



## ***Periclimenaeus devaneyi* sp. nov., from Oahu, Hawai'i (Crustacea: Decapoda: Pontoniinae)\***

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### **Abstract**

A new species of *Periclimenaeus*, *P. devaneyi* sp. nov., is described from Oahu, Hawai'i Islands. The new species is closely related to *P. minutus* and *P. jeancharcoti*, but can be distinguished from both species by the lack of transverse corrugations on the ungui of the ambulatory dactyls, and the absence of minute denticles on the corpus of the dactyli.

**Key words:** *Periclimenaeus devaneyi*, sp. nov., Crustacea, Decapoda, Pontoniinae, Oahu, Hawai'i, taxonomy

### **Introduction**

Through the kindness of Dr L.G. Eldredge, Dr S.L. Coles and Anne Fielding, it has been possible to study a small collection of shrimps of the genus *Periclimenaeus* Borradaile, 1915 from the collections of the Bernice P. Bishop Museum.

Several specimens presented a unique feature that immediately distinguished them from all species of the genus *Periclimenaeus*, so far described, and an illustrated description is now provided. Unfortunately most of the specimens are in a badly damaged state with many appendages missing. A full description can be prepared from the specimens and their unique character, a particularly stout articulated spine on the distoventral carpus of the ambulatory pereopods, enables even badly damaged and incomplete specimens to be identified with certainty.

The specimens were collected in the course of studies of the fauna associated with scleractinian coral heads in shallow waters around Oahu, in the course of a study by S.L. Coles for the Environmental Department of the Hawaiian Electric Company. (A. Fielding, S.L. Coles, pers. com.) and reported upon by (Coles, 1980). Unfortunately the types of host with which the specimens were associated were not precisely recorded but most probably all were obtained from encrusting sponges or ascidians attached to the corals. The specimens are held mainly in the collections of the Bernice P. Bishop Museum, Honolulu, with one specimen donated to the Queensland Museum.

Abbreviations used: CL, post-orbital carapace length (mms): BPBM, the Bernice P. Bishop Museum, Honolulu; QM, Queensland Museum, Brisbane; ZMA, Zoology Museum, University of Amsterdam. Numbers, such as 6B #2, refer to the individual coral host colonies.

### **SYSTEMATICS**

#### **Family Palaemonidae Rafinesque 1815**

#### **Subfamily Pontoniinae Kingsley 1879**

#### ***Periclimenaeus* Borradaile 1915**

*Periclimenaeus devaneyi* sp. nov.

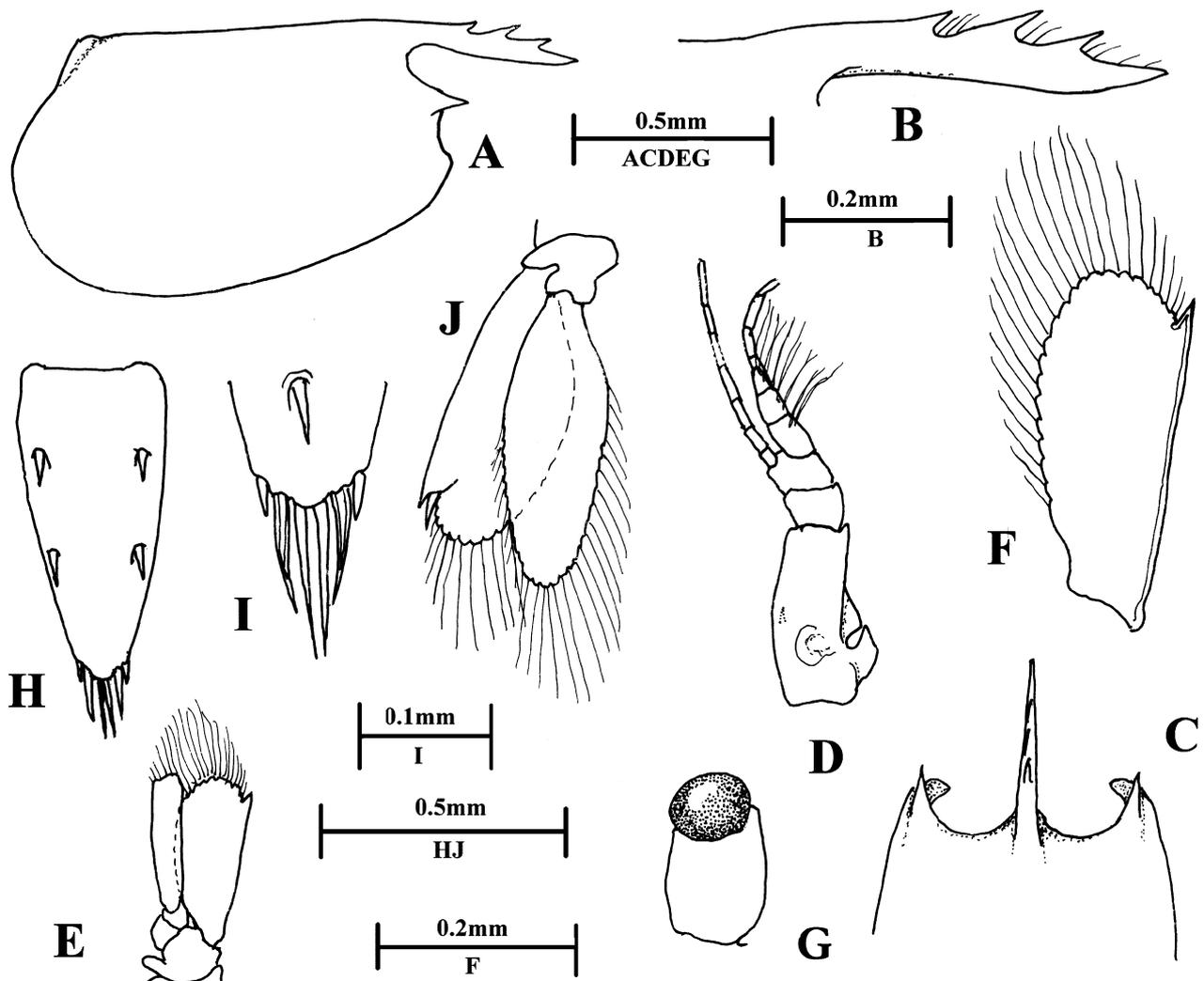
(Figs. 1–5)

**Material examined.** (i) 1 ov. female, 6B #2, CL 1.4, Kahe Point, Oahu, Hawai'an Islands, 15 June 1976, coll. S.L. Coles, BPBM-S 14813; (ii) 1 male, holotype, 5B#3 spm D, CL 1.3, Kahe Point, Oahu, Hawai'an Islands, 21°21'11.0"N, 158°07'54.5"W, 19 June 1976, coll. S.L. Coles, BPBM-S 14814; (iii) ov. female holotype, 10C #3, CL 1.4, Kahe Point, Oahu, Hawai'an Islands, 22 June 1976, coll. S.L. Coles, BPBM-S 14815; (iv) 1 ov. female paratype, 6B #1, CL 1.0, Kahe Point, Oahu, Hawai'an Islands, 13 July 1977, coll. S.L. Coles, QM W28904; (v) 1 female, 7C #4, CL 0.9, Kahe Point, Oahu, Hawai'an Islands, 5 August 1977, coll. S.L. Coles, BPBM-S 14816; (vi) 1 male, 7B #3, CL 1.05, Kahe Point, Oahu, Hawai'an Islands, 20 January 1976, coll. S.L. Coles, BPBM-S 14817.

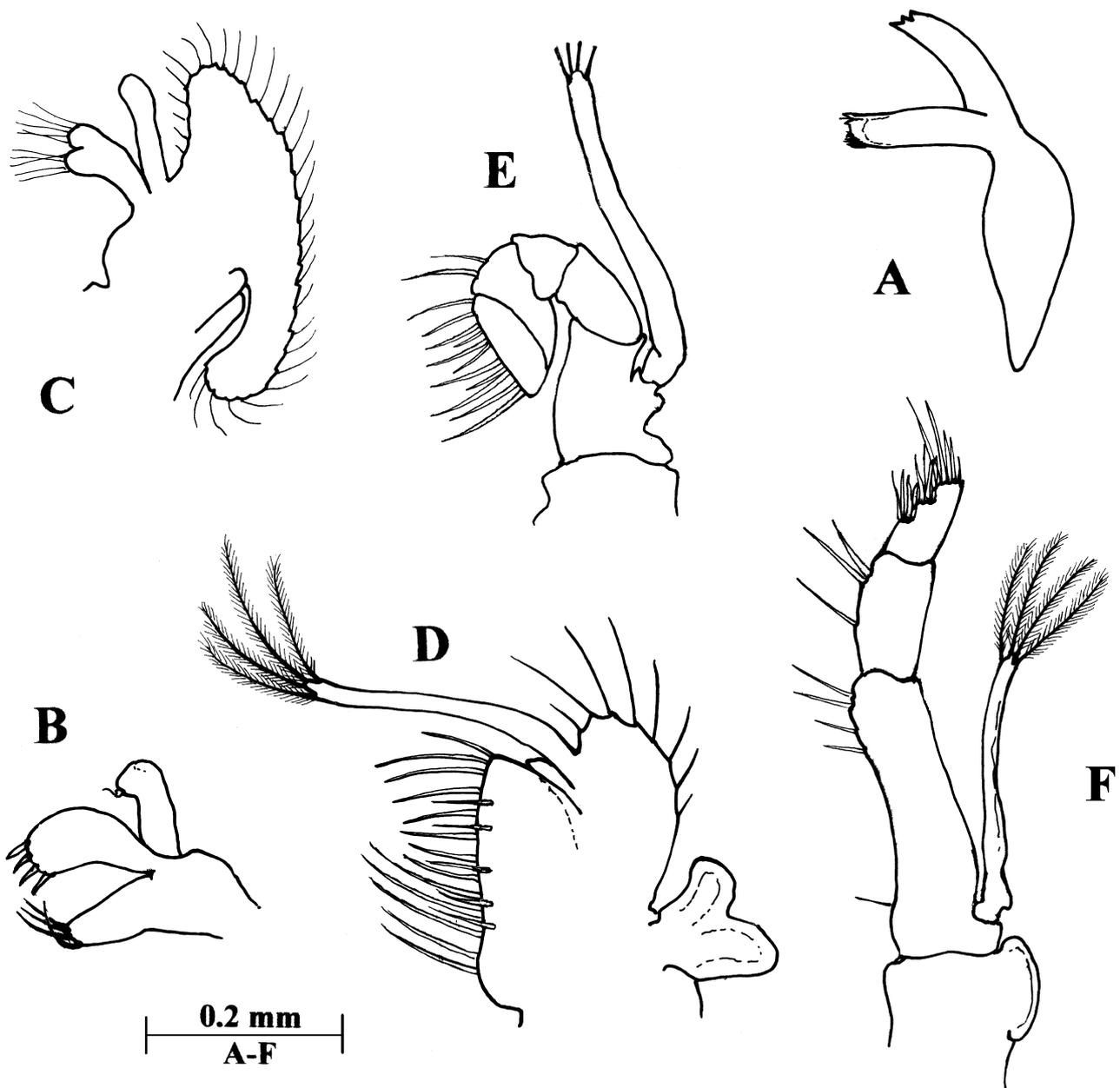
**Diagnosis.** A small species of *Periclimenaeus* Borradaile 1915, with an articulated distoventral spine on the carpus of the ambulatory pereopods. Rostral dentition 3/0 in both sexes, cutting edge of major second pereopod dactyl distally minutely denticulate, of minor second pereopod compressed, subcircular, coarsely dentate, ambulatory dactyls with acute proximal and distal ventral teeth.

**Description.** Oviparous female holotype. A very small-sized pontoniine shrimp, of slender build.

Rostrum (Fig. 1B) about 0.45 of CL, compressed, slender, horizontal, not reaching distal margin of first segment of antennular peduncle, with 3 slender acute teeth over central half, with sparse interdental setae, tip acute, slightly up-turned, ventral margin mainly straight, non-setose.



**FIGURE 1.** *Periclimenaeus devaneyi* sp. nov., holotype female, Kahe Point, Oahu, BPBM-S 14814: A, carapace and rostrum; B, rostrum; C, anterior carapace and rostrum, dorsal; D, antennule; E, antenna; F, scaphocerite; G, eye; H, telson; I, same, posterior margin, dorsal spine inset; J, uropod.



**FIGURE 2.** *Periclimenaeus devaneyi* sp. nov., paratype, female (v): A, mandible; B, maxillula; C, maxilla; D, first maxilliped; E, second maxilliped; F, third maxilliped.

Carapace (Fig. 1A) smooth, without supraorbital spines, tubercles or ridges, orbit obsolescent, inferior orbital angle obsolete (Fig. 1C), antennal spine well developed, marginal, anterolateral angle slightly produced, non-articulate.

Abdomen without special features, first tergite without anteromedian lobe, pleura rounded, sixth segment about 0.42 of CL, 2.0 times longer than deep, posteroventral and posterolateral angles acute.

Telson (Fig. 1H) about 1.8 times length of sixth segment, 0.75 of CL, 2.0 times longer than wide, lateral margins convex, posteriorly convergent to rounded posterior margin, 0.35 of anterior width, without apical process, paired dorsal spines at about 0.3 and 0.6 of telson length, posterior pair slightly longer than anterior, about 0.15 of telson length, three pairs of posterior marginal spines (Fig. 1I), lateral spines small, shorter than anterior dorsal spines, intermediate spines long, slender, about 0.17 of telson length, submedian spines slender, exceeding intermediate spines, sparsely setulose,

Antennule (Fig. 1D) with proximal segment about 2.4 times longer than central width, with small acute ventromedial tooth at half length, lateral margin straight with angular projection over central third, distolateral angle with small acute process, stylocerite short, broad, acute, statocyst normal; intermediate and distal segments short, broad, together about half length of proximal segment, upper flagellum biramous, first two segments fused, shorter free ramus with single segment only, longer ramus with five, about seven groups of aesthetascs, lower flagellum slender, short, with 6 segments.

Antenna (Fig. 1E) with basicerite robust, unarmed, with conspicuous antennal gland tubercle medially, carpoperite subcylindrical, about 4.8 times longer than wide, slightly exceeding scaphocerite, merocerite and ischiocerite normal, scaphocerite (Fig. 1F) well developed, reaching to distal end of carpoperite, 2.5 times longer than maximal width at about 0.6 of length, lateral margin straight, with acute tooth, not exceeding distal margin of lamella, at about 0.87 of scaphocerite length.

Eye (Fig. 1G) with cornea well pigmented, globular, about 0.25 of CL, without accessory pigment spot, stalk as wide as long, tapering slightly distally.

Mouthparts not examined.

Thoracic sternites narrow, unarmed.

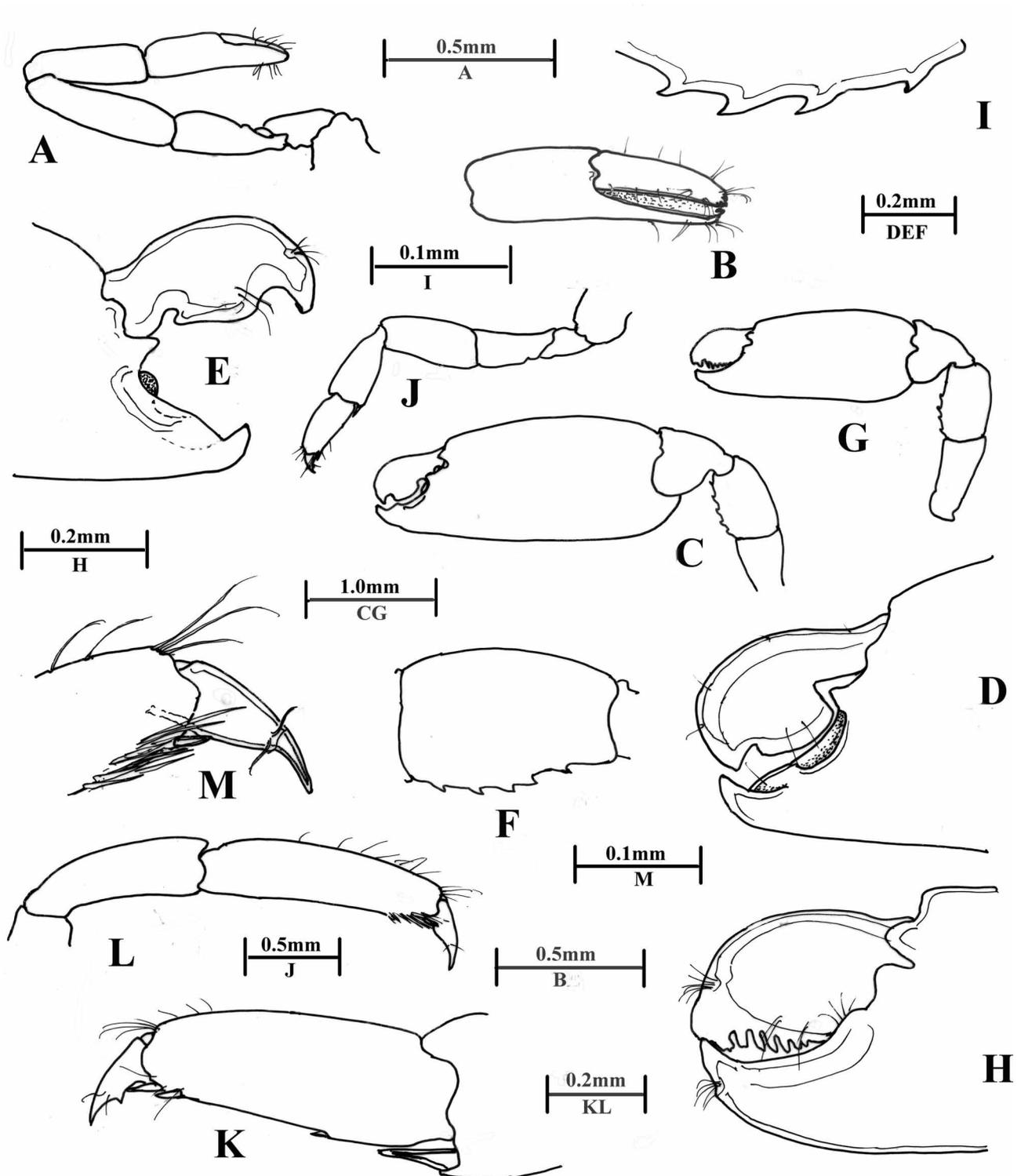
First pereiopod (Fig. 3A) short, robust, chela (Fig. 3B) with palm oval in section about 1.8 times longer than deep, fingers similar, sparsely setose, about 1.1 times palm length, broadly spatulate, cutting edges entire, distally rounded, tips (Fig. 4G) with short stout curved tooth flanked by short stout multi-cusped spines (Fig. 4H); carpus short, stout, subcylindrical, about 0.9 of chela length, merus subequal to chela length, 4.0 times longer than deep, tapering slightly distally; ischium subequal to carpal length, carpus, basis and coxa without special features.

Second pereiopods well developed, dissimilar and unequal. Major second pereiopod (Fig. 3C) very well developed, chela about 2.6 times CL, palm oval in cross section, smooth, 1.7 times longer than deep, tapering slightly distally, fingers (Fig. 3D, E) robust, 0.33 of palm length, dactyl about 2.0 times longer than depth, dorsal margin strongly convex, with stout hooked tip distally (Fig. 4I), cutting edge with very robust molar process proximally, distal cutting edge deeply concave, central portion minutely serrate, fixed finger about 1.2 times longer than proximal depth, ventrally feebly convex, with stout hooked tip distally, cutting edge with large proximal fossa for reception of dactylar molar process, distal cutting edge thickened, entire; carpus obliquely articulated, about 0.3 of palm length, proximally narrow, distally expanded, unarmed, with large medial lobe; merus (Fig. 3F) robust, 0.3 of palm length, slightly longer than carpus, 1.5 times longer than depth, centrally swollen, ventral margin (Fig. 3G) with 5 small stout acute anteroverted denticles; ischium subequal to meral length, tapering proximally, length 2.0 times distal width, ventrally unarmed; basis and coxa robust, without special features.

Minor second pereiopod (Fig. 3G) with chela about subequal to palm length of major chela, palm oval in cross section, compressed, smooth, 1.9 times longer than deep, slightly tapered distally, dactyl (Figs 3H, 5A) about 0.4 of palm length, sub-oval, 1.7 times longer than central depth, compressed, ventrally laminar, dorsal margin thickened, convex, tip expanded forming a broad blunt tooth, cutting edge convex with seven teeth, very small proximally becoming very large distally, separated by deep notches, distal tooth confluent with dactylar tip, fixed finger about 1.1 times longer than proximal depth, tip strongly up-curved, robust, acute, cutting edge concave, sharp, entire; proximal segments similar to major chela but smaller, merus (Fig. 3I) with 4 ventral denticles, otherwise unarmed.

Third pereiopod (Figs 3J, 4J) short, robust; dactyl (Fig. 4K) compressed, about 0.3 of propod length, unguis distinctly demarcated, stout, curved, twice as long as basal width, 0.65 of dorsal corpus length, unarmed, corpus 1.13 times longer than basal width, dorsal margin convex, ventral margin sharp, strongly concave, with short acute erect distal accessory tooth, with small blunt proximal tooth with slender styloform terminal process, with paired distal sensory setae medially and laterally; propod robust, sparsely setose, 0.4 of CL, about 2.8 times longer than proximal depth, tapering slightly distally, with pair of stout distoventral spines (Figs 3K, 4K, 5C), larger spine about 0.5 of distal propod width, ventral margin with 1 spine close to distoventral spines and 1 spinule at about one third of propod length; carpus stout, about 1.3 times propod length, distoventral angle with large mobile spine (Fig. 5C), about 1.7 times longer than distoventral propodal

spine; merus robust, 0.9 of carpal length, 2.2 times longer than wide, slightly tapering distally, unarmed; ischium 0.9 of meral length, 2.0 times longer than distal width, tapering proximally, unarmed, basis and coxa without special features.



**FIGURE 3.** *Periclimenaeus devaneyi* sp. nov., holotype female, Kahe Point, Oahu, BPBM-S 14814: A, first pereiopod; B, same, chela; C, major second pereiopod; D, same, fingers, medial; E, same lateral; F, same, merus; G, minor second pereiopod; H, same, fingers, lateral; I, same, merus, ventral margin; J, third pereiopod; K, same, distal carpus, propod and dactyl; L, fifth pereiopod; M, same, distal propod and dactyl.

Fourth and fifth pereopods (Fig. 3L) similar to third but more elongate; fifth dactyl (Fig. 5C) without distal accessory tooth, with propod 1.3 times length of carpus, 4.2 times longer than proximal depth, with single distoventral spine (Fig. 3M) and numerous serrulate distolateral spines, carpus with strong distoventral spine.

Pleopods of female holotype without special features; basipodite with one distal ovigerous seta, three proximal ovigerous setae.

Uropod (Fig. 1J) with protopod laterally unarmed, exopod broad, about 2.4 times longer than central width, lateral margin straight, non-setose, with strong acute distolateral tooth with well developed mobile spine medially, diaeresis indistinct, endopod more slender, about 3.0 times longer than central width, slightly exceeding exopod.

Ova small and few, about 8 or 9.

Mouthparts (paratype, female (v)): Mandible (Fig. 2A) without palp; molar process (Fig. 4B) slender, subcylindrical, feebly dentate distally; incisor process (Fig. 4A) normal, distally oblique, with three small acute teeth.

Maxillula (Fig. 2B) with simple palp (Fig. 4C) with small distoventral setiferous tubercle, upper lacinia (Fig. 4D) suboval, distal margin slightly truncate with 4 short stout simple spines and several slender simple spines, lower lacinia tapering distally with few slender serrulate spines only.

Maxilla (Fig. 2C) with endopod (Fig. 4E) 5.0 times longer than basal width, distally rounded, non-setose, basal endite bilobed, lobes subequal, short, rounded, sparsely setose, upper lobe with 4 slender simple setae, 5 on lower lobe, medial margin of coxa convex, non-setose, scaphognathite 2.6 times longer than wide, anterior lobe small, scarcely exceeding palp, as wide as long, posterior lobe long, slender and curved, 2.8 times longer than basal width.

First maxilliped (Fig. 2D) with short tapering non-setiferous palp, basal endite about twice as long as broad, sparsely provided with long simple spiniform setae, exopod with small, broad sparsely setose caridean lobe, flagellum slender, with 4 plumose terminal setae, epipod small, bilobed.

Second maxilliped (Fig. 2E) of normal form, dactylar segment 2.5 times longer than broad, medial margin straight, with long sparsely serrulate spiniform setae, flagellum slender with 4 plumose terminal setae, epipod lost in dissection.

Third maxilliped (Fig. 2F) short, robust, ischiomerus completely fused to basis, combined segment about 5.3 times longer than central width, with 4 simple spiniform setae distally, penultimate segment of endopod about 0.4 of antepenultimate, 2.0 times longer than wide, with 3 simple spiniform setae medially, terminal segment 0.75 of penultimate segment length, with 3 groups of simple spiniform setae medially.

Male (vi): BPBM-S 1481, CL 1.05. Rostral dentition 3/0, with first pleopod (Fig. 4L) without special features, endopod about 0.33 of exopod length, 2.6 times longer than central width, distally rounded with two short setae, one disto-medial seta, medial margin with two short curved spiniform setae proximally, without medial accessory lobe. Second pleopod (Fig. 4M) with basipodite 2.0 times longer than central width, exopod 1.1 times basipodite length, 4.2 times longer than proximal with, tapering distally, endopod (Fig. 4N) 0.7 of exopod length, appendix masculina obsolete, with single slender feebly setulose spiniform seta about 0.55 of endopod length at 0.4 of medial margin length, appendix interna about half length of medial spine.

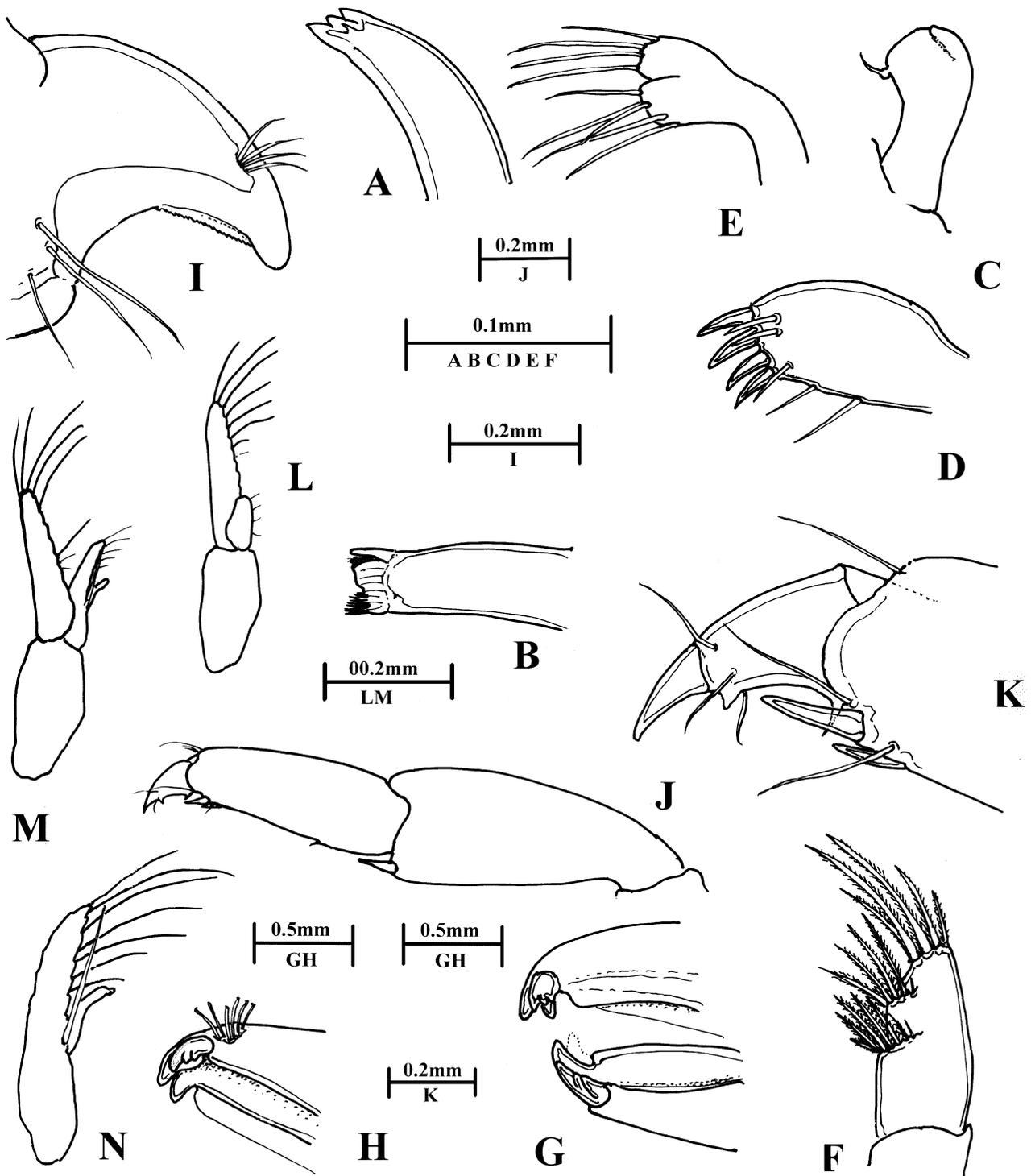
**Measurements (mm).** Holotype female. Postorbital carapace length, 1.3; carapace and rostrum, 1.75; total body length (approx.), 5.5; major chela, 6.0; minor chela, 3.0; length of ovum, 0.5 mm.

**Types.** The ovigerous female (iii), collected on 19 June 1976, the only specimen which possesses both second pereopods, is designated as the holotype (BPBM-S 14815). The accessory teeth on the ambulatory dactyls were damaged in the process of examination. The specimen (iv) is selected as a paratype (QM W28904). The remaining specimens are not in good condition.

**Habitat.** The specimens were obtained from dead heads of the scleractinian coral *Pocillopora meandrina* Dana collected from shallow water, about 3 m depth (Anne Fielding, pers. com.).

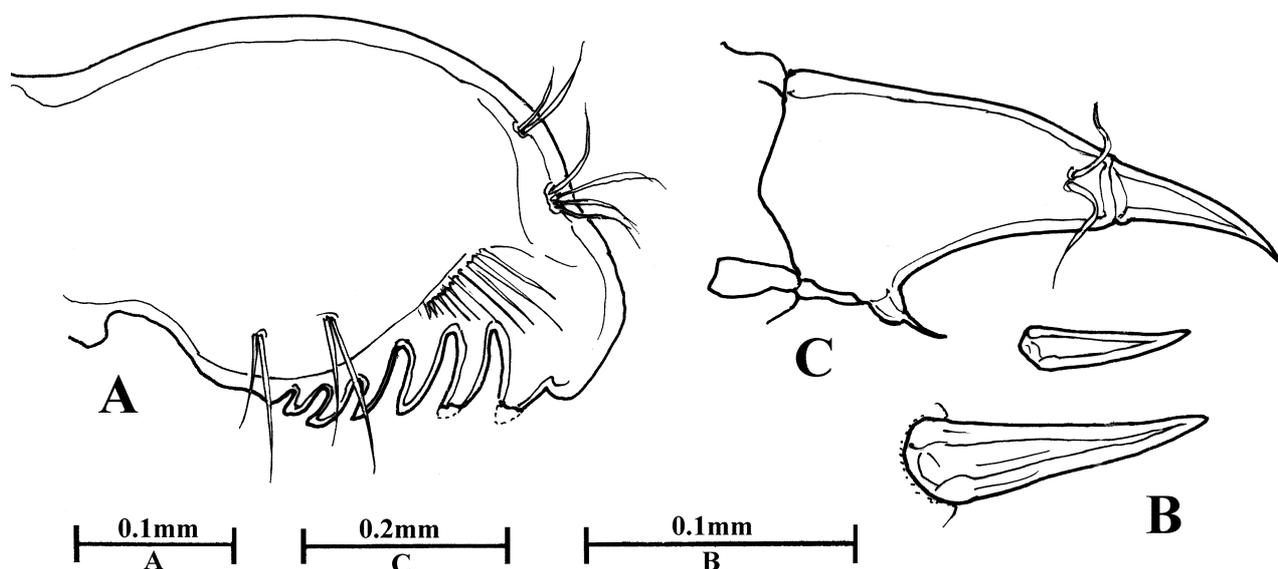
**Systematic position.** Readily distinguished from all *Periclimenaeus* species by the presence of a large articulated spine on the distoventral angle of the carpus of the ambulatory pereopods. *Periclimenaeus devaneyi* sp. nov. appears to most closely resemble *Periclimenes minutus* Holthuis 1952 from Banda Island,

Indonesia, at a depth of 18–36 m, and *Periclimenaeus jeancharcoti* Bruce 1991, first reported from New Caledonia at a depth of 375–450 m. Both these species have spatulate fingers on the first pereiopod, the dactyl of the minor second pereiopod semicircular or suboval and strongly compressed with a convex cutting edge



**FIGURE 4.** *Periclimenaeus devaneyi* sp. nov., paratype, female (v), Kahe Point, Oahu, BPBM-S 14814: A, mandible, incisor process; B, same, molar process; C, maxillula, palp; D, same, upper lacinia; E, maxilla, palp; F, third maxilliped, terminal segment. Holotype female, Kahe Point, Oahu, BPBM-S 14814: G, first pereiopod, finger tips; H, same, dactylus; I, major second pereiopod, distal dactyl; J, third pereiopod, carpus, propod and dactyl; K, same distal propod and dactyl. Male (vi): L, first pleopod; M, second pleopod; N, same, endopod.

armed with strong teeth and the ambulatory dactyls compressed, short and stout, and biunguiculate with proximal spines on the corpus. Further information has recently been provided on *P. minutus* by Fransen (2006) showing that it closely resembles *P. jeancharcoti* with both species having the unguis of the ambulatory dactyl with a characteristic series of transverse corrugations at the proximal end of the dorsal margin. These are not present in *P. devaneyi* sp. nov. The ventral margin of the corpus bears minute denticles in *P. jeancharcoti* and *P. minutus* that are not present in *P. devaneyi* sp. nov. and the proximal ventral margin bears a cluster of small spinules in the former species and a single slender acute tooth in the latter.

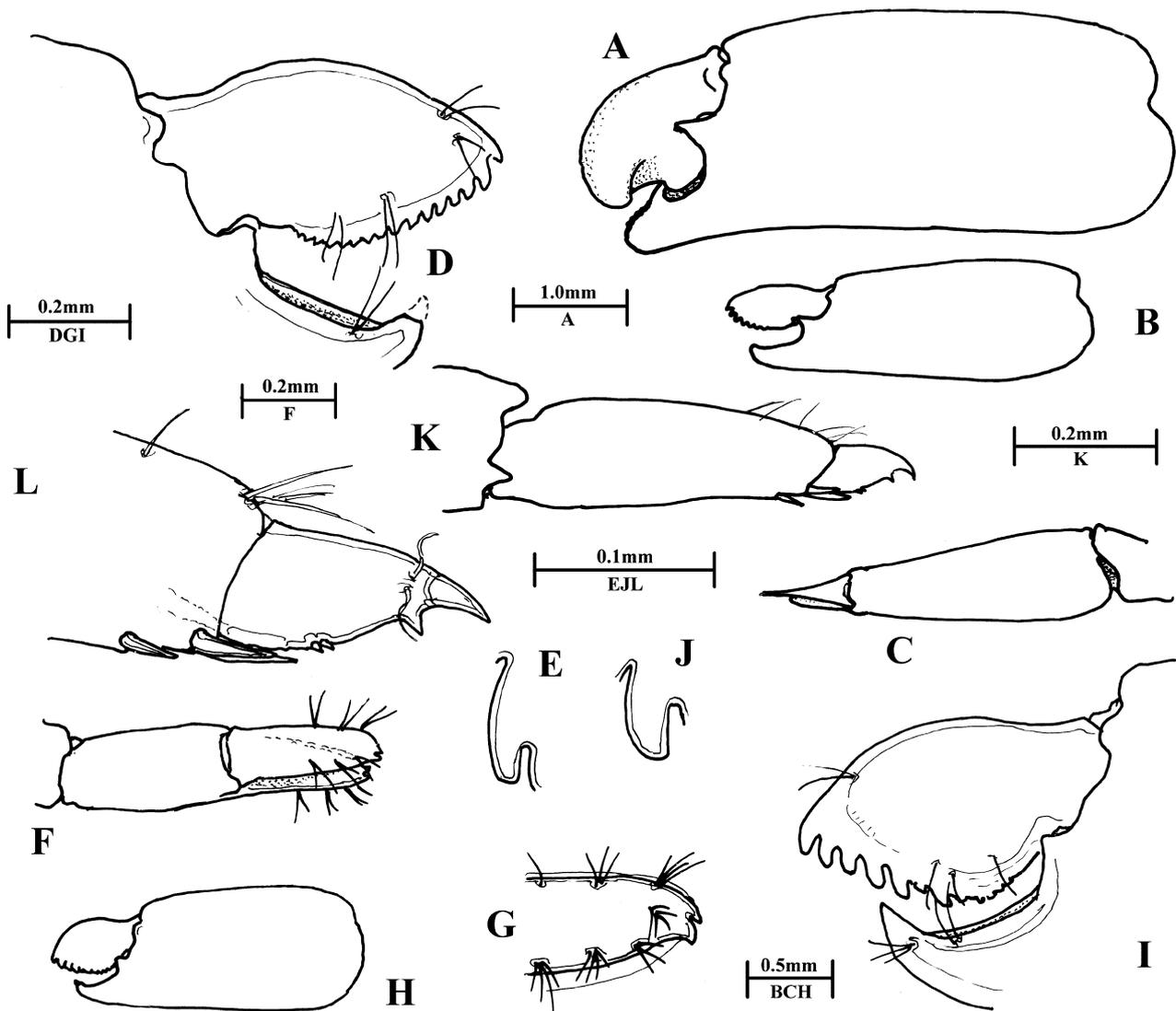


**FIGURE 5.** *Periclimenaeus devaneyi* sp. nov., holotype female, Kahe Point, Oahu, BPBM-S 14814: A, minor second pereopod dactyl; B, third ambulatory pereopod, distoventral propodal spine (upper), distoventral carpal spine (lower); C, fifth pereopod, dactyl.

**Etymology.** The species is named in honour of Dennis M. Devaney (1938–1983), Invertebrate Zoologist at the Bishop Museum, sadly lost at sea while collecting off Hawaii, in long overdue recognition of his contributions to knowledge of the marine fauna of the Hawai’ian region.

**Remarks.** *Periclimenaeus devaneyi* sp. nov. is remarkable, not only for the spines on the carpi of its ambulatory pereopods, unique in the genus *Periclimenaeus* (and also in the Pontoniinae), but also for its particularly small size, with adult females having a post-orbital carapace length of only 1.0–1.5 mm. The specimens are presumed to be only indirectly associated with the *Pocillopora* coral and are most likely to have been associated with an encrusting sponge or ascidian hosts.

The types of *P. minutus* (Figs. 6A–E) have been further re-examined. The male specimen, CL 2.5, still has both second pereopods attached. The ovigerous female, dissected, lacks the minor second pereopod. The major chela (Fig. 6A) is massive, about 2.2 times the CL, the dactylus is very robust and distally thickened with a blunt tip. The proximal part of the cutting edge bears a large molar process and the distal part is sharp with minute acute denticulations (abraded distally). The fixed finger is stout and distally blunt, with a large proximal fossa. The distal cutting edge is bluntly rounded with several small rounded submarginal tubercles laterally. The minor chela (Fig. 6B) is about 0.57 of the major palm length, with strongly compressed fingers. The dactylus (Fig. 6D) is laminar, oval, about twice as long as maximum depth, dorsal and ventral margins similarly convex, with small acute tip, ventral cutting edge mainly sharp, closing into longitudinal groove on fixed finger, distal three fourths with about 15 acute teeth, largest distally and diminishing completely proximally, proximal fourth thickened, unarmed. Fixed finger distally strongly hooked (with tip missing), cutting edge deeply grooved, each margin with an acute process proximally.



**FIGURE 6.** *Periclimenaeus minutus* Holthuis, 1952, syntype, male, ZMA De. 101.630, Banda, Indonesia: A, major second pereiopod chela; B, minor second pereiopod chela; C, same, ventral; D, same, dactyl; E, same, second tooth. Male, QM W28905, Mbweni, Zanzibar: F, first pereiopod, chela; G, same, tip of dactyl; H, minor second pereiopod, chela; I, same, dactyl; J, same, second tooth; K, third pereiopod, propod and dactyl; L, same, distal propod and dactyl.

It may be noted that, of the reports of *Periclimenaeus minutus* from the Western Indian Ocean by (Bruce, 1976, 1978), only that from Mbweni, Zanzibar, QM W28905, may be correct. This specimen (Figs. 6F–L), a male, CL 1.85, dredged from 9.1 m, corresponds closely to the figures of the type specimen provided by Holthuis (1952: 134–137, figs 57–59) and Fransen (2006: 271, fig.11). The other specimens lack the characteristic ambulatory dactyls and are therefore not conspecific. The Zanzibar specimen however, differs slightly in several features and may represent a separate species. It has a slender rostrum, reaching to about the distal margin of the first segment of the antennular peduncle, dentition of 5/0. The first pereiopod chela (Fig. 6F) has the fingers subequal to the palm length, broadly and deeply spatulate, distally rounded with bidentate tips (Fig. 6G), cutting edges laminar, entire. The major second pereiopod is missing. The minor second pereiopod has the palm (Fig. 6H) about 1.75 times longer than deep, dactyl (Fig. 6I) more oval, about 1.7 times longer than deep, 0.44 of palm length, with 13 large teeth (including tip), largest distally, decreasing rapidly in size proximally (some damaged), teeth (Fig. 6J) generally larger and broader. Third pereiopod with propodus (Fig. 6K) about 3.0 times longer than maximal width, tapering distally, distoventral angle with 2

stout spines with smaller preterminal ventral spine, without further ventral spines, dactyl (Fig. 6L) about 0.25 of propod length, unguis 0.33 of corpus length, unornamented, slightly curved, corpus 1.5 times longer than proximal depth, dorsal margin feebly convex, ventral margin with acute erect preterminal tooth distally, with 2 small robust articulated spinules proximally, intervening ventral margin near straight.

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