



## ***Odontonia kerangcaris* sp. nov., a new bivalve-associated shrimp (Crustacea, Decapoda, Palaemonidae) from East Kalimantan, revealing intrageneric host switching**

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### **Abstract**

A new species of bivalve mollusk dwelling palaemonid shrimp of the genus *Odontonia* is described from the Berau Islands, East Kalimantan, Indonesia. This is the only *Odontonia* species recorded as a symbiont of a bivalve mollusk, all other congeners are known to associate with solitary ascidians. The new species belongs to the group wherein the dactylus of the ambulatory pereopods has an accessory tooth. It differs from these species in the absence of a forward directed proximal tooth on the flexor margin of the corpus of the ambulatory dactyli. It also lacks the small denticles posterior to the distoventral accessory tooth on the dactylar corpus.

**Key words:** new species, Indonesia, intrageneric host switching

### **Introduction**

The genus *Odontonia* Fransen, 2002, currently comprises eight species (De Gier & Fransen, 2018): *O. bagginsi* De Gier & Fransen, 2018; *O. compacta* (Bruce, 1996); *O. katoi* (Kubo, 1940); *O. plurellicola* De Gier & Fransen, 2018; *O. rufopunctata* Fransen, 2002; *O. seychellensis* Fransen, 2002; *O. sibogae* (Bruce, 1972); and *O. simplicipes* (Bruce, 1996). All species are distributed in the Indo-West Pacific and living as endosymbionts in solitary ascidians (De Gier & Fransen, 2018).

A specimen of a yet unknown *Odontonia* was collected in 2003 during a marine biodiversity survey of the Berau Islands, East Kalimantan, Indonesia (Hoeksema 2004). The new species is herein described and figured, and compared with its congeners.

### **Material and methods**

The specimen was collected by SCUBA diving during a marine biodiversity survey of the Berau Islands organized by Naturalis Biodiversity Center and the Indonesian Institute of Sciences (LIPI) in the East Kalimantan Programme of the Royal Netherlands Academy of Arts and Sciences (KNAW). The specimen was encountered inside the bivalve mollusk *Chama lazarus* Linnaeus, 1758, and preserved on 70% ethanol.

The specimen was studied and drawn using a dissecting stereomicroscope (Zeiss Discovery.V8) and a compound microscope (Olympus BX53) both provided with a drawing tube. Drawings were scanned (Canon Canoscan 9000F) with a resolution of 600 dpi and subsequently mounted into plates using Adobe Photoshop software (Adobe Systems, USA).

Measurements (in mm) are provided for postorbital carapace length (pocl.), measured from the posterior orbital margin to the posterior margin of the carapace in the dorsal midline.

The type-specimen is deposited in the zoological collections of the Museum Zoologicum Bogoriense (MZB), Research Center for Biology, Indonesian Institute of Sciences, Cibenong, Indonesia.

## Systematics

### Family Palaemonidae Rafinesque, 1815

### Genus *Odontonia* Fransen, 2002

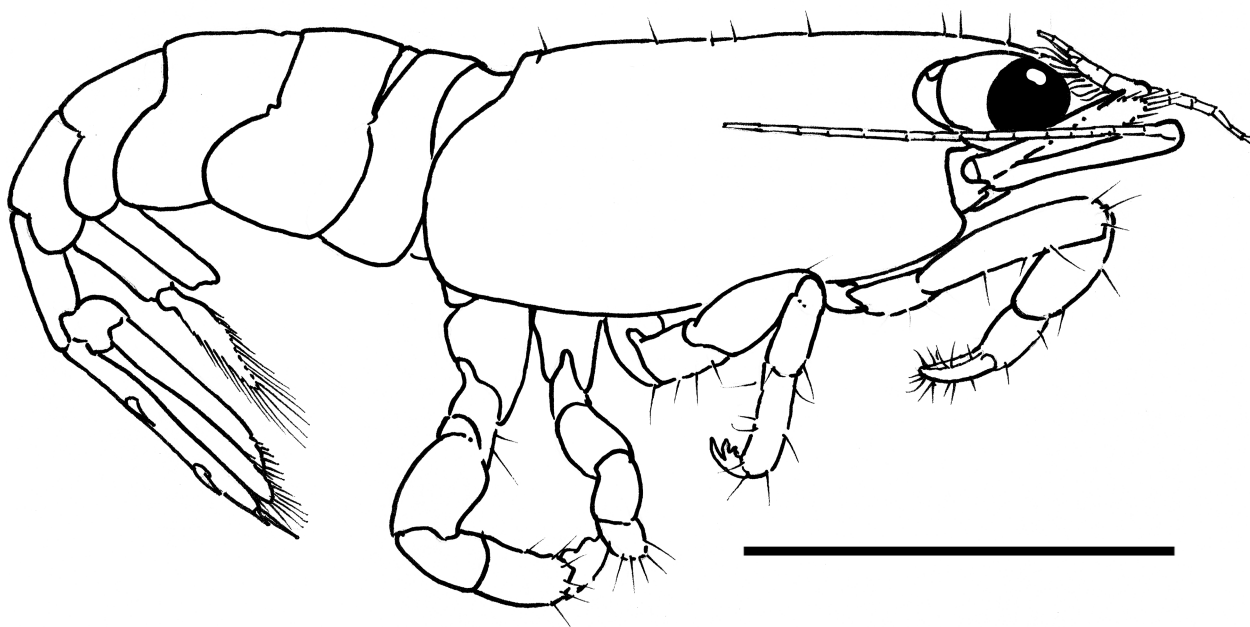
#### *Odontonia kerangcaris* sp. nov.

(Figs. 1–8)

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**Material examined.** Holotype male, pocl. 2.1mm, MZB 5341, stn BER.39, Indonesia, NE Kalimantan, Berau Islands, Baliktaba reef, SW-side (N of Panjang Isl.), 02°34'43.3"N 118°00'48.2"E, 24.x.2003, depth 33m, SCUBA diving, in *Chama lazarus* Linnaeus, 1758, collected by C.H.J.M. Fransen.

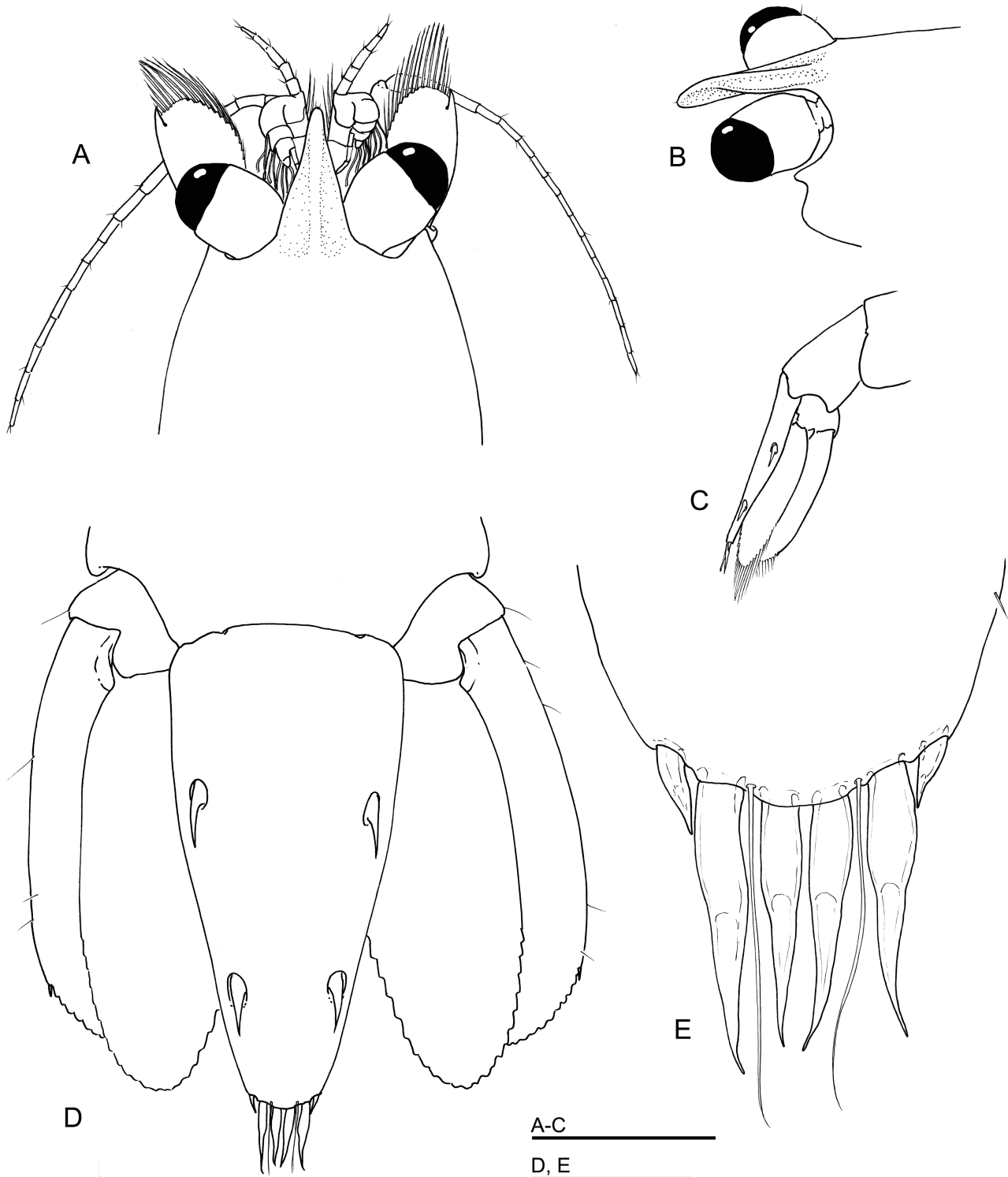
**Diagnosis.** Rostrum short, not overreaching antennular peduncle, without ventral tooth. Pterygostomial angle broadly rounded, slightly produced. Basal segment of antennular peduncle with strong, acute medioventral tooth, with distolateral tooth reaching distal margin of intermediate segment. Carpocerite just falling short of distal margin of lamina of scaphocerite; distolateral tooth of scaphocerite robust, 0.15 times length of lamina (incl. distolateral tooth), almost twice as long as distal lamina; incision between distolateral tooth and lamina rather deep. Dactylus of ambulatory pereopods with acute distoventral accessory tooth, perpendicular to flexor margin; ventral margin of corpus with one rounded protuberance at 2/3rd and one rounded protuberance proximally, without denticles in between; unguis strongly curved, 0.5 times corpus length, with large scales distally on outer margin, gradually decreasing in size proximally. Telson with two pairs of submarginal dorsal spines at 0.3 and 0.7 of telson length; distal and proximal pair of spines of equal length, 0.14 times telson length.



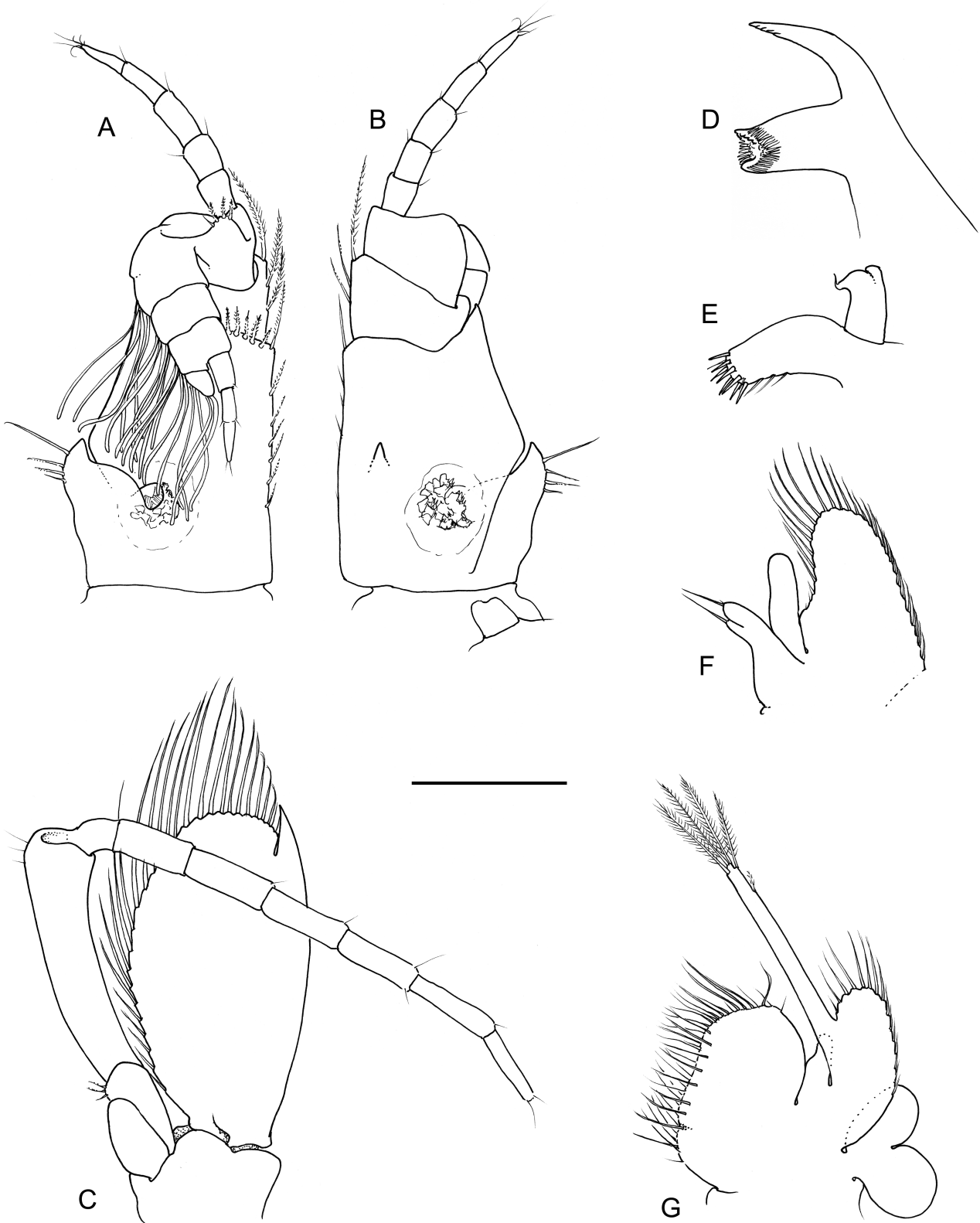
**FIGURE 1.** *Odontonia kerangcaris* sp. nov., holotype male, pocl. 2.1mm, MZB 5341, habitus, lateral view (second pereopods detached, not drawn). Scale bar: = 2mm.

**Description.** Body (Fig. 1) subcylindrical, somewhat depressed. Carapace (Fig. 1) glabrous with a few

scattered simple setae. Rostrum (Fig. 2A, B) well developed, without dorsal teeth, reaching half of distal segment of antennular peduncle, with broad, indistinct, shallow dorsal elevation over entire length and acute lateral carinae, with slightly concave ventral carina in distal part; distal end rounded in lateral view, without subdistal ventral tooth, with few distal setae, blunt in dorsal view, broadened at base. Inferior orbital angle (Fig. 2B) produced, directed inward. Antennal spine (Fig. 2B) blunt, protruding rounded process, not separated by notch from inferior orbital angle. Anterolateral margin straight, pterygostomial angle slightly produced, rounded.



**FIGURE 2.** *Odontonia kerangcaris* sp. nov., holotype male, pochl. 2.1mm, MZB 5341. A, anterior carapace and appendages, dorsal view; B, anterior part of carapace, rostrum and eyes, dorsolateral view; C, tail-fan and sixth abdominal segment, lateral view; D, telson and uropods, dorsal view; E, distal part of telson, dorsal view. Scale bars: A–C = 1mm; D = 0.5mm; E = 0.125mm.



**FIGURE 3.** *Odontonia kerangcaris* **sp. nov.**, holotype male, pochl. 2.1mm, MZB 5341. A, left antennula, dorsal view; B, idem, ventral view; C, left antenna, ventral view; D, left mandible; E, left maxillula (lower lacinia missing); F, left maxilla (proximal part of scaphognathite missing); G, left first maxilliped. Scale bar: = 0.5mm.

Abdomen (Fig. 1) smooth; sixth segment 1.3 times longer than fifth, 1.3 times broader than long, posteroventral angle rounded, posterolateral angle feebly produced, blunt; pleura of first five segments broadly rounded.

Telson (Fig. 2C, D) almost twice as long as sixth abdominal segment, about twice as long as proximal width;

lateral margins slightly convex, almost straight, convergent posteriorly; posterior border without median process; two pairs of submarginal dorsal spines at 0.3 and 0.7 of telson length; distal and proximal pair of spines of equal length, 0.14 times telson length; posterior margin (Fig. 2E) with three pairs of spines, lateral spines small, marginal, about 1/3 of length of intermediate spines; submedian spines slightly shorter than intermediate spines; both intermediate and submedian spines about as long as dorsal spines, but more slender.

Eyestalk (Fig. 2A, B) short, about as long as broad, broader than diameter of hemispherical cornea.

Antennula (Fig. 3A, B) with peduncle and flagella short. Basal segment 1.4 times as long as proximal width, with acute produced distolateral tooth reaching distal margin of intermediate segment, anterior margin oblique; ventromedial tooth large, acute, at midlength of basal segment, submarginal; stylocerite short, reaching halfway basal segment, tip acute, distolateral margin with 4 short plumose setae; statocyst with statolith present in proximal part. Intermediate segment short, slightly broader than long; distal segment broader than long. Upper flagellum short, biramous, with 3 segments fused; short free ramus one-segmented; longer free ramus 3-segmented. Lower flagellum with 5 segments.

Antenna (Fig. 3C) with basicerite short, laterally unarmed, with large rounded antennal gland tubercle medially; ischiocerite and merocerite normal; carpocerite just falling short of distal margin of lamina of scaphocerite, slender, 3.7 times longer than distal width; flagellum about as long as post-orbital carapace length; scaphocerite with lamina twice as long as wide, anterior margin rounded, lateral margin broadly convex; distolateral tooth robust, 0.15 times length of lamina (incl. distolateral tooth), almost twice as long as distal lamina length, somewhat curved inward; incision between distolateral tooth and lamina rather deep.

Epistome with blunt anterior median carina; labrum normal, oval.

Paragnaths well developed, alae with broad transverse more or less rectangular distal lobes, and small rounded more or less triangular ventromesial lobes; corpus very short, with shallow median excavation, bordered laterally by non-setose, oblique, carinae.

Second thoracic sternite with shallow indistinct rounded median elevation, without setae.

Third thoracic sternite unarmed.

Fourth thoracic sternite with low, medially notched, triangular plate formed by the fused lateral carinae.

Fifth thoracic sternite with well-developed lateral plates with shallow central slit posteromedial to second pereopod coxae; coxae almost against each other.

Sixth to eighth thoracic sternites unarmed, broadening posteriorly.

Mandible (Fig. 3D) with incisor process with 5 acute distal teeth, small denticles along medioventral margin absent; molar process robust with several blunt teeth, some fringed with setal brushes.

Maxillula (Fig. 3E) with upper and lower lacinia rather small; distal lacinia rectangular with two rows of about 8 stout distal spines, almost devoid of setae; lower lacinia slender, triangular, with few short serrulate setae in distal part; palp feebly bilobed, large lobe with small ventral tubercle with single short recurved seta.

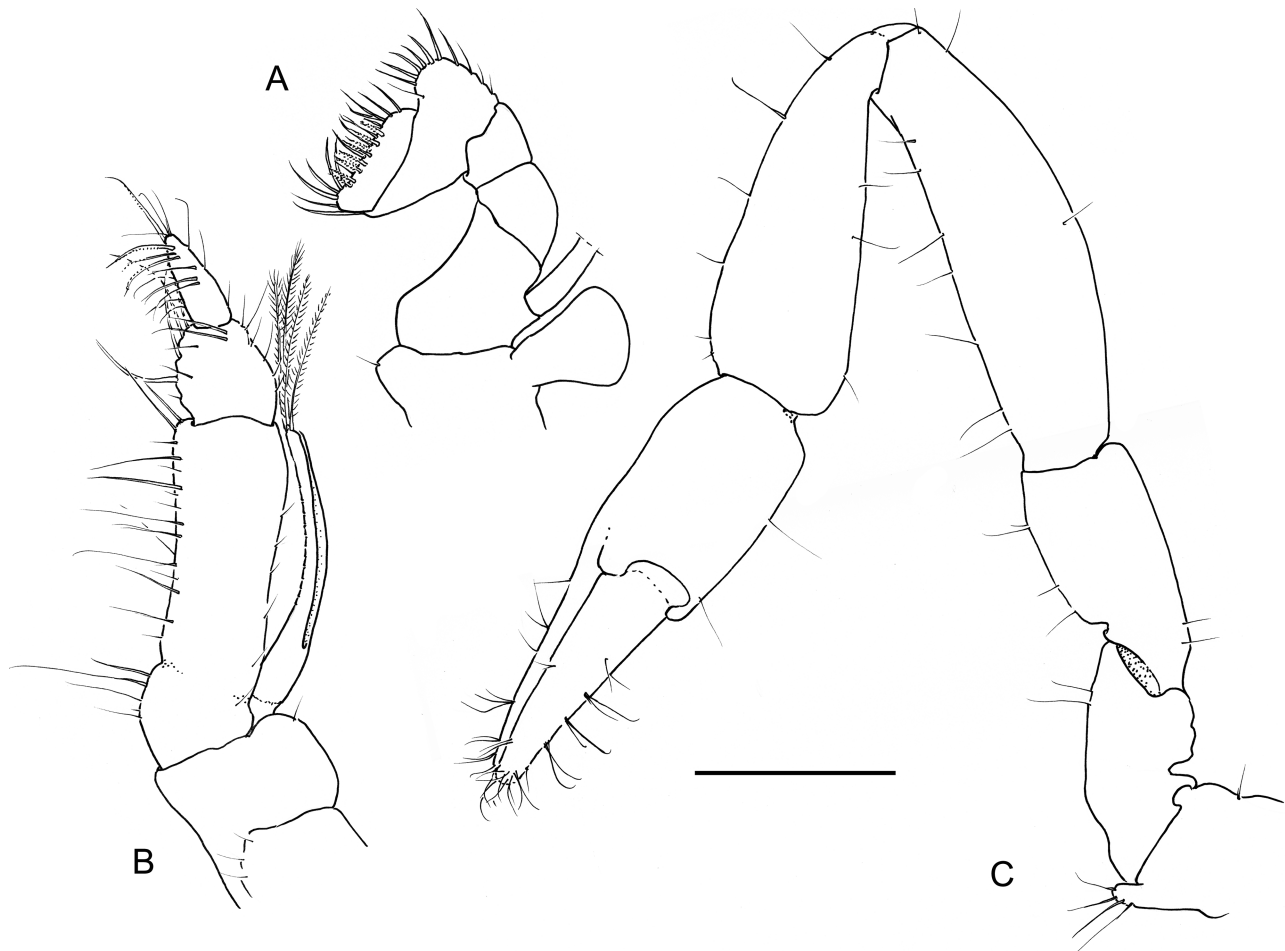
Maxilla (Fig. 3F) with basal endite well developed, with distal lobe and proximal lobe distinct, each with one long, simple distal seta; coxal endite obsolete, medial margin convex, non-setose; scaphognathite of moderate size; palp simple, longer than basal endite, blunt distally, non-setose.

First maxilliped (Fig. 3G) with coxal and basal endite partly fused, broad; basal endite fringed with scattered, rather short simple and finely serrulate setae along medial and distal margins; coxal endite convex, indistinctly separated from basal endite, with few simple setae medially; exopod well developed, flagellum with 4 long plumose setae distally; caridean lobe rather small, narrow; epipod bilobed; palp simple, rather short, non-setose.

Second maxilliped (Fig. 4A) with endopod short, stout; dactylar segment 3.0 times broader than long, fringed with short, coarsely serrulate, spiniform, and longer curled, finely serrulate setae medially; propodal segment with row of robust spines and few simple setae along expanded distomedial margin; one seta in distal part of ventrolateral margin; carpal segment short, broader than long, unarmed; meral segment without setae; ischial and basal segment completely fused, medially somewhat excavate, without setae, basal part strongly convex medially; exopod long, with 4 long plumose setae distally; coxal segment medially slightly produced, with few short simple setae, with expanded epipod laterally.

Third maxilliped (Fig. 4B) short; with ischiomerus partly fused to basis, not broadened, 2.3 times as long as broad, not tapered distally, somewhat flattened, with row of long simple setae along medial margin, lateral margin with few simple setae; basal segment medially convex with few long simple setae on medial margin; exopod well developed, reaching distal margin of ischiomerus, with 4 long plumose setae in distal part; coxal segment without

medial process, with large lateral plate with one short simple seta laterally; without arthrobranch; ultimate and penultimate segments of equal length; penultimate segment as long as broad, somewhat flattened, with few long finely serrulate setae ventromedially; ultimate segment more slender, with groups of long coarsely serrulate setae ventromedially and distally.



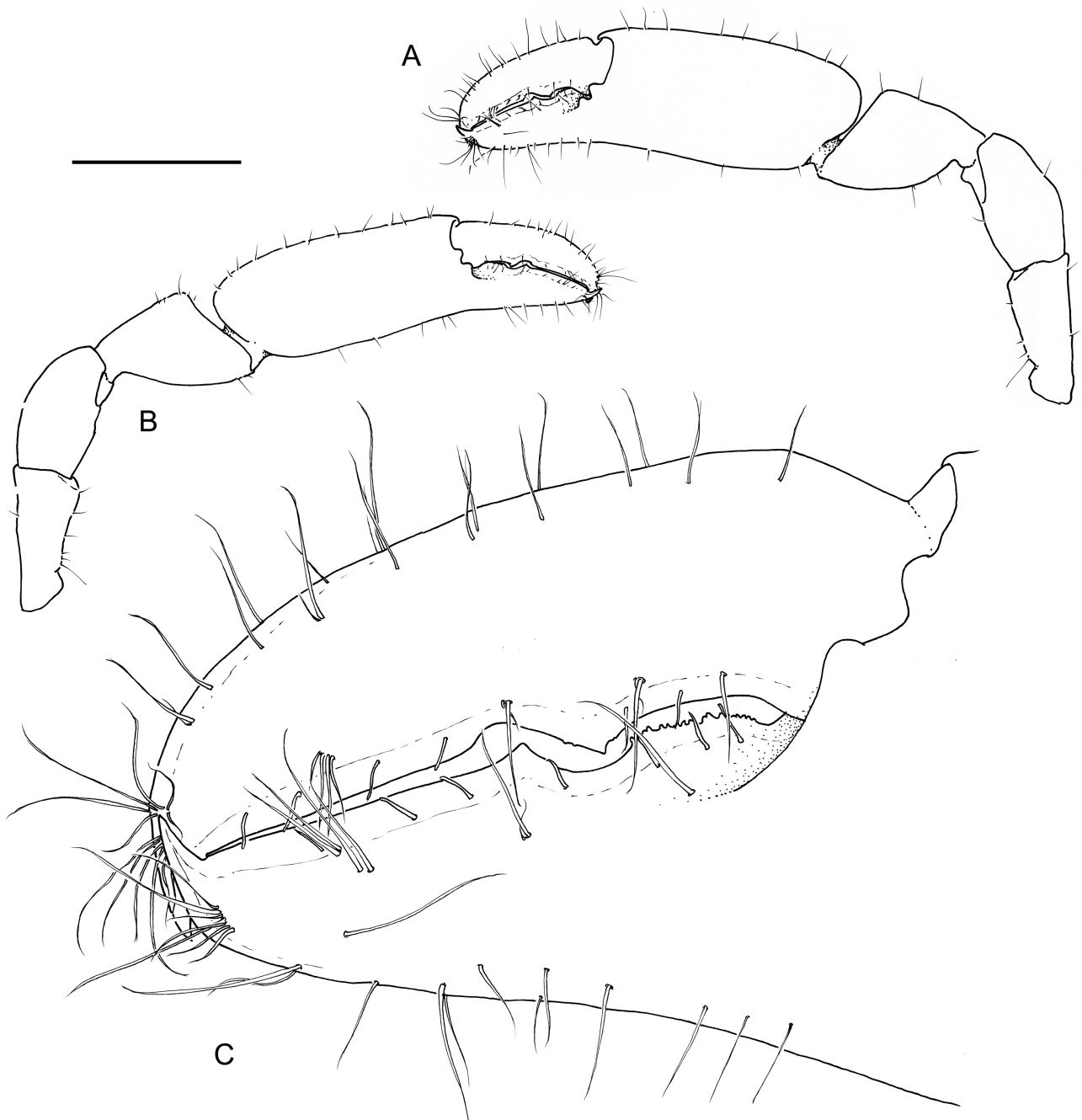
**FIGURE 4.** *Odontonia kerangcaris* sp. nov., holotype male, pochl. 2.1mm, MZB 5341. A, left second maxilliped; B, left third maxilliped; C, left first pereiopod. Scale bar: = 0.5mm.

First pereiopod (Fig. 4C) stout, exceeding carpocerite with chela and half of carpus; chela 3.0 times longer than deep, slightly compressed; fingers as long as palm, cutting edges entire, with groups of serrulate setae, tips slightly hooked; cleaning organ absent; carpus 0.8 times length of chela, 2.4 times longer than distal width, tapering proximally, unarmed; merus as long as chela, 3.3 times longer than central width, somewhat curved, with few setae medially; ischium 0.5 times merus length, slightly expanded medially, with few setae medially; basis as long as ischium, with few setae medially; coxa with small ventral lobe with few short simple setae.

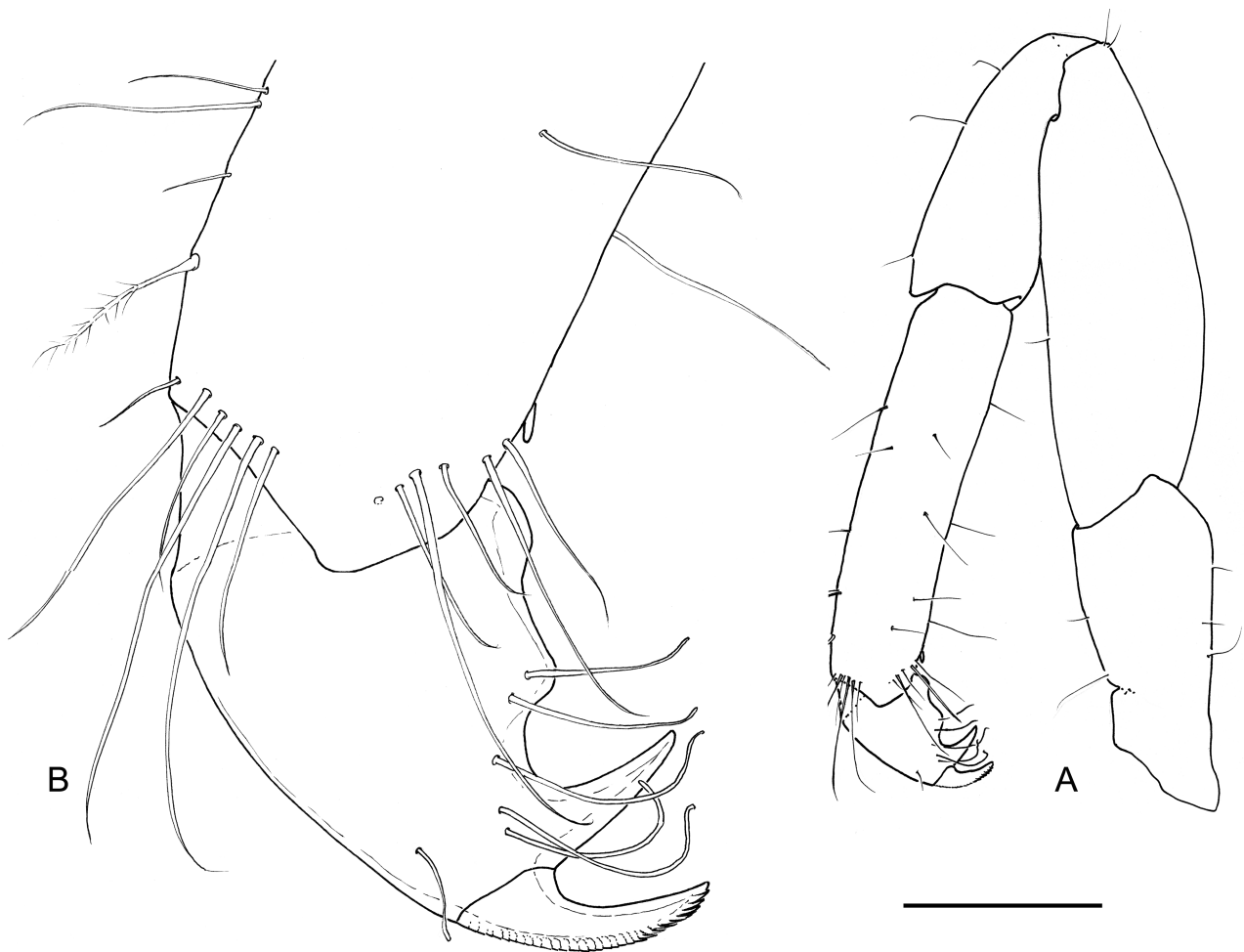
Second pereiopods (Fig. 5A, B) subequal, similar. Major right chela (Fig. 5C) with palm slightly compressed, without carinae, with few scattered simple setae; fingers with simple setae; dactylus 0.6 of palm length, 3.2 times longer than deep, with one large triangular tooth at 1/3 of cutting edge, distal part of cutting edge entire, straight, tip strongly hooked; fixed finger 2.1 times as long as deep, with broad flattened tooth with row of small denticles in proximal part, separated by shallow notch from triangular acute tooth at midpoint of cutting edge, distal part of cutting edge entire, straight, tip strongly hooked; carpus 0.55 of palm length, 1.5 times longer than distal width, strongly tapering proximally; merus as long as carpus, 1.8 times longer than central width, distomedially excavate; ischium as long as merus, somewhat tapering proximally, with slightly protruded distomedial angle; basis and coxa without special features. Minor cheliped (Fig. 5B) similar, dactylus slightly longer in relation to palm than in major chela.

Ambulatory pereiopods (Figs. 6, 7) short, stout. Dactylus of third pereiopod (Fig. 6A, B) with corpus moderately compressed, about 1.2 times longer than proximal width, with single row of few simple setae along ventral margin

and in distal part, distoventral accessory tooth acute, perpendicular to flexor margin, ventral margin with one rounded protuberance at 2/3rd of ventral margin and one rounded protuberance proximally, without denticles in between; unguis strongly curved, about 0.5 of corpus length, distally with large dorsal scales, gradually decreasing in size proximally; propodus 2.8 times dactylus length, 4.7 times longer than proximal width, with one short, blunt, spine in distal part of flexor margin, with few long slender simple setae; carpus 0.64 of propodus length, 2.25 times longer than distal width, slightly tapering proximally, with indistinct distal lobe, unarmed; merus about as long as propodus, slightly swollen, about 2.8 times longer than central width, cylindrical; ischium 0.66 of merus length, 2.2 times longer than distal width; basis and coxa without special features. Fourth and fifth (Fig. 7A, B) pereopods similar.



**FIGURE 5.** *Odontonia kerangcaris* sp. nov., holotype male, pochl. 2.1mm, MZB 5341. A, right major second pereopod, dorsomedial view; B, left minor second pereopod, dorsomedial view; C, fingers of right major second chela, medial view. Scale bar: A, B = 1.25mm; C = 0.125mm.



**FIGURE 6.** *Odontonia kerangcaris* sp. nov., holotype male, pochl. 2.1mm, MZB 5341. A, left third pereopod, lateral view; B, idem, distal part propodus and dactylus. Scale bar: A = 0.5mm; B = 0.125mm.

Male first pleopod (Fig. 8A) with endopod 0.4 times as long as exopod, with 2 long distal setae, with row of 5 small simple setae on lateral margin.

Male second pleopod (Fig. 8B, C) with endopod slightly shorter than exopod, with appendix masculina, equal to about half length of appendix interna, reaching halfway endopod, with 3 very long setulose setae distally.

Uropods (Figs. 2D, 8D) normal, with short unarmed protopodite; exopod broad, 2.0 times longer than central width, lateral margin strongly convex, without distolateral tooth, with minute spinule distolaterally; endopod slightly exceeding exopod, reaching posterior margin of telson, 2.4 times longer than wide.

**Size.** This is a small sized species, pochl. is 2.1 mm.

**Coloration.** Not known.

**Host.** Mollusca, Bivalvia, Chamidae, *Chama lazarus* Linnaeus, 1758.

**Distribution.** Only known from the type locality: Berau Island, NE Kalimantan, Indonesia.

**Etymology.** From the Indonesian word ‘kerang’, which translates to “bivalve”, combined with the Latin ‘caris’ referring to shrimp.

**Remarks.** The species falls within the genus definition for *Odontonia* provided by Fransen (2002) and modified by De Gier & Fransen (2018). The new species has the accessory tooth on the dactyli of the ambulatory pereopods similar to the ones found in *O. rufopunctata*, *O. bagginsi*, *O. sibogae*, *O. compacta*, and *O. katoi*. It differs from these species in the absence of a forward directed proximal tooth on the flexor margin of the corpus of the ambulatory dactyli. It also lacks the small denticles posterior to the distoventral accessory tooth on the dactylar corpus.

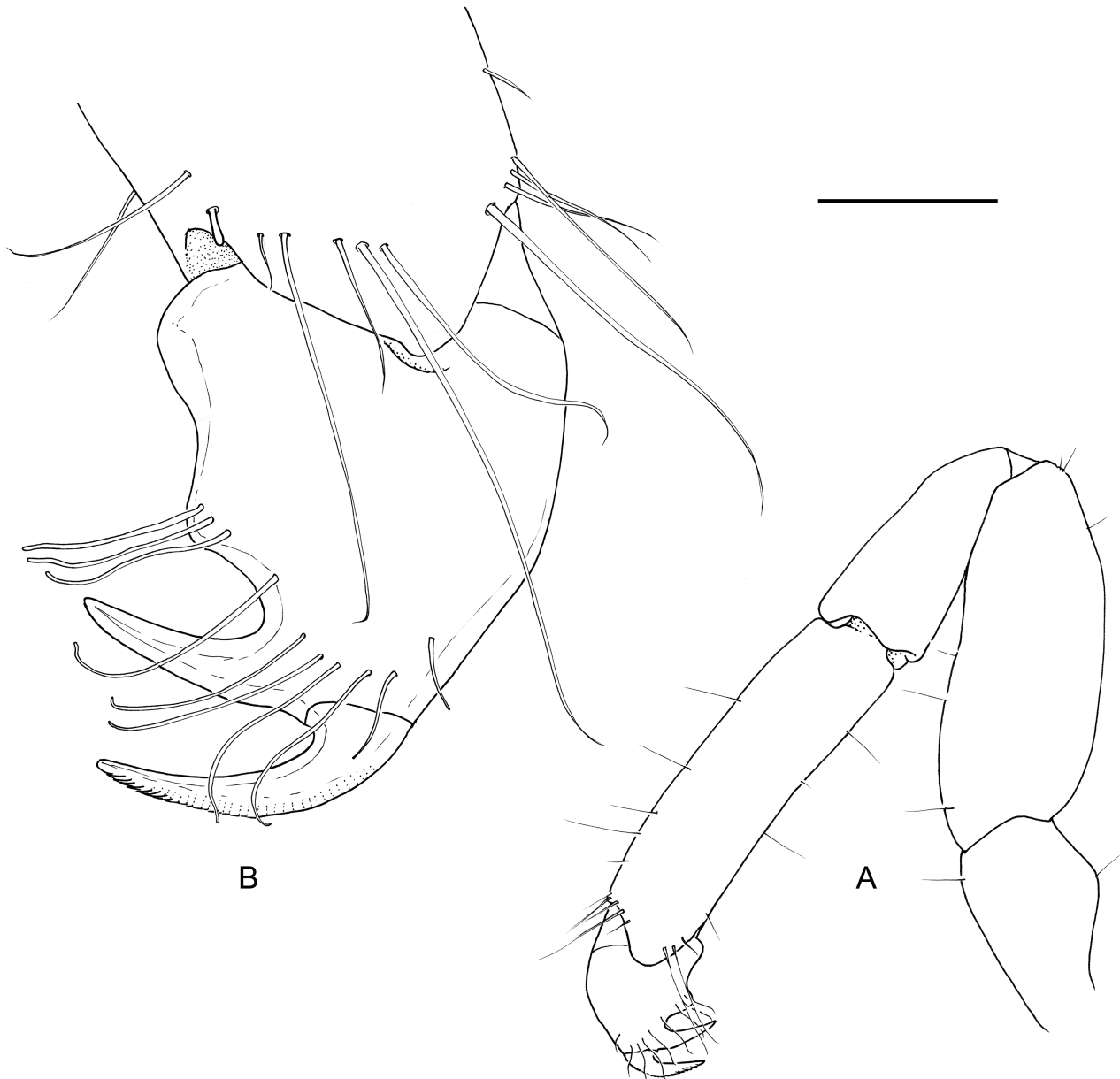
Species of *Odontonia* are known as endosymbionts of solitary ascidians (De Gier & Fransen 2018). *Odontonia kerangcaris* sp. nov. is the first species within the genus recorded from a bivalve mollusk. The species has affinities with species of the closely related bivalve mollusk dwelling genus *Conchodytes* Peters, 1852 (Horká *et al.* 2016;



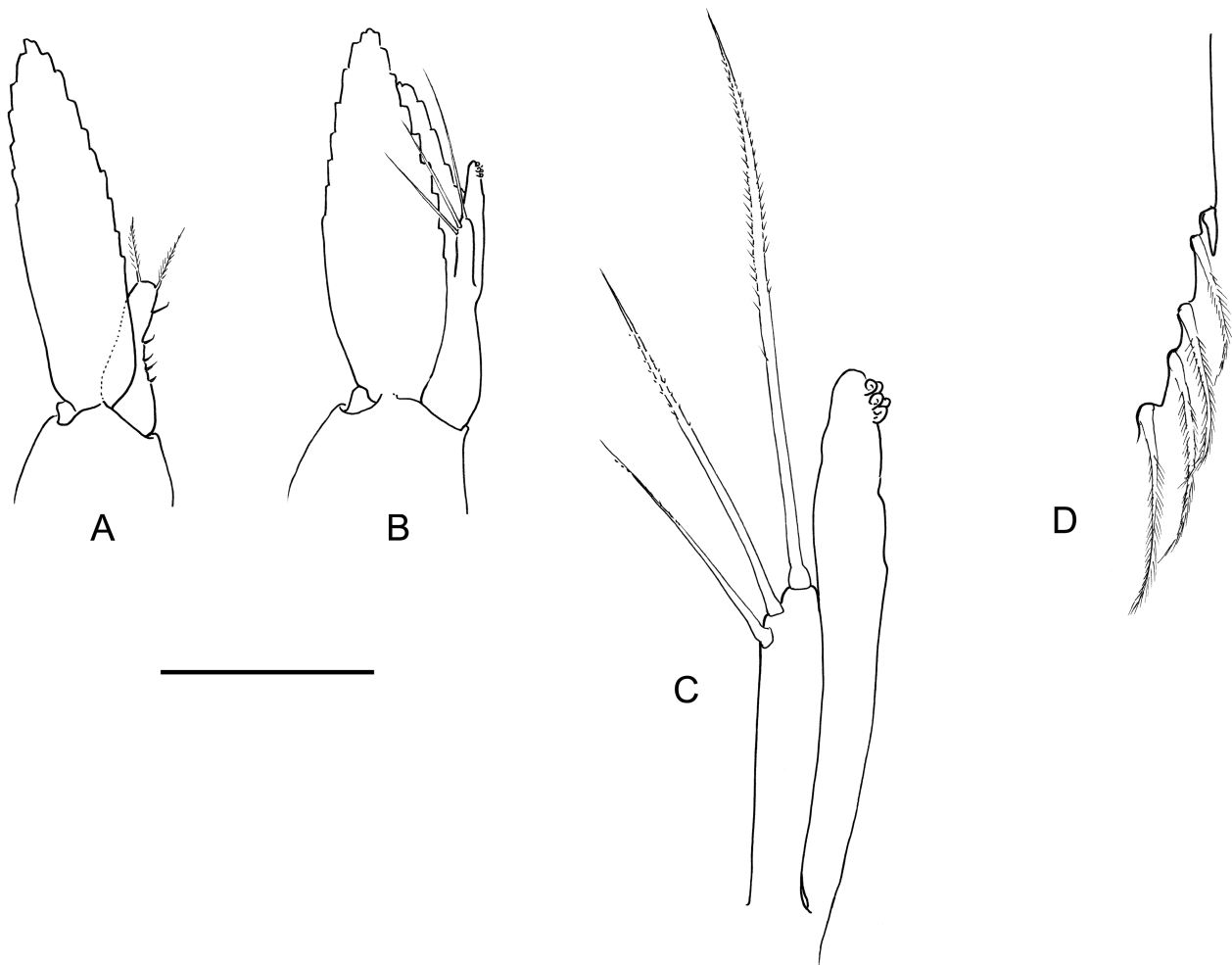
Chow *et al.* 2021). The accessory tooth and protuberances on the flexor margin of the ambulatory pereopods resemble almost all *Conchodytes* species except for *C. chadi* (Marin, 2011) and *C. monodactylus* (Holthuis, 1952).

Other palaemonid endosymbionts known from chamid bivalves are *Pontonia pilosa* Fransen, 2002 and *Bruceonia ardeae* (Bruce, 1981). The East Atlantic *P. pilosa* has been recorded as an endosymbiont of *Pseudochama cristella* (Lamarck, 1819). *B. ardeae* has been recorded from the Great Barrier Reef, Australia, as an endosymbiont of *Chama pacifica* Broderip, 1835. Both *P. pilosa* and *B. ardeae* have the furry appearance shared with another palaemonid endosymbiont of bivalves: *Pinnotherotonia rumphiusi* Marin & Paulay, 2010, hosted by the venerid bivalve *Periglypta crispata* (Deshayes, 1854). A dense setal coverage has also been noted for several pinnotherine crabs infesting bivalves (De Gier & Becker 2020).

The phylogenetic position of the new species seems to be at the base of the *Odontonia* clade and as sister of the *Conchodytes* clade (De Gier, Groenhof & Fransen, in prep.), revealing intrageneric host switching.



**FIGURE 7.** *Odontonia kerangcaris* **sp. nov.**, holotype male, pochl. 2.1mm, MZB 5341. A, left fifth pereopod, lateral view; B, idem, distal part propodus and dactylus, medial view. Scale bar: A = 0.5mm; B = 0.125mm.



**FIGURE 8.** *Odontonia kerangcaris* **sp. nov.**, holotype male, pochl. 2.1mm, MZB 5341. A, left first pleopod; B, left second pleopod; C, idem, appendix masculina and appendix interna; D, right exopod of uropod, distolateral part. Scale bars: A, B = 0.5mm; C, D = 0.125mm.

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