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A new species of crinoid-associated *Periclimenes* from Honduras (Crustacea: Decapoda: Palaemonidae)

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Abstract

A new species of crinoid associated *Periclimenes*, *P. rincewindi* sp. nov. is described from the Bay Islands (Honduras) in the Caribbean. The species associates with the swimming crinoid, *Analcidometra armata* and displays a unique colour pattern. Morphologically, the new species is closely related to the other known crinoid associates in the Caribbean, specifically *Periclimenes crinoidalis*, from which it can be distinguished by a suite of relatively minor morphological features.

Key words: *Periclimenes*, new species, Palaemonidae, Honduras, Caribbean, echinoderm-associate

Introduction

Tropical caridean shrimps of the family Palaemonidae are well known as associates or symbionts of a wide range of marine taxa, including echinoderms. Bruce (1982) tabulated the known number of Palaemonidae associated with Indo-Pacific echinoderms to be 51 species, a number which has since increased considerably, due to new discoveries and an increased number of new taxa. The echinoderms hosts belong to several classes, but the highest number of shrimps is associated with crinoids (26 species in 1982). Six genera are now known to be exclusively associated with crinoids, *Araiopontonia* Fujino & Miyake, 1970 (1 species), *Brucecaris* Marin & Chan, 2006 (1 species), *Crinotonia* Marin, 2006 (2 species), *Lipkebe* Chace, 1969 (1 species), *Pontoniopsis* Borradaile, 1915 (1 species), *Unguicaris* Marin & Chan, 2006 (4 species) and *Laomenes* Clark, 1919 (11 species). Within the Palaemonidae, representatives of two further genera are also encountered on crinoids, *Periclimenes* Costa, 1844 (7 species) and *Palaemonella* Borradaile, 1915 (1 species).

In contrast to the rich fauna of the Indo-West Pacific associated with crinoids, this particular association appears poorly represented in the western Atlantic, with to date only four species known, three of which are in the genus *Periclimenes*. *Periclimenes crinoidalis* Chace, 1969 was described on the basis of material associated with *Nemaster grandis* Clark from Curaçao (Chace, 1969). The only further report of this species is by Criales (1984) from Santa Marta, Colombia on the same host. *Periclimenes meyeri* Chace, 1969 was described from two specimens associated with *Nemaster* sp.? from Curaçao (Chace, 1969), with the only further record being Criales (1984) from Santa Marta, Colombia. Criales (1984) also considers this species to be an obligate commensal of *Nemaster grandis*.

Periclimenes bowmani Chace, 1972 was described from Saint Lucia, occurring with “..either *Nemaster rubiginosa* or *Tropiometra carinata*,..” (Chace, 1972). Criales (1984) provides a further record of this species from Santa Marta (Colombia), exclusively occurring on *Nemaster rubiginosa*, now called *Davidaster rubiginosus* (Pourtalès). Escobar & Villalobos (2003) mention *Periclimenes* sp 2 (near *bowmani*) from a fine sandy bottom at a depth of 113–240 m off Banco Chinchorro, Quintana Roo, Mexico, but the summary description and lack of illustrations makes this identification unconfirmed.

The only other species known to associate with crinoids in the western Atlantic, *Lipkebe holthuisi* Chace, 1969 was described from an unknown host in deeper water, 119 m off the Dry Tortugas, Florida. Although Bruce (1976) when recording a further specimen from off Brazil speculated this species to be associated with gorgonians or

antipatharians, Shaw *et al.* (1977) demonstrated that the species exclusively associates with crinoids, recording it from *Comactinia meridionalis meridionalis* (Agassiz).

Currently, *L. holthuisi* appears to be the most widespread crinoid associate in the western Atlantic, being recorded from the southeastern Gulf of Mexico (Chace, 1969; Shaw *et al.*, 1977), Santa Marta (Colombia, see Criales, 1984) and the Brazilian states of Pará, Rio Grande do Norte and Espírito Santo (Vieira *et al.*, 2012 and references therein) in depths of 5–150 m. As Criales (1984) also recorded the species from *N. grandis*, it is the least host specific taxon of western Atlantic crinoid associates.

Here, a further Caribbean crinoid associated species of the genus *Periclimenes* is described, based on two specimens collected on *Analcidometra armata* (Pourtalès) in Roatán, Honduras. Type material is deposited in the collection of the Oxford University Museum of Natural History (OUMNH.ZC), post-orbital carapace length (pocl) is used as the standard size measurement (in mm).

Taxonomy

Family Palaemonidae Rafinesque, 1815

Genus *Periclimenes* Costa, 1844

Periclimenes rincewindi sp. nov.

(Figs. 1–4)

Periclimenes cf meyeri.—Humann *et al.*, 2013: 109 (photo, Bay Islands, Honduras)

Periclimenes sp.—Charteris, 2012: 177 (photo, Roatan, Honduras)

Material examined. Holotype, ovigerous female (pocl 3.0 mm), Sandy Bay, Roatán Island, Islas de la Bahia, Honduras, 18 m depth, on *Analcidometra armata*, leg. M. Charteris, Febr. 2010, OUMNH.ZC.2014-01-004; paratype, male (pocl 1.6 mm), Flower Bay, Roatán Island, Islas de la Bahia, Honduras, 10 m depth, on *Analcidometra armata*, leg. M. Charteris, Jan. 2010, OUMNH.ZC.2014-01-005.

Etymology. *Rincewind* is a fictional wizard in several Discworld novels by Terry Pratchett, who is well known for his ability to blend in with any situation, despite his penchant for colourful clothing. Used as a noun in the genitive case.

Description. Rostrum nearly horizontal (Figs. 1A–B, E), reaching to midlength of distal segment of antennular peduncle; dorsal margin armed with 10 teeth in holotype female, 6 in male paratype, posterior tooth placed at level of orbital margin or slightly posterior to it; ventral margin armed with four teeth in distal half in holotype female, two in paratype male; midrib equidistant from dorsal and ventral margin of rostrum proximally. Antennal tooth distinct, reaching to distal angle of orbital margin, subequal in size to hepatic tooth (Fig. 1A).

Pleura of third and fourth abdominal somites distally rounded (Fig. 1C), fifth bluntly angular; third somite with somewhat distinct dorso-distal cap; sixth somite with posterolateral margin produced into polygonal lobe (Fig. 1D), posteromedial margin produced into distinct tooth.

Telson slightly longer than sixth somite (Fig. 1C); with two pairs of dorsal spines (Fig. 3A), proximal pair at about 0.6 of telson length, distal pair at 0.9 (Fig. 3A); distal margin with two pairs of spines and one (mesial) pair of stout, plumose setae (Fig. 3B), intermediate pair longest, about 4.0 times as long as lateral ones; terminal process between mesial setae present.

Eyes with cornea slightly narrower than and about half as long as eyestalk; ocellus distinct (Fig. 1F).

Antennular peduncle (Fig. 1H) with slender and sharp stylocerite, falling short of mid-length of basal segment; distolateral margin of basal segment produced into 3 broad teeth, two lateral-most ones more narrow (Fig. 1I); distal segment 1.5 times as long as penultimate; lateral antennular flagellum with branches fused for 5–6 segments, free part of shorter branch consisting of 2–3 segments, distinctly shorter than fused segment.

Antennal scale (Fig. 1G) reaching to distal margin of distal segment of antennular peduncle, approx. 2.5 times as long as broad; lateral margin straight, distal tooth falling far short of distal margin of blade, distal margin anteromesially produced; basal segment of antennal peduncle with sharp lateral tooth.

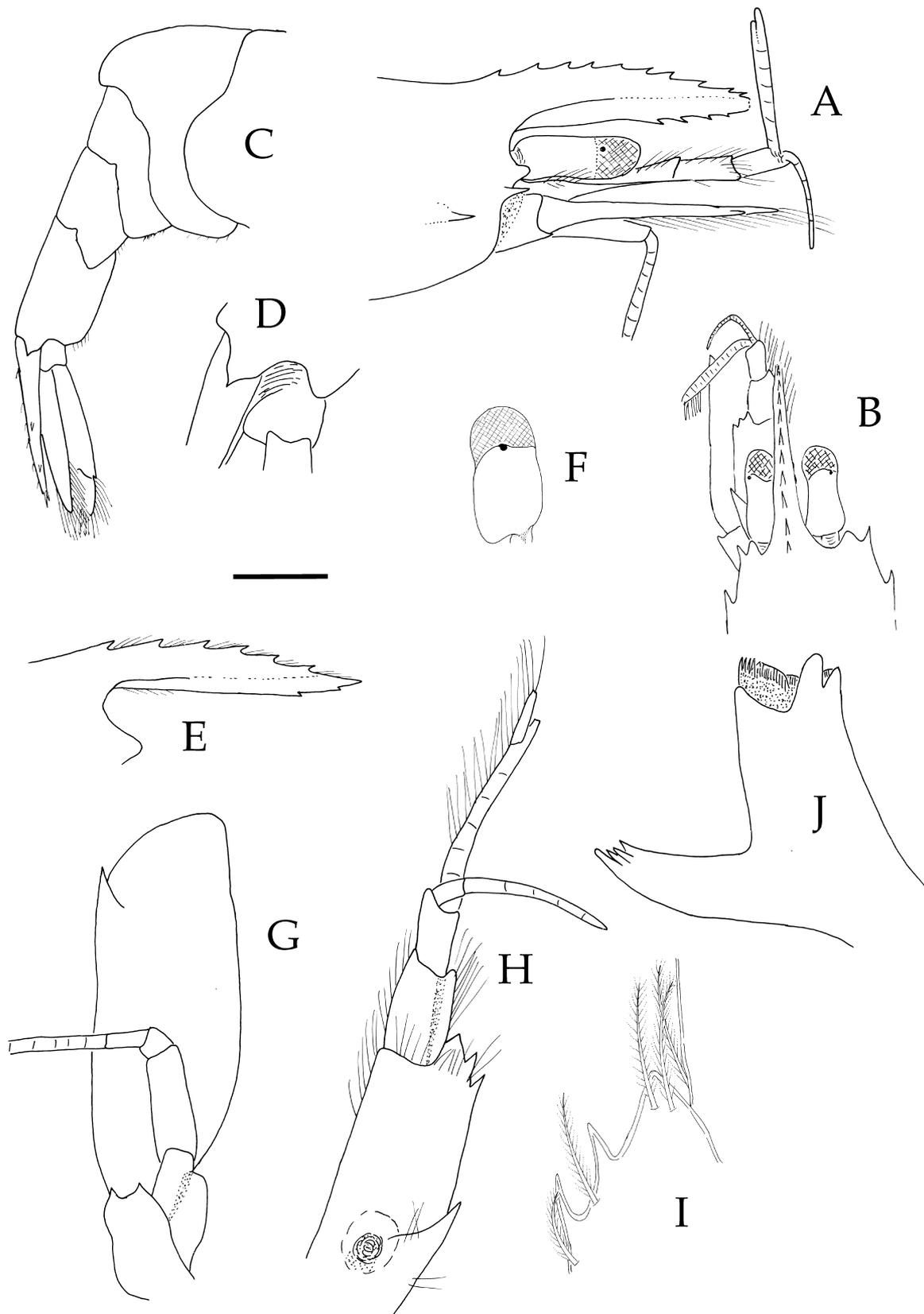


FIGURE 1. *Periclimenes rincewindi* n. sp. A, carapace, frontal margin, lateral; B, same, dorsal; C, pleon; D, sixth somite; E, rostrum, lateral; F, eye, dorso-lateral; G, antenna; H, antennule; I, same, distolateral angle of basal segment; J, mandible. Holotype (A–D, G–I), paratype (E–F, J). Scale bar indicates 0.5 mm (F), 0.75 mm (C–B), 1 mm (A), 1.5 mm (D–E, G–H) or 2.5 mm (I–J).

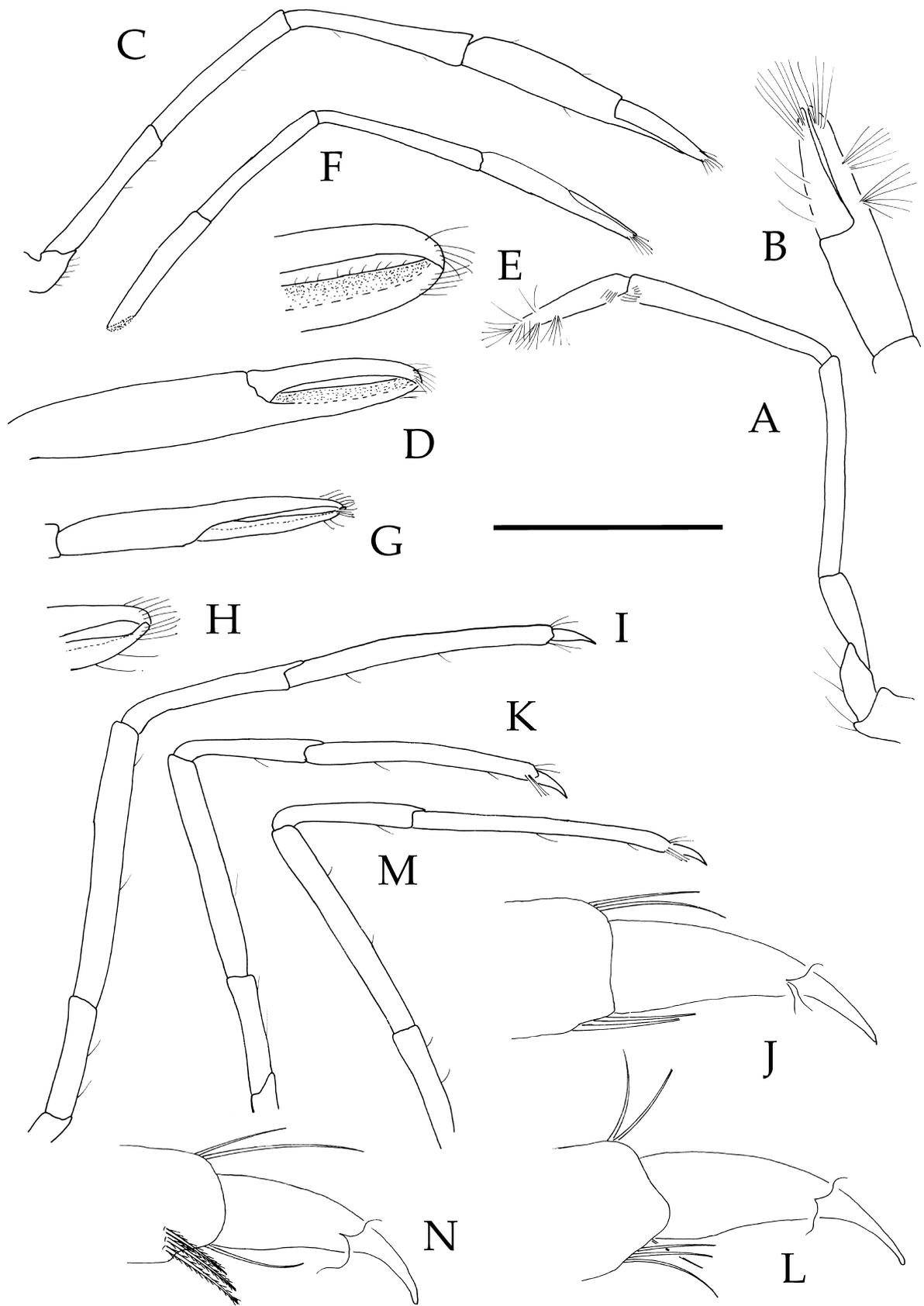


FIGURE 2. *Periclimenes rincewindi* n. sp., holotype. A, first pereopod, B, same, chela; C, major second pereopod; D, same, chela; E, same, distal; F, minor second pereopod, G, same, chela; H, same, distal; I, third pereopod, J, same, dactylus; K, fourth pereopod; L, same, dactylus; M, fifth pereopod, same, dactylus. Scale bar indicates 2 mm (A, C–D, F–G, I, K, M), 1 mm (E, H) or 0.5 mm (B, J, L, N).

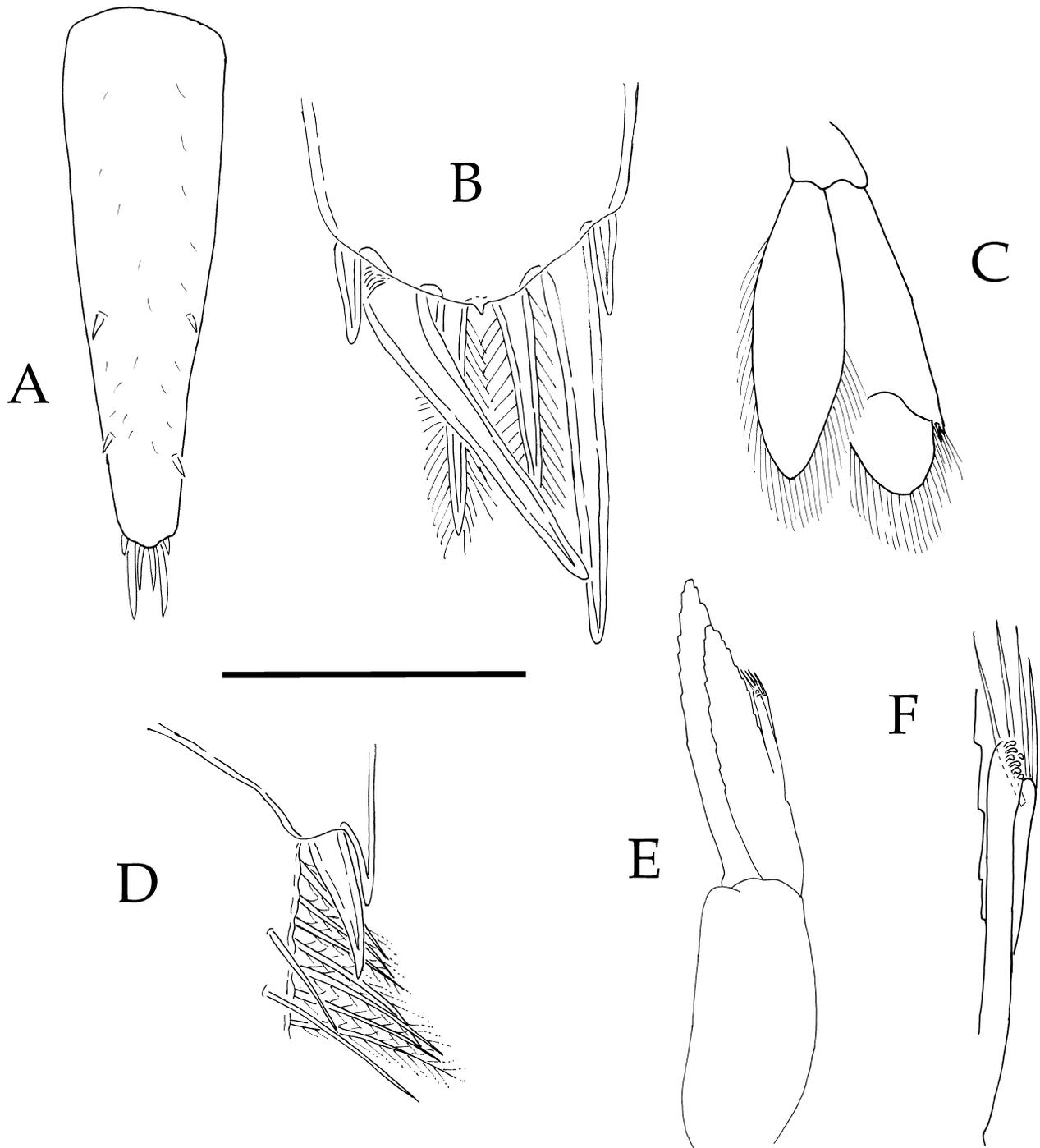


FIGURE 3. *Periclimenes rincewindi* n. sp. A, telson; B, same, distal; C, uropod; D, same, distolateral angle of exopod; E, second pleopod; F, same, appendices. Holotype (A–D), paratype (E–F). Scale bar indicates 2mm (A, C), 1 mm (E) or 0.5 mm (B, D, F).

Mandible (Fig. 1J) with widely separated incisor and molar process; molar process of usual type for genus; incisor process narrow, distally armed with 4 teeth.

First pereiopod (Figs. 2A–B) just overreaching antennal scale by tip of fingers; fingers unarmed, subequal in length to palm; carpus approx. twice as long as chela and subequal in length to merus. Second pereiopods subequal and similar in size and shape. Major cheliped (Figs. 2C–E) overreaching antennal scale by two-thirds of carpus; fingers not ornamented, cutting edges non-denticulate, tips simple; carpus two-thirds in length of chela and of

equal length to merus; ischium slightly shorter than merus. Minor cheliped (Figs. 2F–H) more slender and slightly shorter than major cheliped, reaching to mid-length of major cheliped palm; fingers not ornamented, cutting edges non-denticulate, tips simple; carpus subequal in length of chela and of equal length to merus; ischium slightly shorter than merus.

Third (Figs. 2I–J) and fourth (Figs. 2K–L) pereopod similar in size and structure; dactyli unguiculate, unguis poorly demarcated; propodus about almost six times as long as dactylus, distal margin of flexor margin unarmed, distolateral margin armed with pair of slender spines; carpus two-thirds as long as propodus, unarmed; merus subequal to propodus. Fifth pereopod (Figs. 2M–N) slender, similar to fourth in proportions; setal brush poorly developed, consisting of single row of 3–4 comb-like setae.

Uropods (Figs. 3C–D) typical for genus, slightly over-reaching telson; exopod somewhat broader than endopod, transverse suture distinct, disto-lateral tooth and associated spine well developed, spine twice as long as tooth.

First pleopod of male with endopod entire, not bilobate. Second pleopod of male (Fig. 3E) with appendices masculina and interna on endopod; appendix masculina slightly shorter than interna (Fig. 3F), provided with four subdistal/distal serrulate setae.

Color in life. Carapace semi-transparent with scattered red to dark red spots; anterior to eyestalks background colour white to light pink, incl. rostrum; lower margin of carapace with series of large red to dark red spots. Abdomen semi-transparent up to and including fifth somite; dorsal margin with broad orange to pink stripe, with scattered red to dark red spots; lower margin with series of darker spots, positioned above white to pinkish pleopods. Sixth somite pink background colour with single, large red spot dorsally near articulation with telson; telson and uropods similar. Pereiopods orange to pink in background colour, with single, large spot at joints.



FIGURE 4. *Periclimenes rincewindi* n. sp. A, holotype, in situ; B–C, non-collected specimen, in situ; D, non-collected specimen, on host.

Remarks. In general morphology, *P. rincewindi* **sp. nov.** appears closely related to the other three crinoid dwelling species of the genus in the western Atlantic, *P. crinoidalis*, *P. meyeri* and *P. bowmani*, sharing a similar ornamentation of the distolateral angle of the basal segment of the antennular peduncle, as well as similar chelipeds. The new species differs from *P. bowmani* in that the third abdominal somite is posteriorly produced into a low hump or cap (a feature it shares with the other two species), the feebly developed chelipeds, differences in the molar structure of the mandible, as well as the proportions of the carpus of the first pereopod. The new species differs from *P. meyeri* primarily by the different structure of the mandibular incisor process, being flared in *P. meyeri* and not flared in *P. rincewindi* **sp. nov.** Further differences are the absence of a minute tubercle on the dactyls of the ambulatory pereopods (vs. present in *P. meyeri*) and the carpus of the first pereopod being twice as long as the chela (vs. carpus being only slightly longer in *P. meyeri*).

Morphologically, the new species is most closely related to *P. crinoidalis*, a known symbiont of *Nemaster grandis*, sharing a similar rostral morphology, presence of a posterodorsal hump on third abdominal somite, a very similar ornamentation of the distolateral angle of the basal segment of the antennular peduncle, similar incisor process and weakly developed chelae. Both species can be distinguished on the basis of the following characteristics: 1) carpus of first pereopod twice as long as chela in *P. rincewindi* vs. at most 1.2 times as long in *P. crinoidalis*; 2) denticle on carpus of ambulatory pereopods absent in *P. rincewindi* vs. minute, but always present in *P. crinoidalis*; 3) terminal process on telson present in *P. rincewindi* vs. absent in *P. crinoidalis* and 4) pleuron of fifth somite bluntly angular in *P. rincewindi* vs. rounded in *P. crinoidalis*. A further difference may lie in the number of ventral rostral teeth, with Chace (1969) indicating only a single, often inconspicuous subapical tooth is present in most specimens, with however three being distinct in larger females. The holotype specimen of *P. rincewindi* (of similar size to adult *P. crinoidalis*) harbours four ventral teeth, whilst the paratype male has two. This character will need to be confirmed in more material, before its utility can be confirmed.

Both species also differ in their host preference, as *P. crinoidalis* appears to exclusively associate with *Nemaster grandis* (see Chace, 1969; Criales, 1984) whilst the new species has only been recorded from *Analcidometra armata*.

The colour pattern of *P. rincewindi* is very distinctive and will likely prove a useful identification aid in the field and be fully species specific. However a comparison with *P. crinoidalis* can currently not be made, as colour photos in several guide books (e.g. Humann *et al.*, 2013) of *P. crinoidalis* appear to refer to the related *P. bowmani*, which is exclusively known from *Davidaster rubiginosa* (see Criales, 1984).

Ecology. All known individuals were inhabiting *Analcidometra armata* (Pourtalès) (Crinoidea: Colobometridae) in water depths of 10–18 m.

Distribution. Currently only known from the type locality, Roatán Island, Islas de la Bahía, Honduras. As the host species is however, relatively widespread, if rare, across the wider Caribbean, it is anticipated that *P. rincewindi* will prove to be more widespread.

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