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A Review of the Parasitic Isopod Genus *Epicepon* Nierstrasz & Brender à Brandis, 1931 (Crustacea: Isopoda: Epicaridea), Parasites of Cyclodorippoid Crabs (Crustacea: Decapoda: Brachyura), with Description of a New Species from New Caledonia

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A new species of the parasitic isopod genus *Epicepon* Nierstrasz & Brender à Brandis, 1931 (Isopoda: Bopyridae) found parasitizing the cyclodorippoid crab host *Tymolus hirtipes* Tan & Huang, 2000 is described from New Caledonia. Females of *Epicepon belema* n. sp. can be distinguished from those of the other two species in the genus in length to width ratio, pleopodal endopod morphology, and structure of the barbula. We review the two previously described species of *Epicepon* from *Tymolus* Stimpson, 1858 hosts based on type specimens of *E. indicum* Nierstrasz & Brender à Brandis, 1931 from Indonesia and type specimens plus new material of *E. japonicum* Nierstrasz & Brender à Brandis, 1931 from Japan. New details previously omitted from the original descriptions and a key to species of *Epicepon* based on female and male specimens are provided.

Key words: Bopyridae, Indonesia, Japan, Podotremata, *Tymolus*.

BACKGROUND

Although bopyrid isopods are known from a wide variety of brachyuran species and these ectoparasites can cause conspicuous swellings of the branchial chamber (see Shields et al. 2015), few have been reported parasitizing hosts in Podotremata, a relatively small group of “primitive” crabs. To date, only four species of branchial parasitic bopyrids have been described from two superfamilies of podotreme hosts: two species of *Epicepon* Nierstrasz & Brender à Brandis, 1931 on hosts in Cyclodorippoidea Ortmann, 1892 (Nierstrasz & Brender à Brandis, 1931) and two species of *Gigantione*

Kossmann, 1881 on hosts in Dromioidea De Haan, 1833 (Markham, 1999), although an additional undescribed but apparently distinct species of *Gigantione* is also known (McLay, 1999). No recent species in the three remaining superfamilies (Homolodromioidea Alcock, 1899, Homoloidea De Haan, 1839 and Raninoidea De Haan, 1839) are known to bear any bopyrids.

The fossil record contains bopyridiform swellings (*Kanthylooma crusta* Klompmaker et al. 2014) from 27 additional host species in Dromioidea as well as from three species in Homolodromioidea, one host in the fossil superfamily Glaessneropsoidea Patrulius, 1960, one host in Homoloidea, and nine host species

in Raninoidea (Klomp maker et al. 2014). There are reports of bopyridiform swellings from two species of host crabs in the fossil taxon Torynommatidae Glaessner, 1980, sometimes also given as Torynommatidae (Feldmann 1993; Feldmann et al. 1993; Schwietzer and Feldmann 2011); this family has been variously placed in Cyclodorippoidea (Feldmann 1993), Tymoloidea Alcock, 1896 (= Cyclodorippoidea) (Feldmann et al. 1993) and Homolodromioidea (Schwietzer and Feldmann, 2011) but is now in its own *incertae sedis* superfamily within Podotremata as Torynommoidea Glaessner, 1980 (Jagt et al. 2015). One host in the fossil superfamily Etyoidea Guinot & Tavares, 2001 is also known to bear branchial swellings; this superfamily is also *incertae sedis* within Podotremata (Jagt et al. 2015).

In the present paper, we review the two previously described species of *Epicepon* from *Tymolus* Stimpson, 1858 hosts collected from Japan (including observations based on new material) and Indonesia. Details omitted from the original descriptions are added based on examination of type specimens. Additionally, we describe a new species of *Epicepon* parasitizing a different species of *Tymolus* host collected from New Caledonia. Keys to species of *Epicepon*, for both females and males, are provided.

MATERIALS AND METHODS

Line drawings were made by sketching specimens with dissecting (Olympus SZX) or compound (Olympus CX31) microscopes with drawing tube attachments. Sketches were scanned and traced in Adobe Illustrator to produce final figures. Scans of the original drawings of *Epicepon indicum* Nierstrasz & Brender à Brandis, 1931 and *Epicepon japonicum* Nierstrasz & Brender à Brandis, 1931 were optimized and cleaned of stray marks in Adobe Photoshop prior to including in final figures. All female isopod total length (TL) measurements include uropods; measurements were made using ImageJ software based on slide micrometers associated with the original sketches. Specimens were borrowed from the Zoological Museum, University of Copenhagen, Denmark (ZMUC) and the Zoological Reference Collection of the Lee Kong Chian Natural History Museum (formerly the Raffles Museum of Biodiversity Research) (ZRC).

RESULTS

TAXONOMY

Isopoda Latreille, 1817
Epicaridea Latreille, 1825
Bopyroidea Rafinesque, 1815
Family Bopyridae Rafinesque, 1815
Subfamily Keponinae Boyko, Moss, Williams & Shields, 2013

Genus *Epicepon* Nierstrasz & Brender à Brandis, 1931

Type species: Epicepon japonicum Nierstrasz & Brender à Brandis, 1931 by present designation.

Diagnosis: Female. Pereomeres without mid-dorsal projections. Pleomeres 1–5 with strongly elongated lateral plates lacking digitation on margins; five pairs of biramous pleopods, endopods much smaller than exopods; uropods well developed, uniramous.

Male: Pereomeres and pleomeres distinctly segmented. Pleon lacking midventral tubercles, pleopods as low rounded swellings on pleomeres 1–5; pleotelson with large distolateral lobes, lacking true uropods.

Remarks: Females of species in *Epicepon* can be distinguished from those of other keponine genera in having oostegite 1 not protruding forward, no mid-dorsal processes on any pereomeres, lacking well-developed digitation on the margins of the lateral plates or pleopods, and small pleopodal endopods and large exopods (Nierstrasz and Brender à Brandis 1931). Nierstrasz and Brender à Brandis (1931) did not designate a type species for *Epicepon*; we select *E. japonicum* as the type species herein.

***Epicepon japonicum* Nierstrasz & Brender à Brandis, 1931**

(Fig. 1)

Epicepon japonicum Nierstrasz & Brender à Brandis, 1931: 188–189, figs. 71–73; Dollfus et al. 1933: 76 [list]; Shiino, 1936: 168–170, fig. 3; Danforth, 1963: 8 [list].
 ? "a bopyrid" — Takeda et al. 2005: 108.

Material examined: Mature female syntype (5.0 mm TL), mature male syntype (2.2 mm TL) parasitizing *Tymolus* sp. (see Remarks), Misaki, Osaka, Japan, 21.9–146.3 m, coll. T. Mortensen, 10 Jun 1914 (ZMUC CR-6930). Ovigerous female (7.2 mm TL), mature male (1.8 mm TL), parasitizing right branchial chamber of male *Tymolus uncifer* (Ortmann, 1892) (11.6 mm CL × 13.4 mm CW), Shizuoka, Suruga Bay, Japan, from aquarium trade, imported into Singapore, obtained by P. Y. C. Ng, 2016 (ZRC 2016.0452).

Redescription: Female (Fig. 1A–I) length 5.0 mm; maximum width (across pereomere 3) 3.0 mm; head length 0.8 mm; head width 1.4 mm; pleon length

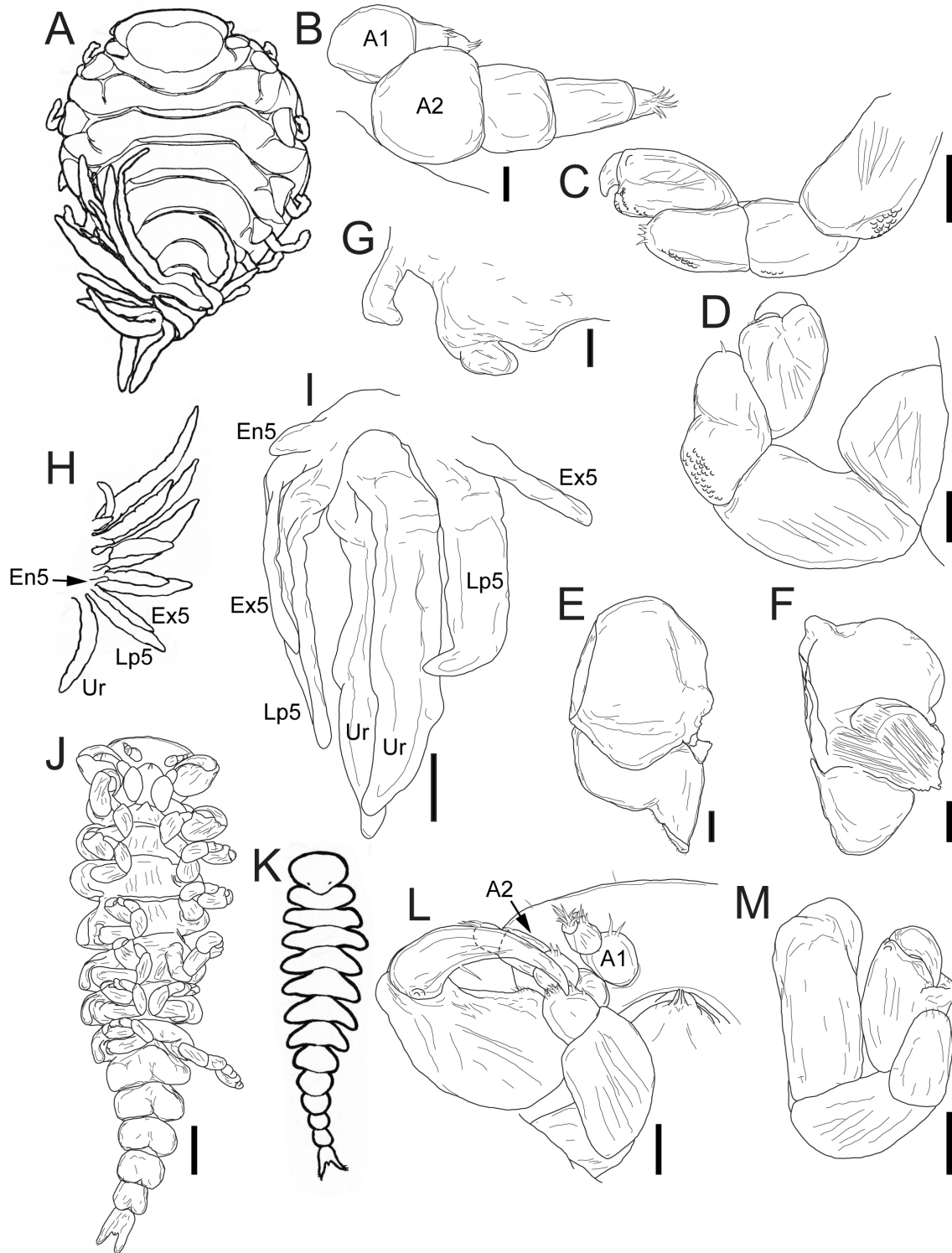


Fig. 1. *Epicepon japonicum* Nierstrasz and Brender à Brandis, 1931, female syntype, ZMUC CR-6930 (A–H), ZRC 2016.0452 (I), and male syntype, ZMUC CR-6930 (J–M). A, dorsal view. B, left antennule (A1) and antenna (A2). C, left pereopod 1. D, right pereopod 7. E, left oostegite 1, internal view. F, left maxilliped, external view. G, right side of barbula. H, left side of pleon, ventral view showing uropods (Ur), fifth lateral plates (Lp5), exopod (Ex5) and endopod (En5). I, pleon, ventral view showing uropods (Ur), fifth lateral plates (Lp5), exopods (Ex5) and endopod (En5). J, ventral view. K, dorsal view. L, right antennule (A1), antenna (A2; partially obscured), pereopod 1 and mouthparts. M, right pereopod 7. Scale bars: B = 25 μ m, C, D, L, M = 50 μ m, E, F = 20 μ m, G = 10 μ m, I = 250 μ m, J = 200 μ m. A, H, K, from Nierstrasz and Brender à Brandis (1931); not to scale

1.8 mm. Body slightly dextral; all segments of body distinct (Fig. 1A).

Head ovate, wider than long, frontal margin slightly bilobate. Frontal lamina large and extending beyond sides and frontal margin of head (Fig. 1A). Eyes lacking. Antennules and antennae with three and four articles each, respectively, distalmost two articles of antennule and distalmost article of antenna terminally setose (Fig. 1B). Barbula with two slender short, distally rounded lateral projections on each side, outer projections longer and thinner than inner ones, middle region smooth with lateral low lobe near inner projection (Fig. 1G). Maxilliped with prominent anterior segment, palp as low non-articulated projection lacking setae, plectron triangular, short and thin (Fig. 1F).

Pereon broadest across pereomere 3. Irregularly shaped tergal projections prominent on both sides of pereomeres 1–4 and right pereomere 5, dorsolateral bosses on both sides of pereomeres 1–5 (crescent-shaped on pereomeres 1–3, triangular on pereomeres 4–5), thin coxal plates on both sides of pereomeres 1–3 and right pereomere 4 (Fig. 1A). No mid-dorsal projections on any pereomeres. Oostegites enclosing brood pouch, oostegite 1 (Fig. 1E) with ovate anterior article, longer than posterior article, internal ridge smooth, posterior article rounded distally, triangular proximally. Pereopods subequal in structure, first four shorter than others (Fig. 1A). All pereopods with short, blunt dactyli, cylindrical propodi, carpi and meri fused in posterior pereopods (Fig. 1C, D).

Pleon with six segments, first five pleomeres each bearing five pairs of biramous pleopods and longer uniramous lateral plates, all margins with slight undulation but not digitate, surfaces smooth (Fig. 1A, H). Stub-like endopods of pleopods no more than 1/4 length of slender, distally tapering exopods (Fig. 1H, I); exopods greater than 1/2 length of lateral plates (Fig. 1H, I). Terminal pleomere ending in uniramous uropods, similar to but slightly longer than fifth pleopodal exopods, surfaces smooth, margins with slight undulation but not digitate (Fig. 1A, H, I).

Male (Fig. 1J–M) length 2.2 mm; maximum width (across pereomere 3) 0.6 mm; head length 0.25 mm; head width 0.4 mm. All body regions and segments distinct (Fig. 1K).

Head broadly rounded distally, extending posteriorly to rounded point overlapping approximately 1/3 length of pereomere 1, distinctly separated from first pereomere (Fig. 1K). Thin, slit-like dark eyes near posterolateral margin of head. Antennules and antennae not visible beyond margins of head in dorsal view, of three and four articles, respectively; both bearing setae on all articles (Fig. 1L).

Pereomeres 3 and 4 subequal in width, other

pereomeres only slightly narrower (Fig. 1J, K). All pereomeres tapered laterally, lacking mid-ventral tubercles. First pereopod larger than second, both larger than other five (Fig. 1J); all carpi with setae on distoventral ventral surface. Dactyli of pereopods 1 and 2 elongate, overreaching distal margins of carpi (Fig. 1J, L), dactyli of pereopods 3–7 short, inserted into cup-like indentations at distoventral margin of propodi (Fig. 1J, M).

Pleon with six pleomeres, rounded laterally, each slightly narrower than preceding one (Fig. 1J, K). Mid-ventral tubercles lacking, pleopods as low ventrolateral swellings on pleomeres 1–5. Pleomere 6 without uropods, posterolaterally extended into two slender rami, each as long as rest of pleotelson, both tipped with short setae; minute anal cone present distomedially (Fig. 1J, K).

Range: Known from the Pacific coast of Japan, Suruga Bay to Osaka, 21.9–146.3 m depth.

Remarks: The figure of the female syntype in dorsal view was labeled incorrectly by Nierstrasz & Brender à Brandis (1931: fig. 71): “C II” (Coxalplatten II) is actually the coxal plate on pereomere 1 and “HS III” (Hintere Seitenteile) is actually the tergal projection on pereomere 2. Shiino (1936) reported on a pair of specimens found parasitizing *Tymolus japonicus* Stimpson, 1858 from Shimoda, Japan; the male and female greatly resemble the syntypes but were likewise incompletely described and figured. The identity of the host of Shiino’s (1936) specimens may be incorrect as at that time *T. dromioides* (Ortmann, 1892) (see below) was considered a synonym of *T. japonicus* (Tavares, 1992).

The identity of the type host is uncertain as it was not retained with the parasites, but it is likely *T. dromioides* based on identification of a pair of male specimens collected from the type locality, Misaki, on 30 June 1914 (ZMUC NHMD-226207). The identity of the bopyrid reported by Takeda et al. (2005) on a female *T. uncifer* from west of Amami-Oshima Island (28°33.25'N, 126°58.11'E–28°22.09'N, 126°57.03'E, 334–348 m) is also unknown but is likely *E. japonicum* based on host choice and the known distribution of the parasite. The type specimens likely came from the right branchial chamber of the host, as the female is slightly dextral (dextral females are found in the right branchial chamber, sinistral ones in the left in all known host species; see Markham 1985).

Epicepon indicum Nierstrasz & Brender à Brandis, 1931

(Fig. 2)

Epicepon indicum Nierstrasz & Brender à Brandis, 1931: 189–191,

figs. 74–77; Dollfus et al. 1933: 76 [list].

Material examined: Female syntype (2.8 mm TL), parasitizing *Tymolus* sp., Kei Islands, Indonesia, St. 56, 05°30'S, 132°51'E, 345 m, coll. T. Mortensen, Danish Expedition to the Kei Islands, 10 May 1922 (ZMUC CR-6788).

Redescription: Female (Fig. 2A–H) length 2.8 mm; maximum width (across pereomere 3) 1.3 mm; head length 0.5 mm; head width 0.7 mm; pleon length 1.2 mm. Body linear (no asymmetry); all segments of body distinct (Fig. 2A).

Head ovate, wider than long, frontal margin rounded medially. Frontal lamina relatively thin and extending beyond sides and frontal margin of head (Fig. 2A). Eyes lacking. Antennules and antennae with three and four articles each, respectively, distalmost article of antennule and two distalmost articles of antenna terminally setose (Fig. 2B). Barbula with one

slender, distally rounded lateral projection on each side, middle region smooth with low lateral lobe (Fig. 2E, G). Maxilliped with prominent anterior segment, palp as low non-articulated projection with few distal setae, plectron triangular, short and broad (Fig. 2G).

Pereon broadest across pereomere 3. Irregularly shaped tergal projections prominent on pereomeres 1–5 on right side, 2–4 on left side, ovate dorsolateral bosses on pereomeres 1–5 on right side, 2–3 on left side, thin coxal plates on both sides of pereomeres 1–5 (Fig. 2A). No mid-dorsal projections on any pereomeres. Oostegites enclosing brood pouch, oostegite 1 (Fig. 2F) with ovate anterior article, longer than posterior article, internal ridge smooth, posterior article rounded on lateral margin, extending to triangular point posteriorly. Pereopods subequal in structure, first four shorter than others (Fig. 2A). All pereopods with short, blunt dactyli, cylindrical propodi, carpi and meri fused in posterior pereopods (Fig. 2C, D).

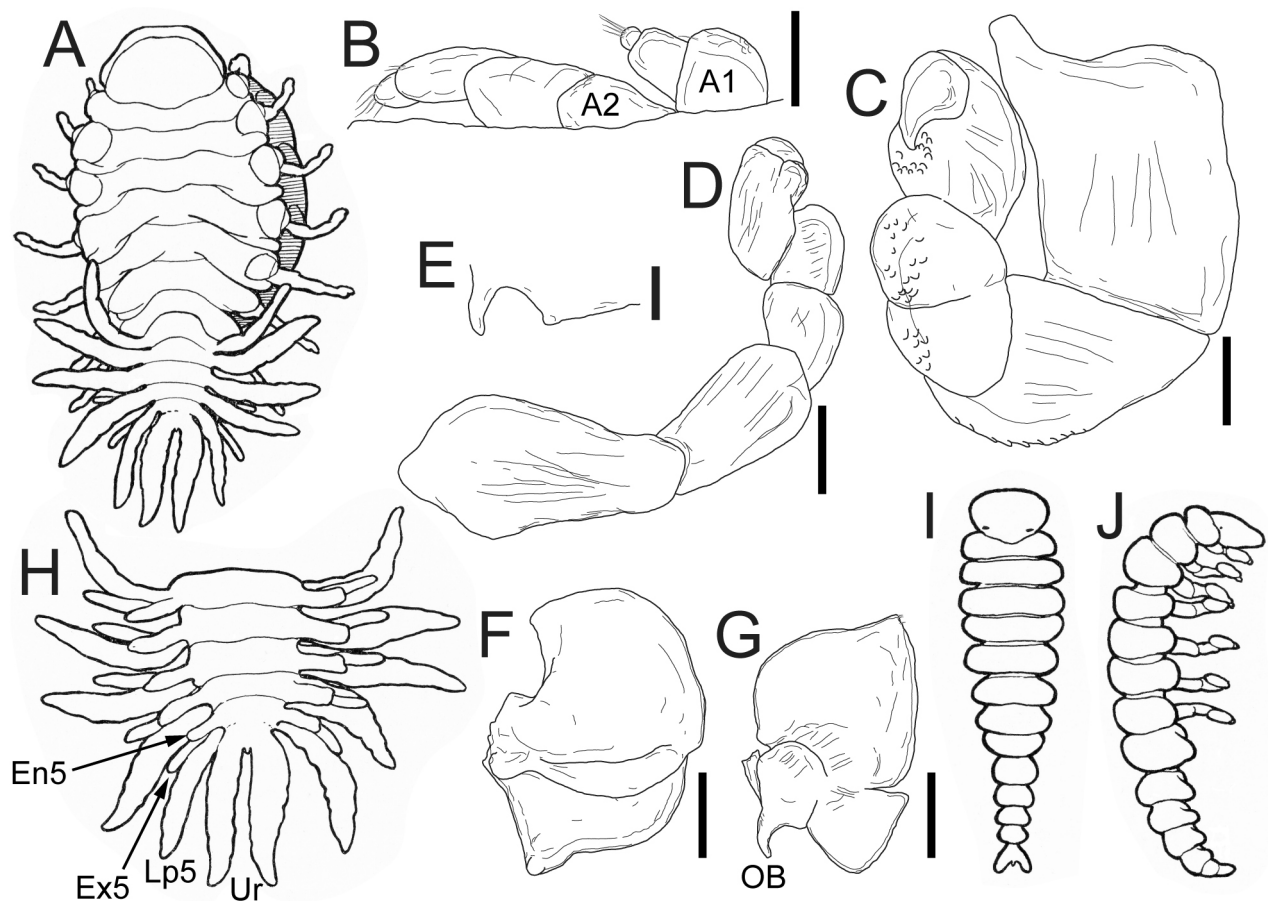


Fig. 2. *Epicepon indicum* Nierstrasz and Brender à Brandis, 1931, female syntype, ZMUC CR-6788 (A–H) and male syntype, CR-6788 (I–J). A, dorsal view. B, left antennule (A1) and antenna (A2). C, right pereopod 1. D, right pereopod 7. E, left side of barbula. F, right oostegite 1, internal view. G, right maxilliped, external view with outer projection of barbula (OB). H, pleon, ventral view showing uropods (Ur), fifth lateral plates (Lp5), exopod (Ex5) and endopod (En5). I, dorsal view. J, lateral view. Scale bars: B = 25 μ m, C, D = 50 μ m, E = 100 μ m, F, G = 200 μ m. A, H–J, from Nierstrasz and Brender à Brandis (1931); not to scale.

Pleon with six segments, first five pleomeres each bearing five pairs of biramous pleopods and longer uniramous lateral plates, all margins with slight undulation but not digitate, surfaces smooth (Fig. 2A, H). Short digitiform endopods of pleopods approximately half as long as slender, distally tapering exopods (Fig. 2H). Terminal pleomere ending in uniramous uropods, similar to but slightly longer than fifth pleopodal exopods, surfaces smooth, margins with slight undulation but not digitate (Fig. 2A, H).

Male (Fig. 2I–J) with all body regions and segments distinct.

Head broadly rounded distally, extending posteriorly to rounded point overlapping approximately 1/3 length of pereomere 1 (Fig. 2I). Small, ovate dark eyes near posterolateral margins of head. Antennules and antennae not visible beyond margins of head in dorsal view.

Pereomeres 2–4 subequal in width, other pereomeres only slightly narrower (Fig. 2I). All pereomeres tapered laterally, lacking mid-ventral tubercles. All pereopods subequal in structure and size (Fig. 2J).

Pleon with six pleomeres, rounded laterally, each slightly narrower than preceding one (Fig. 2I). Mid-ventral tubercles lacking, pleopods as ventrolateral swelling on pleomeres 1–5 (Fig. 2J). Pleomere 6 without uropods, posterolaterally extended into two slender rami, each as long as rest of pleotelson; minute anal cone present distomedially (Fig. 2I).

Range: Known only from the type locality, Kei Islands, Indonesia, 05°30'S, 132°51'E, 345 m depth.

Remarks: The male syntype was incompletely described and figured by Nierstrasz & Brender à Brandis (1931) but is no longer in the vial with the female syntype and the above redescription of the male is therefore incomplete. The female syntype superficially appears to be immature based on the linear shape of the body but the oostegites are well-developed. The specific identity of the host is unknown as it was not retained with the parasites and the branchial chamber from which the parasites were extracted is not clear as the female is nearly linear.

Epicepon belema n. sp.

(Figs. 3, 4)

urn:lsid:zoobank.org:act:975C18A3-DE0C-4892-AEF0-D47ACEE92297

Material examined: Female holotype (2.0 mm TL including uropods), male allotype (1.1 mm TL) parasitizing right branchial chamber of *Tymolus hirtipes* Tan & Huang, 2000, north of Panan, Pott (Phwoc) Island, Belep Islands, New Caledonia, Sta.

CP172, 19°01'1.2"S, 163°16'1.2"E, 275–330 m, coll. MUSORSTOM 4, 17 Sept 1985 (ZRC 2016.0424).

Description: Female (Fig. 3) length 2.0 mm; maximum width (across pereomere 3) 1.4 mm; head length 0.4 mm; head width 0.7 mm; pleon length 0.7 mm. Body slightly dextral; all segments of body distinct (Fig. 3A).

Head oblong, wider than long, extending into rounded lateral projections, frontal margin entire medially. Frontal lamina thin and extending slightly beyond frontal margin of head (Fig. 3A). Small, irregular black eyes present mediolaterally (Fig. 3A). Antennules and antennae with two and three articles each, respectively, distalmost article of each terminally setose (Fig. 3B). Barbula with hook-shaped rounded lateral projection (Fig. 3G) and one rounded lobe, middle region smooth with low lateral lobe (Fig. 3H). Maxilliped with prominent anterior segment, palp as low non-articulated projection with few distal setae, plectron triangular, short and thin (Fig. 3G).

Pereon broadest across pereomere 3. Irregularly shaped tergal projections prominent on pereomeres 1–5 on right side and 2–4 on left side, kidney-shaped dorsolateral bosses on both sides of pereomeres 1–4, thin coxal plates on both sides of pereomeres 1–4 (Fig. 3A). No mid-dorsal projections on any pereomeres. Oostegites enclosing brood pouch; oostegite 1 (Fig. 3E, F) with ovate anterior article, subequal in length to posterior article, internal ridge smooth, posterior article rounded distally (smaller posterior lobe is curled and has slight damage in holotype). Pereopods subequal in structure and size (Fig. 3A). All pereopods with short, blunt dactyli, cylindrical propodi, carpi and meri distinct in all pereopods (Fig. 3C, D).

Pleon with six segments, first five pleomeres each bearing pair of biramous pleopods and longer uniramous lateral plates, all margins with slight undulation but not digitate, surfaces smooth (Fig. 3A, I). Stub-like endopods of pleopods no more than half length of short, distally rounded exopods (Fig. 3I, J); exopods less than ½ length of lateral plates (Fig. 3I, J). Terminal pleomere ending in large uniramous uropods, similar to but longer than fifth pleopodal exopods, surfaces smooth, margins with slight undulation but not digitate (Fig. 3A, I).

Male (Fig. 4) length 1.1 mm; maximum width (across pereomeres 3 and 4) 0.32 mm; head length 0.2 mm; head width 0.25 mm. All body regions and segments distinct (Fig. 4A).

Head expanded distally, rounded posteriorly, distinctly separated from first pereomere (Fig. 4A). Large, irregular dark eyes near posterolateral margins of head. Antennules and antennae not visible beyond margins of head in dorsal view, of three articles each; both bearing setae on all articles (Fig. 4C).

Pereomeres 3 and 4 subequal in width, other pereomeres only slightly narrower except pereomere 7 which is much narrower (Fig. 4A). All pereomeres rounded laterally, lacking mid-ventral tubercles. First pereopod larger than second, both larger than other five (Fig. 4B, C, D); all carpi with setae on distoventral

ventral surface. Dactyli of pereopods 1 and 2 elongate, reaching distal margins of carpi (Fig. 4B, C), dactyli of pereopods 3–7 short, inserted into cup-like indentations at distoventral margin of propodi (Fig. 4B, D).

Pleon with six pleomeres, rounded laterally, each slightly narrower than preceding one (Fig. 4A, B).

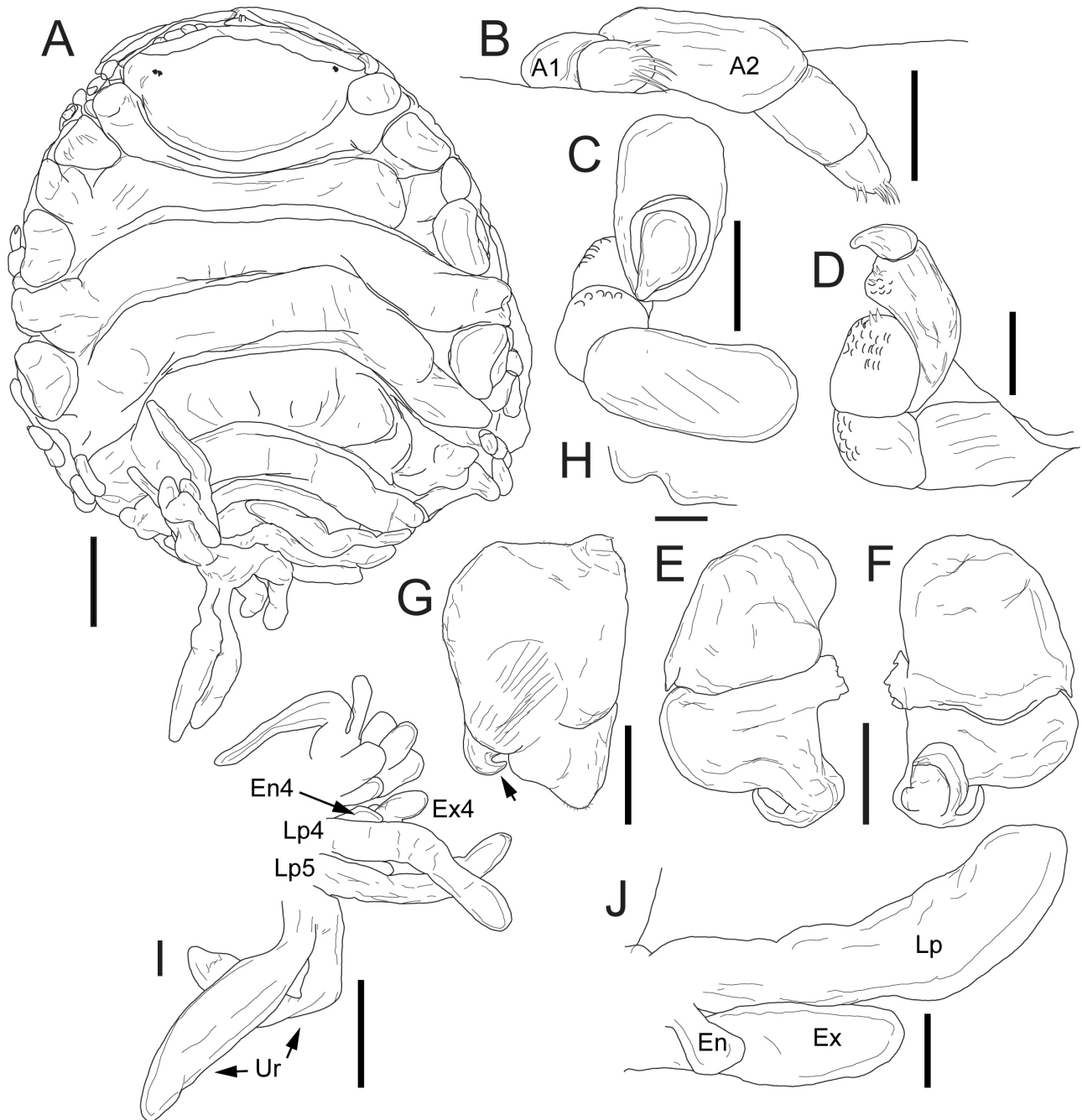


Fig. 3. *Epicepon belema*, new species, female holotype, ZRC 2016.0424. A, dorsal view. B, right antennule (A1) and antenna (A2). C, left pereopod 1. D, left pereopod 7. E, left oostegite 1, external view. F, left oostegite 1, internal view. G, left maxilliped, external view (with outer lobe of barbula indicated with arrow). H, barbula (median lobes only). I, right side of pleon showing uropods (Ur), fourth and fifth lateral plates (Lp4, Lp5), fourth exopod (Ex4) and fourth endopod (En4). J, right pleomere 5 showing lateral plate (Lp), exopod (Ex) and endopod (En). Scale bars: A, E, F = 250 μ m, B–D, J = 50 μ m, G, I = 200 μ m, H = 100 μ m.

Mid-ventral tubercles absent, distinct pleopods present laterally on pleomeres 1–5. Pleomere 6 without uropods, posterolaterally extended into two slender rami, each longer than rest of pleotelson, both tipped with short

setae; anal cone present distomedially (Fig. 4A, B).

Range: Known only from the type locality, north of Panan, Pott (Phwoc) Island, Belep Islands, New Caledonia, 275–330 m.

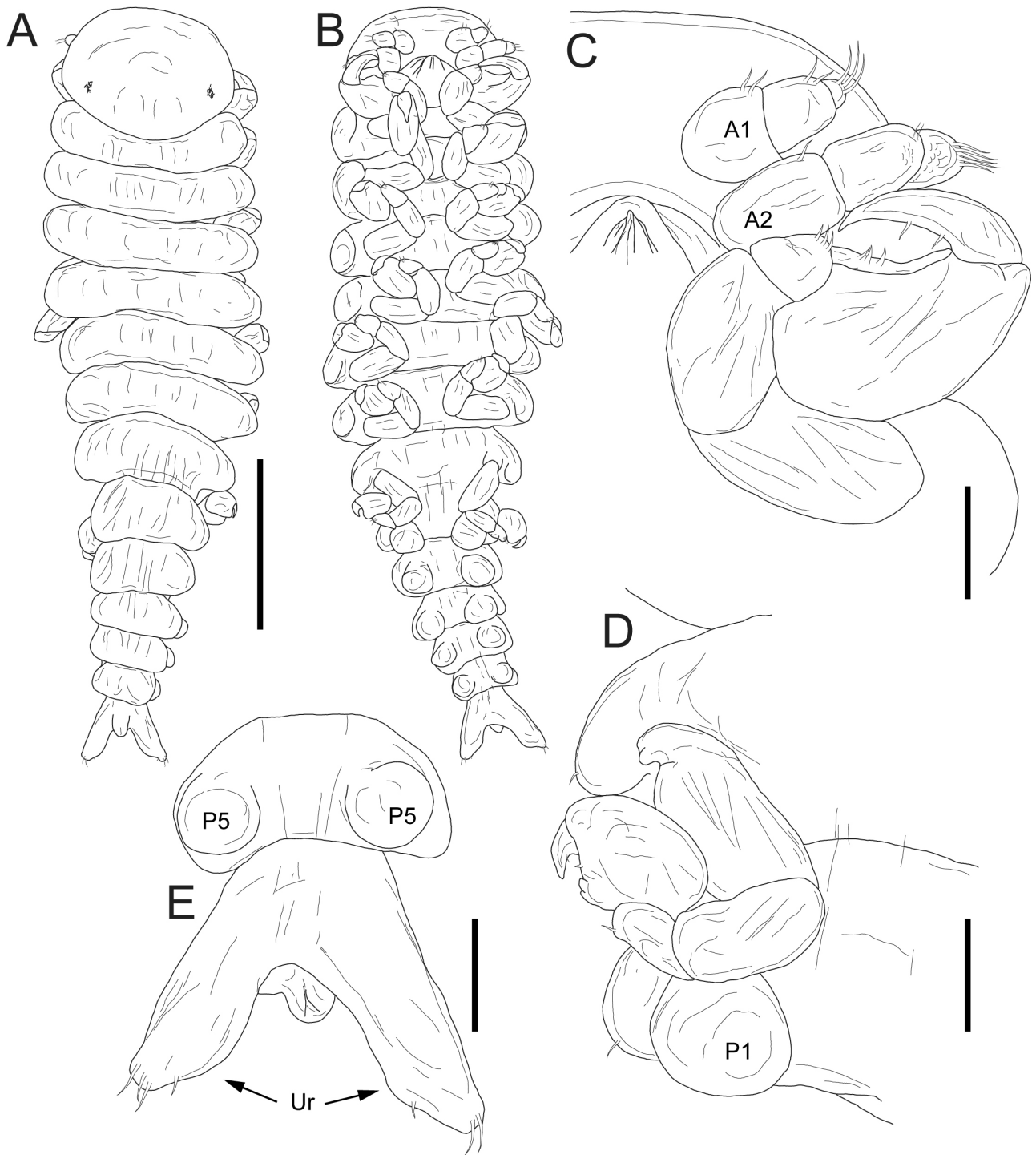


Fig. 4. *Epicepon belema*, new species, male allotype, ZRC 2016.0424. A, dorsal view. B, ventral view. C, left antennule (A1), antenna (A2), pereopod 1 and mouthparts. D, right pereopod 7 and pleomere 1 showing pleopod 1 (P1). E, pleomere 5 with pleopods (P5) and uropods (Ur). Scale bars: A, B = 250 μ m, C–E = 50 μ m.

Remarks: The female of *Epicepon belema* n. sp. can be distinguished from those of the other two in the genus in having a total length less than 2 times the maximum width (*E. indicum* with total length greater than 2 times the maximum width) and pleopodal endopods greater than 1/4 length of the exopods, exopods less than 1/2 length of lateral plates, and barbula without slender elongated lobes (*E. japonica* with pleopodal endopods less than 1/4 length of the exopods, exopods greater than 1/2 length of lateral plates; barbula of *E. indicum* with one slender elongate lobe, barbula of *E. japonica* with two slender elongated lobes).

Etymology: The specific name “*belema*” is both the name inhabitants of the Belep islands call themselves as well as the adjective used for things related to the Belep Islands; the name is used here as a noun in apposition.

Key to species of *Epicepon*

Based on females

- 1a. Total length > 2x maximum width of pereon
..... *E. indicum* Nierstrasz & Brender à Brandis, 1931
- 1b. Total length < 2x maximum width of pereon 2
- 2a. Pleopodal endopods < 1/4 length of exopods; exopods > 1/2 length of lateral plates; barbula with slender extended lobes
..... *E. japonica* Nierstrasz & Brender à Brandis, 1931
- 2b. Pleopodal endopods > 1/4 length of exopods; exopods < 1/2 length of lateral plates; barbula without slender extended lobes ...
..... *E. belema* n. sp.

Based on males

(*E. indicum* not included in key*)

- 1a. Antenna with three articles; dactylus of pereopod 1 reaching distal margin of carpus *E. belema* n. sp.
- 1b. Antenna with four articles; dactylus of pereopod 1 overreaching distal margin of carpus
..... *E. japonica* Nierstrasz & Brender à Brandis, 1931

*As indicated by Nierstrasz & Brender à Brandis (1931), males of *E. indicum* and *E. japonica* are nearly identical in morphology. The latter has a slightly slimmer pleon and more elongate uropods, but these characters can often vary in bopyrid males and be affected by fixation. Thus, a complete key based on males requires new material of *E. indicum*.

DISCUSSION

The new species of *Epicepon* is only the fifth bopyrid described parasitizing a recent podotreme host, although bopyridiform swellings are known from a

much larger number of fossil podotreme species. It is unclear why so few modern podotremes are parasitized, but this may be an effect of the substantial decrease in diversity over time of the host group (Schweitzer and Feldmann 2015). However, additional bopyrids on podotremes are expected to be discovered because there has been no systematic study of hosts in museum collections. We suggest the apparent rarity of podotreme parasites is, in part, an artifact of limited sampling.

CONCLUSIONS

A new species of parasitic isopod, *Epicepon belema* n. sp. found infesting the branchial chamber of the podotreme crab host *Tymolus hirtipes* collected in New Caledonia, is described. The two other species of *Epicepon* (*E. indicum* from Indonesia and *E. japonicum* from Japan) are redescribed based on type material and new samples from hosts in the genus *Tymolus*.

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