2.— Bruce & Wong, 2015: 160.

Material examined

Holotype. Female (ovig. 10.4 mm), off Eastern Boarding Ground A, 01°12.974–958'N, 103°52.960–832'E, 30 May 2013, beam trawl, depth 113–128 m, stn. TB127, SS-4153, coll. Lim Swee Cheng & party (ZRC.2020.0151). Paratypes. 2 females (ovig. 8.8 [dissected], 8.2 mm), Pulau Semakau, 01°12.389'N, 103°45.240'E, 23 May 2013 SCUBA coral brushing, depth 5 m, stn. SB41, SS-5382, coll. Heok Hui Tan & party (ZRC.2020.0152). Female (non-ovig. 8.8 mm), St. John's Island, 01°13.116'N, 103°51.079'E, 29 May 2013, gill net, depth 2 m, stn. SW104, SS-0858, M.R bin Duriat & D. Uyeno (ZRC.2020.0153). Female (non-ovig. 9.2 mm), south of Pulau Sebarok, 01°10.876'N, 103°47.660'E, 03 Sep 2013, rectangular dredge; depth 32.5 m, stn. DR197, SEA-0102, coll. Helen Wong & party (ZRC.2020.0154).

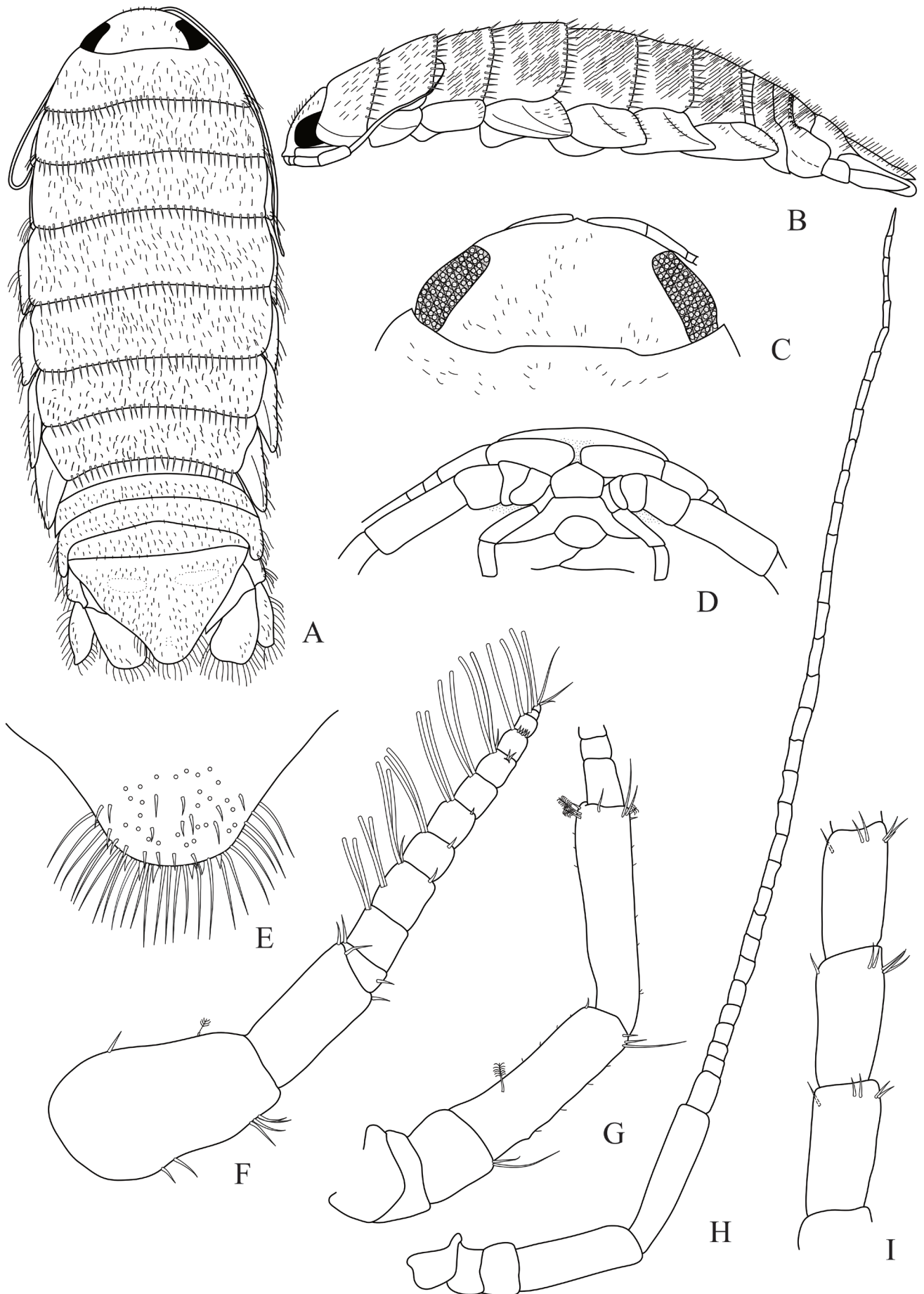


Fig. 6. *Argathona trichota*, new species, A–E, holotype, ZRC 2020.0151; F–I, female paratype, 8.8 mm, ZRC 2020.0152. A, dorsal view; B, lateral view; C, head, dorsal view; D, head and frons, ventral view; E, pleotelson, posterior margin; F, antennula; G, antenna peduncle; H, antenna, I, antenna flagellum, articles 14–15.

Description of female. Body 2.7 times as long as greatest width, widest at pereonite 5, dorsal surfaces all densely setose, lateral margins subparallel. Rostral point present, projecting anteriorly, minute. Eyes separated by about 54% width of head, each eye made up of ~6 transverse rows of ommatidia, each row with ~11 ommatidia, eye colour dark brown. Pereonite 1 and coxae 3 each with posteroventral angle right-angled, coxae 2 rounded; coxae 5–7 with entire oblique carina; posterior margins of pereonites 5 and 6 smooth, that of pereonite 7 very finely nodular. Pleon with pleonite 1 largely concealed by pereonite 7; pleonites 3 and 5 posterior margins smooth, pleonite 4 with fine nodules; posterolateral angles of pleonite 2 concealed, not posteriorly produced; pleonite 3 with posterolateral margins not extending to posterior margin of pleonite 5, acute; posterolateral margin of pleonite 4 subtruncate with ventral point, not extending beyond posterior margin of pleonite 5; pleonite 5 with posterolateral angles overlapped by lateral margins of pleonite 4. Pleotelson 0.6 times as long as anterior width, dorsal surface without longitudinal carina; lateral margins weakly sinuate, smooth; posterior margin sub-truncate, without median point, with 6 robust setae.

Antennule peduncle articles 1 and 2 entirely fused; articles 3 and 4 0.7 times as long as combined lengths of articles 1 and 2, article 3 2 times as long as wide; flagellum with 10 articles, extending to anterior of pereonite 1. Antenna peduncle article 4 3.0 times as long as wide, 2.8 times as long as article 3, inferior margin with 1 pappose seta, and 1 short simple seta; article 5 1.2 times as long as article 4, 3.9 times as long as wide, inferior margin without pappose setae; anterodistal angle with cluster of 2 pappose setae; anterodistal angle without cluster of short simple setae; anterodistal angle with cluster of 2 long simple setae; flagellum with 32 articles, extending to middle of pereonite 4.

Frontal lamina 0.7 times as long as posterior width, lateral margins straight, diverging slightly towards anterior, anterior margin acute, without small median point.

Mandible palp article 2 with 18 simple and biserrate distolateral setae; article 3 with 20 robust biserrate setae. Maxillula mesial lobe with distal margin truncate and concave, distomesial angle with two recurved RS; lateral lobe with 1 large, 1 small falcate and 1 small straight terminal robust setae. Maxilla distally rounded, with 2 small simple setae and 2 stiff setae. Maxilliped palp article 2 mesial margin with 3 slender setae, lateral margin distally with 1 slender seta; article 3 mesial margin with 3 slender setae, lateral margin with 2 slender setae; article 4 mesial margin with 8 slender setae, lateral margin with 3 slender setae; article 5 distal margin 14 setae, lateral margin with 3 setae.

Pereopod 1 basis 2.4 times as long as greatest width, superior distal angle with cluster of 2 acute setae; inferior distal angle with cluster of 7 acute setae; ischium 0.5 times as long as basis, inferior margin with 2 setae, inferior distal margin with 4 RS, superior distal margin with row of 9 long stiff setae; merus inferior margin with 9 molariform RS, set as two groups, inferior margin with row of 13 stiff acute setae,

inferior distal margin without RS, superior distal angle with 5 setae and 1 RS; carpus inferior margin without RS, inferior margin with 2 simple setae; propodus 1.8 times as long as wide, inferior margin with 2 RS, inferior margin without simple setae, inferior distal margin with 1 large RS and 10 simple setae, superodistal angle with 2 pappose setae; dactylus 0.7 times as long as propodus. Pereopod 2 ischium inferior margin without stout, bluntly rounded RS, with 1 acute RS and 5 simple setae; distal margin with 1 RS; without molariform RS; ischium superior distal margin with 3 long simple setae; without RS; merus inferior margin with 6 molariform RS, set as two groups, inferior distal margin with 7 stout RS, superior distal margin with 2 stout RS and 2 setae; carpus inferior distal margin with 1 RS; propodus 2.5 times as long as wide; inferior margin with 2 RS; inferodistal margin with 1 long RS and 6 simple setae; dactylus 0.6 times as long as propodus. Pereopod 3 similar to pereopod 2. Pereopod 6 similar to pereopod 7. Pereopod 7 basis 2.7 times as long as greatest width, superior margin weakly convex, inferior margin without palmate setae; ischium 0.5 times as long as basis, inferior margin with 8 RS set as clusters of 3+3+2, superior distal angle with 4 simple and 1 biserrate RS, inferior distal angle with 8 RS and 2 setae; merus 0.7 times as long as ischium, 1.6 times as long as wide, inferior margin with 6 RS (set as 2+2, superior distal angle with 10 RS, inferior distal angle with 7 RS; carpus 0.6 times as long as ischium, 2.4 times as long as wide, inferior margin with 1 RS, superior distal angle with smooth and biserrate 12 RS, inferior distal angle with 5 RS; propodus 0.8 times as long as ischium, 3.9 times as long as wide, inferior margin with 4 single of RS, superior distal angle with 3 slender and 2 pappose setae, inferior distal angle with 2 simple setae; dactylus 0.4 times as long as propodus.

Pleopod 1 exopod 1.8 times as long as wide, lateral margin weakly convex, distally broadly rounded, mesial margin strongly convex, with PMS from distal one-third, with ~52 PMS; endopod 2.2 times as long as wide, distally subtruncate, lateral margin weakly concave, with PMS on distal margin only, mesial margin with PMS on distal margin only, endopod with ~19 PMS; peduncle 2.3 times as wide as long; mesial margin with 4 coupling setae. Pleopod 2 exopod with ~62 PMS, endopod with ~24 PMS. Pleopod 3 exopod with ~72 PMS, endopod with ~16 PMS. Pleopod 4 exopod with ~66 PMS, endopod with ~13 PMS. Pleopod 5 exopod with ~65 PMS. Pleopods 2–5 peduncle distolateral margin with prominent acute RS; pleopods 1–5 exopod lateral margins each with widely spaced serrations; pleopods 3–4 endopods with mesial serrate scale patch, 5 with mesial and distomesial scale patches.

Uropod peduncle and rami dorsolaterally densely covered with stiff, acute hyaline setae; peduncle ventrolateral margin RS not visible, lateral margin without medial short acute robust seta, posterior lobe about three-quarters as long as endopod; rami extending beyond pleotelson, marginal setae in single tier, apices broadly rounded. Endopod apically not bifid; lateral margin weakly convex, proximal lateral margin with 3 RS; mesial margin strongly convex, with 8 RS. Exopod not extending to end of endopod, 3.0 times

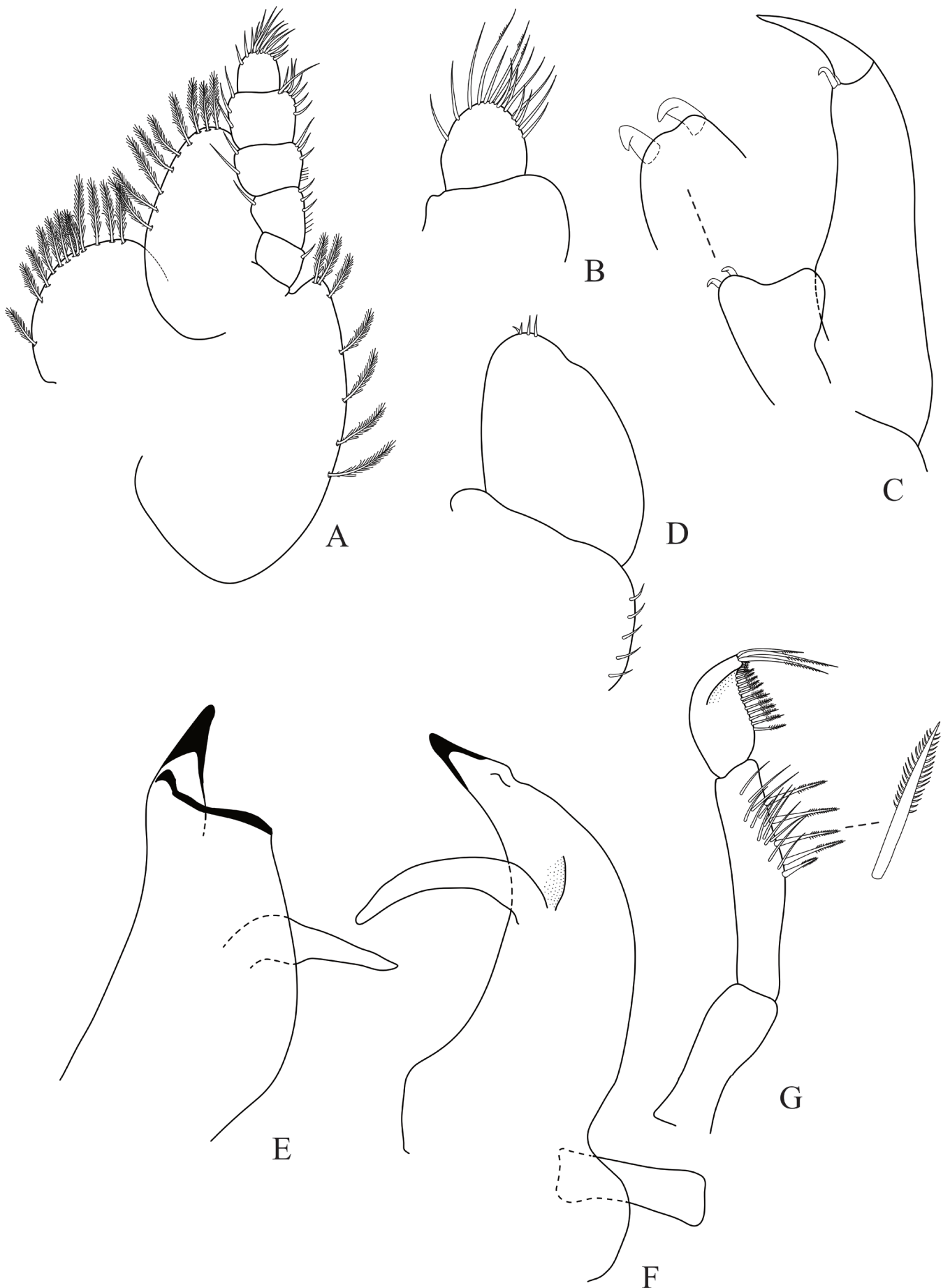


Fig. 7. *Argathona trichota*, new species, female paratype, 8.8 mm, ZRC 2020.0152. A, maxilliped, ovigerous female; B, maxilliped, palp article 5; C, maxillula; D, maxilla; E, left mandible incisor; F, right mandible incisor; G, mandible palp.

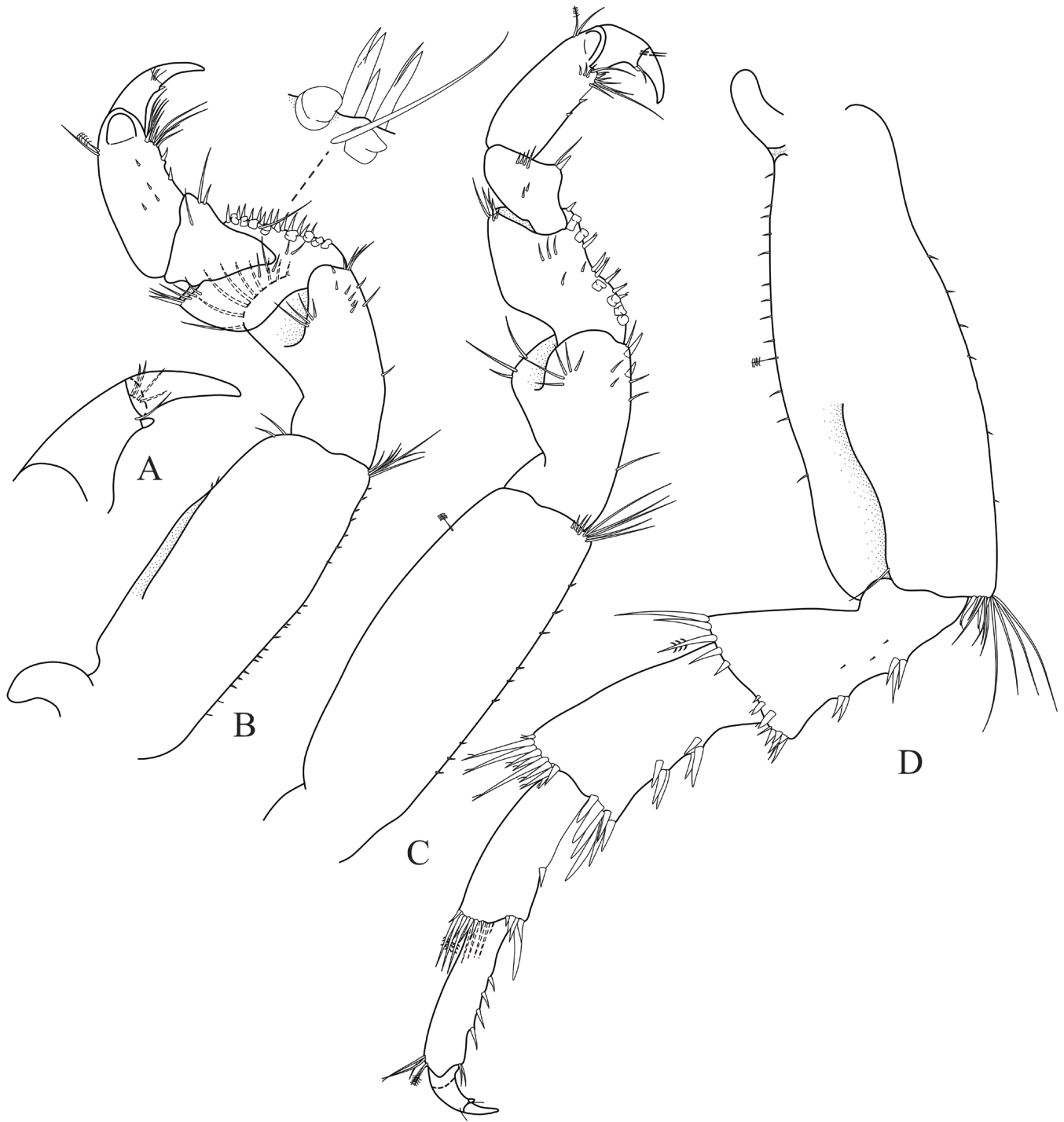


Fig. 8. *Argathona trichota*, new species, female paratype, 8.8 mm, ZRC 2020.0152. A, pereopod 1, dactylus; B, pereopod 1; C, pereopod 2; D, pereopod 7.

as long as greatest width, apically not bifid; lateral margin weakly convex, with 4 RS, proximal RS slender not ‘peg-like’; mesial margin weakly convex, with 2 RS.

Size. Ovigerous females 8.2–10.4 mm (mean = 9.1 mm); single non-ovigerous female 9.2 mm.

Remarks. *Argathona trichota*, new species, has a uniquely short frontal lamina that is shorter than the posterior width, effectively separating it from all other species in the genus. In addition, the ovigerous females have the dorsum covered

by dense hyaline setae, which in combination with the relatively short antennal flagellum extending to mid-pereonite 4, sub-truncate pleotelson posterior margin and the rounded uropodal endopod, all serve to identify the species.

Argathona lineata, new species, is similar in general morphology, particularly the shape of the uropods and pleotelson but *A. trichota* differs in having a shorter frontal lamina, abundant hyaline setae all over the dorsum; fine pleonal tubercles only on the posterior margin of pereonite 7; a shorter antennal flagellum that extends to mid-pereonite 4

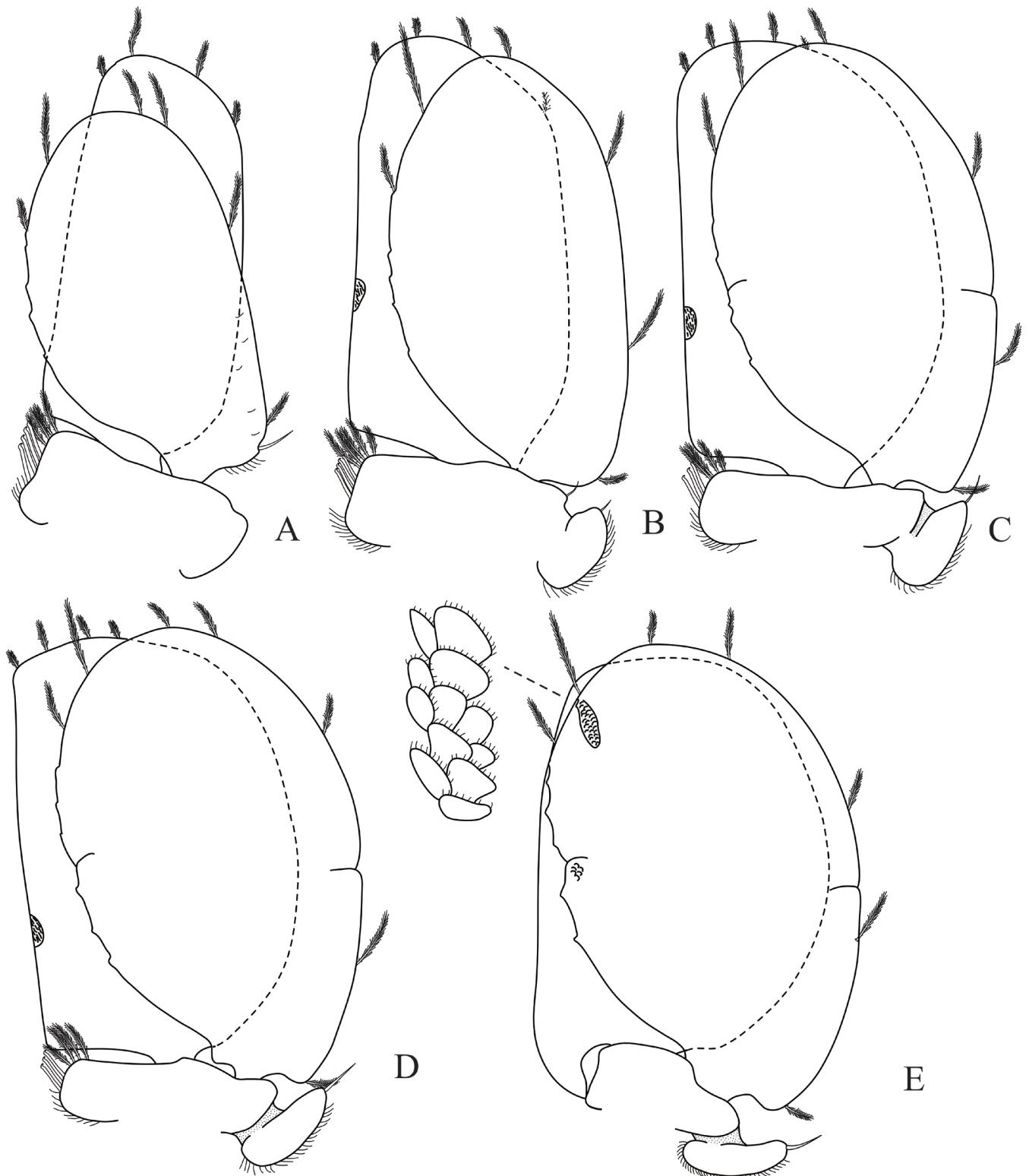


Fig. 9. *Argathona trichota*, new species, female paratype, 8.8 mm, ZRC 2020.0152. A–E, pleopods 1–5 respectively.

(to posterior of pereonite 4 in *A. lineata*); more robust setae on the pereopods; and the mesial margin of the pleopodal exopods all have widely spaced serrations (smooth in *A. lineata*).

Etymology. The epithet is derived from the Greek τριχωτός (trichotós), meaning ‘hairy’.

Argathona rhinoceros (Bleeker, 1857)

Restricted synonymy:

Argathona rhinoceros.— Monod, 1976: 853, fig. 1–4.— Bruce, 1982b: 14, fig. 1.— Delaney, 1989: 17, figs 1B, 7, 8.

Argathona rhinoceros.— Anil, Das and Jayaraj, 2018: 297, figs 2–4 [lapsus].

Argathona cf. rhinoceros.— Bruce & Wong, 2015: 160.

Material examined: Female (non-ovig. 15.4 mm), Lazarus Island, 01°13.317'N, 103°51.170'E, 23 May 2013, SCUBA, from Blue-ring Angelfish *Pomacanthus annularis*, depth, 16.2 m, stn SD 45, SS-0828, coll. Heok Hui Tan & party (ZRC.2022.0014). Female (non-ovig. 13.8 mm), Cyrene Reef, 01°15.374'N, 103°44.816'E, 27 May 2013, hand collected, intertidal, tide at 0.2–1.2 m, stn. IT86, SS-1917, coll. Lee Yen-Ling & party (ZRC.2022.0015). Imm. (c. 13 mm), Kusu Island, 01°13.274'N, 103°51.659'E, 03 Jun 2013, SCUBA, hand collected, depth 19.1 m, stn. SD166, SS-4217, coll. Heok Hui Tan & party (ZRC.2022.0016).

Remarks: *Argathona rhinoceros* can be recognised by the smooth body surface and prominent rounded rostrum (Monod 1976: 854, figs. 1, 2). This species has been widely reported from fish, primarily groupers. The specimens here were taken from the Blue-ringed Angelfish, *Pomacanthus annularis* (Bloch). The strong association with fish may be connected to the smooth body surfaces shown by this species, in contrast to many other species in the genus. Photos of this species can be seen at the website “The Biodiversity of Singapore” at the following link: <https://singapore.biodiversity.online/species/A-Arth-Crus-Isopoda-000098>

Fish hosts are *Pomacanthus annularis* (present work); *Lutjanus* sp. (as Emperor) (Bruce 1982b); *Epinephelus malabaricus* (Bloch & Schneider), *Epinephelus tauvina* (Forsskål), *Epinephelus chlorostigma* (Valenciennes), *Variola louti* (Forsskål), *Plectropomus leopardus* (Lacepède) (all from Delaney, 1989).

Argathona aff. *macronema* (Bleeker, 1857)

Aega macronema Bleeker, 1857: 23, pl. 1 figs. 1–1c. Monod, 1975: 1003.
Corallana macronema.— Miers, 1880: 469.
Brotherus longicornis Budde-Lund, 1908: 307.— Stebbing, 1911: 179; Monod, 1975: 1003.
Argathona similis Richardson, 1910: 11, fig. 10.— Hale, 1925: 162, fig. 16; 1929: 251, figs. 244–245; Nierstrasz, 1931: 175; Monod, 1933: 177; 1975: 1003.
Alcirona macronema.— Nierstrasz, 1917: 97, pl. 14 figs. 29–35; 1931: 168; Monod, 1924: 99; 1975: 1003.
Orcilana hansenii Nierstrasz, 1931: 170, figs. 48–57, pl. 40 figs. 19–20.— Monod, 1975: 1003.
Argathona longicornis.— Monod, 1933: 179, 182.
Argathona macronema.— Monod, 1933: 174, 182, figs. 4–11; 1975: 1003, figs. 1–20; Nordenstam, 1946: 14; Shiino, 1961: 98; Bruce, 1982b: 13; 1997: 200; 1999: 306; 2002: 210; Grutter & Lester, 2002: 250; Trilles, 2008: 27; Justine, 2010: 170; Anil et al. 2018: 298, figs 5, 6, 4.

Material examined: Female (non-ovig. 13.7 mm), Kusu Island, 01°13.314'N, 103°51.640'E, 04 Jun 2013, SCUBA, depth, 16.3 m, stn. SD 177, SS-4249, coll. Heok Hui Tan & party (ZRC.2022.0017). Manca (5.4 mm), taken along with an *A. rhinoceros*, SS-0828, same data as ZRC.2022.0017 (ZRC.2022.0018).

Remarks: Bleeker’s (1857) description and figures are minimal and provide few clues to identity other than the long antennal flagellum. The perceived long antennal flagellum has

been critically influential in subsequent species identifications (e.g. Monod, 1933, 1975; Bruce, 1982b). The presence of a long antennal flagellum, among some other characters, has also influenced the placing of several notional species into junior synonymy with *A. macronema*.

Bleeker (1857: figs. 1, 1a–c) gave four small figures, and while there is barely enough detail to characterise the species, it can be seen that the ‘long antennae’ are in fact considerably shorter than that of many the records and synonyms subsequently reported under the name *A. macronema*, extending at most to the anterior of pereonite 5 rather than posterior of pereonites 6 and 7 (or longer) for most subsequent records. Interpreting Bleeker’s figures suggests that there is a short pentagonal frontal lamina, and that the pleotelson is relatively broadly rounded with a distinct median longitudinal carina; it is not possible to determine if the dorsal surfaces are setose or smooth.

Several species have been placed in synonymy, but to date there has been no type-based redescription of *A. macronema*. Bleeker’s material is held at the Naturalis Museum, Leiden, so probable type specimens are available. Unfortunately, at the time of writing, the probable type material of *Argathona macronema* (Bleeker, 1857) was not available for examination or loan as the collection was in the process of being relocated (Karen van Dorp, pers. comm.). Monod (1933, 1975) described specimens as this species but his two records are clearly of two different species. Australian specimens (as *A. similis* Hale, 1925) have a long antennal flagellum extending to nearly to the pleon and a long anteriorly rounded or truncate frontal lamina—not the same as Monod’s (1933, 1975) descriptions. Specimens from the Great Barrier Reef, Queensland (held at the Queensland Museum: QM W10817–W10828, W15486, W15489) have a long antennal flagellum extending to at least pereonite 6 and occasionally to the anterior of the pleon; the frontal lamina is elongate pentagonal, with rounded angles that can appear rounded if viewed slightly from the posterior. These specimens agree well with the material from Singapore.

It is highly probable that several species have been and are being recorded under the name of *A. macronema*. Some species names may need to be brought out of synonymy. Establishing the identity of both named and potential new species is not possible without a detailed type-based species redescription against which all subsequent records can be assessed, and to confirm identity of the synonymised taxa to make sure that they are or are not the same species. Below are comments on the records of *A. macronema* with an assessment of their status.

Our conclusion is that the current usage of *Argathona macronema* includes a number of similar species and a full revision, based on the type material for the species, is needed; the material for all records and synonyms needs to be re-examined and the identification confirmed or rejected. For completeness the presented synonymy includes all uses of the name *Argathona macronema* (in different combinations) as well as the names that have been placed into junior synonymy.

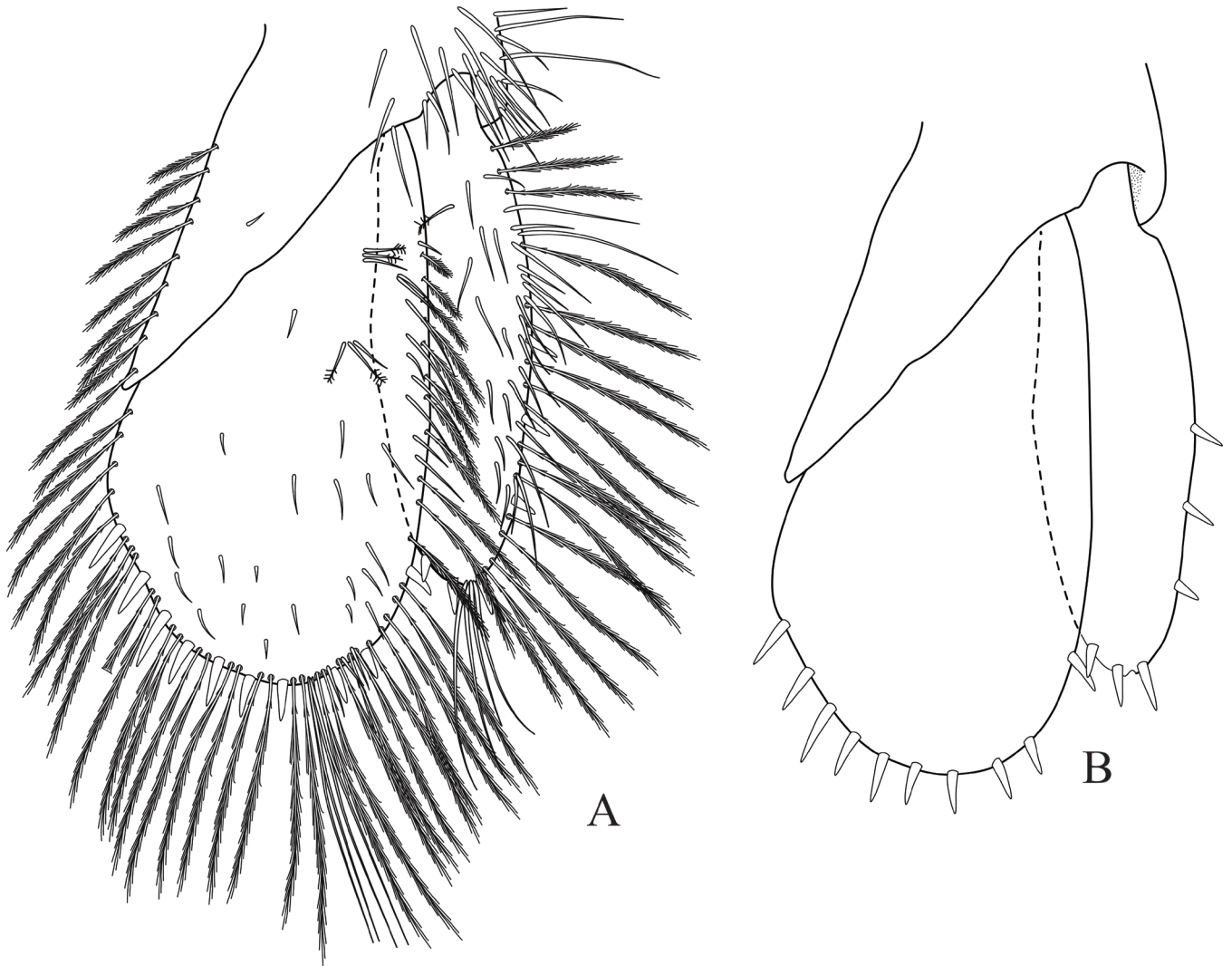


Fig. 10. *Argathona trichota*, new species, female paratype, 8.8 mm, ZRC 2020.0152. A, uropod; B, uropod, showing marginal robust setae only.

It is clear that most subsequent records are misidentifications.

Most host records under this species name are from Serranidae.

***Argathona macronema* (Bleeker, 1857).** Bleeker's (1857) figures (figures 1, 1a-c) show the antenna flagellum (described by Bleeker as "plus longue que la moitié de la longueur du corps.") extends only to the posterior of pereonite 4. If interpreted correctly, the frontal lamina is pentagonal, 2.1 times longer than wide (Bleeker, 1857, figure 1a) and, if interpreted correctly, the pereonites may be setose, but that is not clear, and there is no mention of nodules on the pereonites or pleonites.

Locality: Java Sea (as 'mer du Batavia').

***Brotherus longicornis* Budde-Lund, 1908.** While briefly described by Budde-Lund (1908), there are a number of precise figures that permit some characterisation. Notably the pentagonal frontal lamina has concave lateral margins that clearly diverge towards the anterior, with the straight

anterior margins strongly convergent. The pleon and pleotelson both appear setose but there is insufficient detail to allow interpretive comparison to other species. The length of the antennal flagellum was not described or figured. The shape of the frontal lamina excludes this species from both *Argathona macronema* of Bleeker (1857) and from the Singapore-Australian group of species documented here.

Locality. Majunga Bay, northwestern Madagascar; from eels ("Meeraales").

***Argathona macronema* of Bruce (1982b).** This species is common on the Great Barrier Reef and is conspecific with specimens collected in Singapore. It differs from *A. macronema* (of Bleeker, 1857) in having a longer antennal flagellum that extends to at least the posterior of pereonite 6, sometimes longer if not broken, and an elongate frontal lamina (3.8 times as long as posterior width) with a rounded or 'rounded pentagonal' anterior margin. A colour photo of this species was given by Bruce (1999: 306). Referred to below as the 'Singapore-Australian species', this species is possibly the same as *Argathona similis* Richardson, 1910.

Locality: Great Barrier Reef (Bruce, 1982b; Bruce et al., 2002) and Singapore (present study); also, Papua New Guinea and probably Indonesia (Richardson, 1910; Nierstrasz, 1931) and New Caledonia (Justine, 2010); possibly Andaman Islands (Anil et al., 2018).

***Orcilana hansenii* Nierstrasz, 1931.** As far as can be seen, this species corresponds to the Singapore–Australian species rather than to Bleeker’s figures, with the antennal flagellum extending to pereonite 7.

Locality: Atjatuning, western New Guinea

***Argathona similis* Richardson, 1910.** Figured by Hale (1925). This species agrees well with the Singapore–Australian species, with long to very long antenna extending to the pleon, relatively large eyes, a narrowly rounded pleotelson apex and uropodal rami that extend beyond the posterior margin of the pleotelson. The name has priority over most other species names except *Brotherus longicornis* Budde-Lund, 1908, but that species is clearly a distinct species (see above).

Locality: Lembah Strait, North Sulawesi, Indonesia; South Australia and Western Australia (Hale, 1925).

***Argathona macronema* of Monod (1933).** This species is not the same as the Singapore–Australian species: the antenna flagellum is shorter, extending only to pereonite 5 (vs to posterior of pereonite 6 or 7); it is far more setose dorsally (vs setose only on pleotelson and weakly on pleon, not setose on the pereon); the uropods do not or not significantly extend beyond the pleotelson apex (vs clearly beyond); and the frontal lamina has a rounded anterior margin but is much shorter.

Locality: Egypt.

***Argathona macronema* of Monod (1975).** The identity of this record is uncertain. It is not the Singapore–Australian species, nor does it appear to be the same as the species from Egypt. The frontal lamina was not described or figured; while the uropods extend well beyond the pleotelson apex, the endopod is drawn as rounded and quite unlike the Singapore–Australian species which has an acute or sub-acute apex.

Locality: Kenya.

***Alcirona macronema* of Nierstrasz (1917).** Nierstrasz’s photograph of the dorsal view (plate XIV, fig. 29) shows a posteriorly acute pleotelson apex, with strongly convergent and nearly straight lateral margins; both the uropodal exopod and endopod have acute apices. These characters agree neither with Bleeker’s (1857) original description and figures, nor with the later accounts of Monod (1933, 1975) but correspond to the Singapore–Australian species, based on material examined here from Singapore and the Great Barrier Reef.

Locality: Java, Indonesia.

***Argathona macronema* of Anil et al. (2018).** As figured, the frontal lamina is elongate–pentagonal, the pleotelson has a notably acute apex and straight lateral margins, the uropodal endopod has an acute apex, and the antennal flagellum is described as extending to pereonite 6. This record does not agree with Bleeker’s (1857) description; it is perhaps most similar to the Singapore–Australian species although the frontal lamina shape differs from that species.

Locality: Andaman Islands.

***Corallana macronema* of Miers, 1880.** Miers (1880) considered this to be a species of *Corallana* as it had a “narrow linear interantennular process (frontal lamina)”; this character would exclude the species from *Argathona*. Identity not known.

Locality: Miers (1880) had no locality data, other than ‘Malaysia’ in the broadest sense.

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