BRILL

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NOTES ON SOME INDO-PACIFIC PONTONIINAE, LI. *PERICLIMENAEUS QUADRIDENTATUS* (RATHBUN, 1906) AND *P. CRASSIPES* (CALMAN, 1939) (DECAPODA, PONTONIINAE), WITH THE DESIGNATION OF *P. CALMANI* AND *P. SERENEI* SPP. NOV.

BY

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ABSTRACT

Further information on the little known pontoniine shrimps, *Periclimenaeus quadridentatus* Rathbun, 1906 and *P. crassipes* (Calman, 1939), is provided and illustrated, and *Periclimenaeus calmani* sp. nov, from the Cobourg Peninsula, Northern Territory, Australia, and *P. serenei* sp. nov., from Nha Trang, Vietnam, are designated.

RÉSUMÉ

Des informations complémentaires concernant deux crevettes Pontoniinae peu connues, *Periclimenaeus quadridentatus* Rathbun, 1906, et *P. crassipes* (Calman, 1939), sont fournies ainsi que des illustrations; *Periclimenaeus calmani* sp. nov., de la peninsule de Cobourg, Territoire du Nord, Australie est décrite et illustrée, et *P. serenei* sp. nov., de Nha Trang, Vietnam, est désignée.

INTRODUCTION

In 1906 Mary J. Rathbun described and illustrated the pontoniine shrimp *Coralliocaris quadridentata* based on a single specimen collected by the U.S. Albatross Expedition, from 51-79 m, in the Auau Channel, Hawaiian Islands. She provided a brief description with a photograph and a drawing of the rostrum. This species was subsequently placed in the genus *Periclimenaeus* Borradaile, 1915 by Holthuis (1952) as a synonym of *Periclimenaeus tridentatus* (Miers, 1884). Bruce (1974) considered *Periclimenaeus quadridentatus* distinct from *P. tridentatus* and later re-described *P. tridentatus* and formally removed *Periclimenaeus quadridentatus* Rathbun, 1906 from its synonymy (Bruce, 2002).

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Rathbun's (1906) description was particularly brief (18 lines) with a small figure of the rostrum and a small photo of the whole specimen. Many of the details necessary for a fuller assessment of the systematic position of the species were not provided. Although some further specimens have been referred to this species, none have provided these details and the brevity of the details of the holotype renders them all somewhat dubious. Through the kindness of Dr Raphael Lemaitre the holotype specimen was made available in 1999 and some notes and drawings were prepared. These are now presented to facilitate the further study of this species.

Similarly, in 1939, Calman described *Periclimenes* (*Ancylocaris*) *crassipes* from two specimens collected from 38 m off Oman by the John Murray Expedition to the Red Sea and Gulf of Aden, 1933-1934 (Calman, 1939). This species was also included in the synonymy of *Periclimenaeus tridentatus* (Miers) by Holthuis (1952). Bruce (1974) treated *P. crassipes* as a valid species distinct from *P. tridentatus* and also from *P. hecate* (Nobili, 1904), also previously included in the synonymy of *P. tridentatus*. Calman's (1939) description was also brief and provided limited detail of specific value with figures of the whole animal and the distal fifth propod and dactyl only. Re-examination of the type material showed the absence of a distal accessory tooth on the corpus of the ambulatory dactyl indicating that they were not conspecific with *P. tridentatus* (Miers). The only subsequent report of this species was from Darwin, the Northern Territory, Australia (Bruce & Coombes, 1997) from 8 m in association with an ascidian host. This specimen has now been re-examined and the identification found to be erroneous. The specimen is thus described as a further new species.

In the course of preparation of this communication some discrepancies were noticed in various reports of *Periclimenaeus hecate* (Nobili). The original description of this species was brief and un-illustrated (Nobili, 1904) and was later augmented with a plate with a small figure of the whole specimen (Nobili, 1906). A re-description of the holotype was later provided by Bruce (1974). A further report of this species was recently provided by Marin et al. (2005). This was re-evaluated and as a result *P. serenei* sp. nov. has been designated and included in this report.

Abbreviations used. — CL, post-orbital carapace length; R., rostrum; LEMMI, Laboratory of Ecology and Morphology of Marine Invertebrates, A.N. Severtzov Institute of Ecology and Evolution of RAS, Moscow; NHM, the Natural History Museum, London; QM, Queensland Museum, Brisbane; USNM, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

SYSTEMATICS

Family PALAEMONIDAE Rafinesque, 1815
Subfamily PONTONIINAE Kingsley, 1878
Genus *Periclimenaeus* Borradaile, 1915

Periclimenaeus quadridentatus Rathbun, 1906
(figs. 1-2)

Coralliocaris quadridentata Rathbun, 1906, Bull. U.S. Fish. Comm., **23**(3): 920, fig. 69, pl. 24 fig. 1.
Periclimenaeus quadridentatus — Holthuis, 1953, Atoll Res. Bull., **24**: 56.

Material examined. — One ♀, holotype, Albatross Expedition, stn 3876, Auau Channel, Hawaiian Islands, 51-79 m, USNM 30552.

Diagnosis. — Rostral dentition 4/0, posterior dorsal carina convex, carapace without supraorbital teeth or tubercles, post-antennal spines absent, first abdominal tergite without anterior median dorsal lobe, scaphocerite with small distolateral tooth, not exceeding lamella, dactyl of major second pereiopod with well developed molar process, distal cutting edge entire, carpus with dorsal and medial lobes well developed, dactyl of minor second pereiopod unknown, dactyl of third pereiopod biunguiculate with unguis non-denticulate, corpus without acute basal process, ventral margin non-denticulate, carpus and propod of third pereiopod not greatly swollen, propod 5.7 times as broad proximally as centrally, with paired distoventral spines and 2 small ventral spines only; dorsal telson spines small, at about 0.1 and 0.55 of telson length, uropodal exopod with small distolateral tooth and mobile spine only.

Description. — Holotype. Rostrum (fig. 1C) about 0.33 of CL, stout, horizontal, reaching to about middle of intermediate antennular segment, with 4 small acute teeth on distal two-thirds, proximal dorsal margin convex, ventral border convex, unarmed; carapace (fig. 1A, B) smooth, with feeble supraorbital ridges, without supraorbital tubercles, antennal spine marginal, slender, acute, with small inferior orbital process medially, pterygostomial angle produced. Abdomen without special features, first somite without anterodorsal lobe. Telson (fig. 1D) about 0.5 of CL, 2.3 times as long as proximal width, with two pairs of small dorsal spines, about 0.1 of telson length, at 0.1 and 0.55 of telson length, posterior margin (fig. 1E) 0.4 of anterior telson width, lateral posterior spines small, about 0.3 of intermediate spine length, intermediate spines well developed, about 0.15 of telson length, submedian spines shorter, robust.

Antennule with distolateral angle of proximal segment acute, strongly produced; upper flagellum biramous, proximal four segments fused, short ramus with 2 free segments, longer ramus with 7 segments, lower flagellum with about 17 segments.

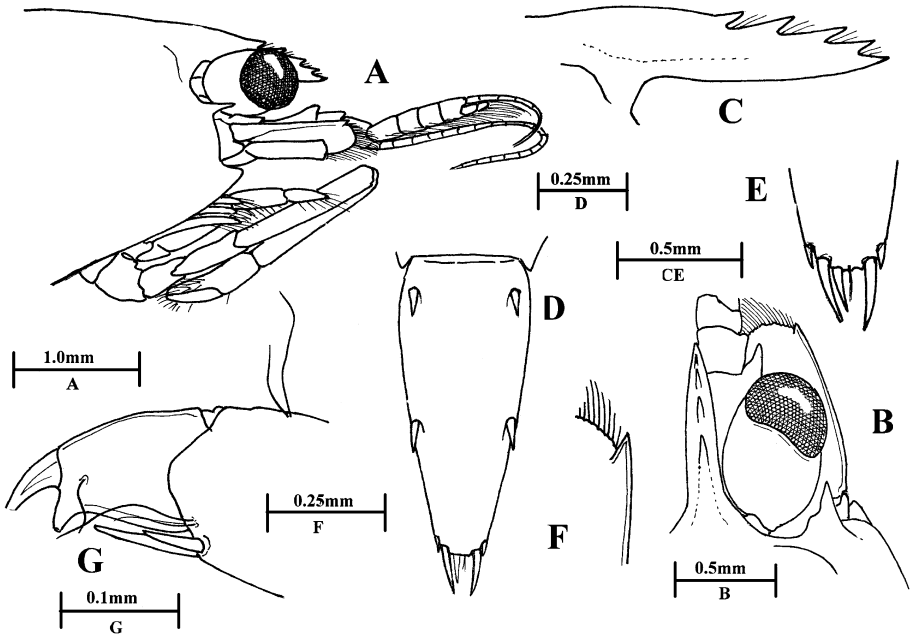

Fig. 1. *Periclimenaeus quadridentatus* Rathbun, 1906, holotype, Hawaiian Islands, USNM 30552. A, anterior carapace and appendages, lateral; B, right anterior carapace, rostrum, antennal peduncles, dorsal; C, rostrum; D, telson; E, same, posterior spines; F, scaphocerite, distolateral tooth; G, third pereiopod, distal propod and dactyl.

Antenna with basicerite unarmed, carpocerite short, reaching to about distal margin of proximal antennular segment, scaphocerite (fig. 1F) well developed, exceeding intermediate antennular segment, far exceeding carpocerite, lateral margin feebly convex, with small acute distal tooth, not exceeding lamella.

Eye (fig. 1B) well developed, cornea large, oblique hemispherical, diameter about 0.15 of CL, stalk globular, broader than cornea, about as wide as long.

First pereiopods slender, exceeding carpocerite by distal fourth of merus; chela (fig. 2A) with palm about 1.6 times as long as deep, compressed, fingers slightly shorter than palm, slender, simple, tips acute, cutting edges entire; carpus about 1.5 times chela length, subequal to merus; proximal segments without special features.

Major second pereiopod (fig. 2B) with chela smooth, glabrous, non-tuberculate, about 3.0 times CL, palm twice as long as deep, subcylindrical, slightly compressed, feebly tapered distally, dactylus (fig. 2C, D, E) about 0.4 of palm length, semicircular, robust, with stout incurved tip, molar process feebly developed, distal cutting edge entire, much thickened, bluntly rounded, fixed finger (fig. 2C, D, E) with similar incurved tip, cutting edge with deep fossa proximally, dorsal border with small setose angle, ventrally with broad blunt lobe, carpus (fig. 2F, G) articulated very obliquely with chela, well in advance of the posterior end, strongly

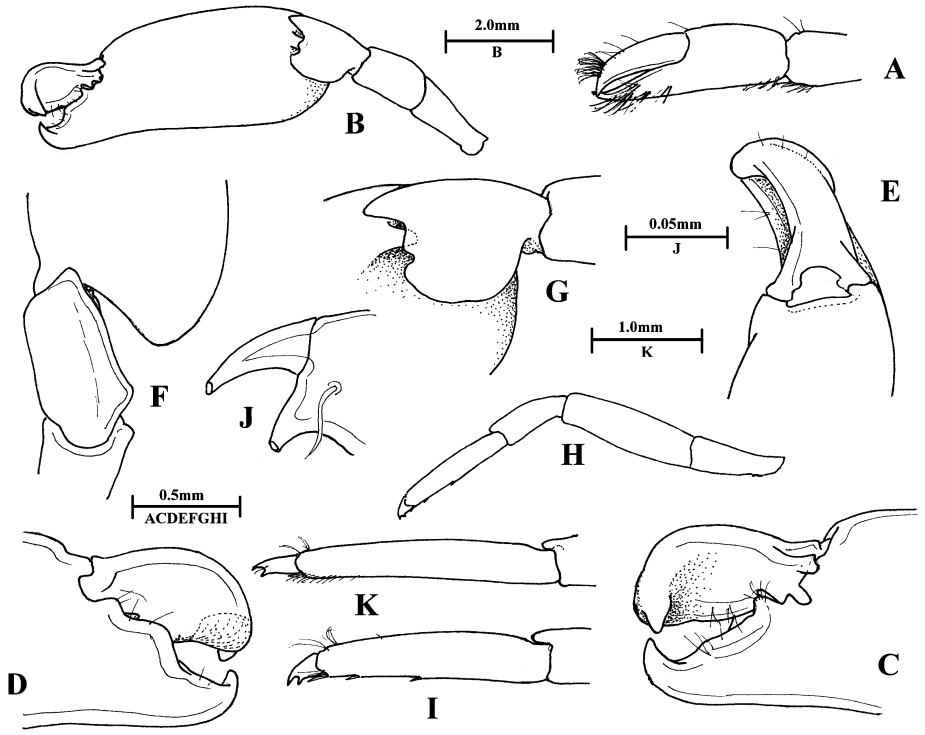

Fig. 2. *Periclimenaeus quadridentatus* Rathbun, 1906, holotype, Hawaiian Islands, USNM 30552. A, first pereiopod, chela; B, major second pereiopod; C, same, fingers, medial; D, same, lateral; E, same, dorsal; F, carpus, lateral; G, same, dorsal; H, third pereiopod; I, same, propod and dactyl; J, same, distal dactyl; K, fifth pereiopod, propod and dactyl.

obliquely excavate laterally, with well developed medial and lateral lobes, non-tuberculate; merus short, about 0.3 of palm length, 1.6 times as long as wide, unarmed; ischium 1.1 times merus length, 2.2 times as long as distal width, tapering proximally, unarmed; basis and coxa normal.

Minor second pereiopod missing.

Third pereiopod (fig. 2H) normal; dactyl (fig. 1G) with unguis (fig. 2J) (tip missing) distinct, short, slender, acute, about 0.6 of corpus length), corpus compressed, about 1.3 times as long as proximal depth, with stout distal accessory tooth (fig. 2J), slightly smaller than unguis, ventral border sinuous, without denticles or proximal tooth; propod (fig. 2I) about 0.35 of CL, 5.75 times as long as central width, with well developed pair of slender unequal distoventral spines, two small ventral spines; carpus about 0.6 of propod length, unarmed; merus 1.1 times propod length, 3.2 times as long as central width, unarmed; ischium 0.66 of merus length, 3.0 times as long as distal width, unarmed. Fifth pereiopod (fig. 2K) more slender; dactyl biunguiculate, 0.16 of propod length, propod about 1.15 times third

propod length, 7.0 times as long as maximal width, with single distoventral spine and numerous distal ventral cleaning setae.

Uropods without special features.

Measurements. — Post-orbital carapace length, 3.0 mm.

Coloration and host. — Unknown.

Remarks. — The holotype specimen is in good condition, although lacking the minor second pereiopod. The major second pereiopod is detached and four detached ambulatory pereiopods are preserved, together with most of one second maxilliped, the other mouthparts being missing. The loss of the minor second pereiopod and mouthparts has been recently confirmed by Dr Raphael Lemaitre. In the original description the photographic illustration clearly shows that the minor second pereiopod was originally present and was very much smaller than the massive major pereiopod, about 0.3 of its length, but the details of the fingers, particularly if the dactylar cutting edge is denticulate or not, can not be discerned.

The holotype specimen of *Periclimenaeus quadridentatus* shows a close resemblance to *P. stylirostris* Bruce, 1969. An un-illustrated preliminary description of this species was initially provided (Bruce, 1969). The pair of specimens were collected from 89.6-90.1 m in the South China Sea. A later publication (Bruce, 1972) reported a further specimen, a male from a shallow water Fijian coral reef, with more morphological detail and illustrations. The very slender rostrum of the holotype of *P. stylirostris* was subsequently considered to be atypical and that of the allotype male is probably more typical. More recent re-consideration suggests that the specimens are not conspecific with the type specimen of *P. quadridentatus* showing a more strongly carinate antennal tooth than the Fijian specimen. This may be supported by the considerable differences in habitat and depth of capture of the two taxa.

Periclimenaeus quadridentatus differs from *P. stylirostris* in the presence of a deeper rostrum with four dorsal rostral teeth situated on the distal half with the proximal dorsal margin convex and the ventral margin also distinctly convex, in contrast to a shallower rostrum with six teeth spread along almost the whole rostral length with the ventral margin sinuous or concave. Both species have a characteristic dactylus on the major second pereiopod in which the molar process almost merges with a much thickened blunt distal cutting edge.

The specimens from Saipan referred to *Periclimenaeus quadridentatus* by Holthuis (1953) have rostral dentitions of 3/0 (male) and 5/0 (female). Both specimens have a minor second pereiopod that is somewhat similar to that of *P. stylirostris* as figured in Bruce (1972, fig. 5F, G) but the palm is swollen proximally and tapers very strongly distally where its depth is about 0.4 of the maximal depth, the dactyl is about half the palm length and the fixed finger is distinctly more

slender, about 2.0 times as long as the proximal depth, distally bidentate, with the dorsal tooth more robust than the ventral tooth. The third ambulatory pereiopod has the dactyl more strongly curved and the propod is armed distally with very long spines that project well beyond the distal margin of the dactyl. The features suggest that these specimens should not be referred to *P. quadridentatus*.

Periclimenaeus quadridentatus was earlier synonymized with *Periclimenaeus tridentatus* (Miers), a tunicate associate, by Holthuis (1952). The dactyl of the third ambulatory pereiopod in *P. tridentatus* is very short and stout, longer than deep, and bears a well developed distal tooth and a styliform acute basal tooth (Bruce, 1974: 1580, fig. 15C), flanked by three robust subequal distoventral spines. The specimens referred to *Coralliocaris tridentata* Miers, 1884 and *C. quadridentata* Rathbun, 1906 by Edmondson (1923, 1924, 1925, 1946) from the Hawaiian region and referred to *P. tridentatus* by Holthuis (1952) have been examined and lack the styliform basal tooth on the ambulatory pereiopod dactyls and are therefore not referrable to *P. tridentatus*. They may be referrable to *P. quadridentatus* s. str. but need further study before this can be confirmed.

The specimens of *P. quadridentatus* from Mombasa (Bruce, 1976, 30 m, QM W29086) have been re-studied. The male and ovigerous female pair (CLs 3.0, 4.0 mm) obtained from a sponge host both have a rostral dentition of 5/0 and possess both second pereiopods. The minor chela is 0.36 of the major chela length in the male, 0.35 in the female. The major second pereiopod corresponds well to that of *P. quadridentatus*, the minor is closely similar to that of *P. stylirostris* with the fingers very strongly compressed, dactyl subcircular with entire cutting edge and fixed finger distally acutely bidentate. It can be assumed that the minor second pereiopod fingers in *P. quadridentatus* will be subcircular with entire cutting edges.

Periclimenaeus quadridentatus has also been reported from Heron Island, Queensland (Bruce, 1981: 27, table 1), while not included in the text. This error was compounded in Bruce (2010) where its presence on Heron Island was repeated. This record appears to be completely unfounded and no specimens or notes suggesting its presence in Australian waters can as yet be provided.

The relationship of *P. quadridentatus*, *P. stylirostris* and related taxa remains rather obscure and suggests the existence of a species complex. The association of the *P. stylirostris* types with a sponge host also suggests that the other taxa will have similar associations. Their distributions remain uncertain and all specimens need critical re-examination. It seems possible that *P. stylirostris* will prove to be a junior synonym of *P. quadridentatus*.

Distribution. — Type locality: Auau Channel, between Maui and Lanai Islands, Hawaiian Islands, 51-79 m. Also reported from Kenya, ? La Réunion, ? Queensland and ? Marianna and ? Hawaiian Islands.

Periclimenaeus crassipes (Calman, 1939)
(figs. 3-5)

Periclimenes (*Ancylocaris*) *crassipes* Calman, 1939, Scient. Rep. John Murray Exped., **6**: 211-215, fig. 5.
Periclimenaeus tridentatus — Holthuis, 1952, Siboga Exped. Mon., **39a**: 14, 141 (partim).
Periclimenaeus crassipes — Bruce, 1974, Bull. Mus. natn. Hist. nat., Paris, **180**: 1577, fig. 15E.

Material examined. — Two ovigerous ♀♀, syntypes, CLs 3.0, 3.0 mm, John Murray Expedition, stn 45, Oman, 18°03.5′N 57°02.5′E, 38 m, NHM 1939.10.9.304-305.

Diagnosis. — R. 4/0, supraorbital spines lacking, post-antennal spines absent, first abdominal tergite without anterior median dorsal lobe, scaphocerite with small distolateral tooth, not exceeding lamella, dactyl of major second pereiopod with well developed molar process, distal cutting edge entire, dactyl of minor second pereiopod much longer than fixed finger, cutting edge denticulate with about 10 blunt teeth distally; dactyl of third pereiopod with unguis non-denticulate, with acute basal process, without distal accessory tooth, corpus with ventral margin non-denticulate, carpus and propod of third pereiopod greatly swollen, propod 3 times as broad proximally as distally, with distoventral spines only; dorsal telson spines small at about 0.23 and 0.65 of telson length, uropodal exopod with small distolateral tooth and mobile spine only.

Description. — Rostrum (fig. 3B) short, slightly exceeding anteroverted eye, straight with slightly up-turned tip, dorsal margin with four acute teeth, all anterior to orbital margin, ventral margin unarmed. Carapace (fig. 3A) with orbit obsolete, supraorbital teeth or tubercles absent, antennal spine well developed, anterolateral angle of branchiostegite strongly produced. Abdomen normal, first somite without median anterior dorsal lobe. Telson (fig. 4F) 2.0 times length of sixth abdominal somite, 2.4 times as long as anterior width, lateral margins feebly convex, posteriorly convergent to rounded posterior margin, about 0.4 of anterior width, without median point, with two pairs of small submarginal equal dorsal spines, about 0.09 of telson length, at 0.23 and 0.65 of telson length, lateral posterior spines (fig. 3G) smaller, more slender than dorsal spines, about 0.5 of intermediate spine length, intermediate spines well developed, about 0.1 of telson length, 1.2 times lateral spine length, submedian spines longer than intermediate spines, about 0.15 of telson length, slender, setulose.

Antennule (fig. 5A) normal, with short flagella, proximal segment (fig. 3C) of peduncle with sinuous lateral margin expanded proximally, with acute leaf-like stylocerite, distolateral angle rounded with minute acute process only, ventral medial margin with small acute tooth; upper flagellum with proximal five segments fused, shorter free ramus with single segment only. Antenna (fig. 3D) with basicerite laterally unarmed, coxal segment with rounded boss medially, scaphocerite about 2.1

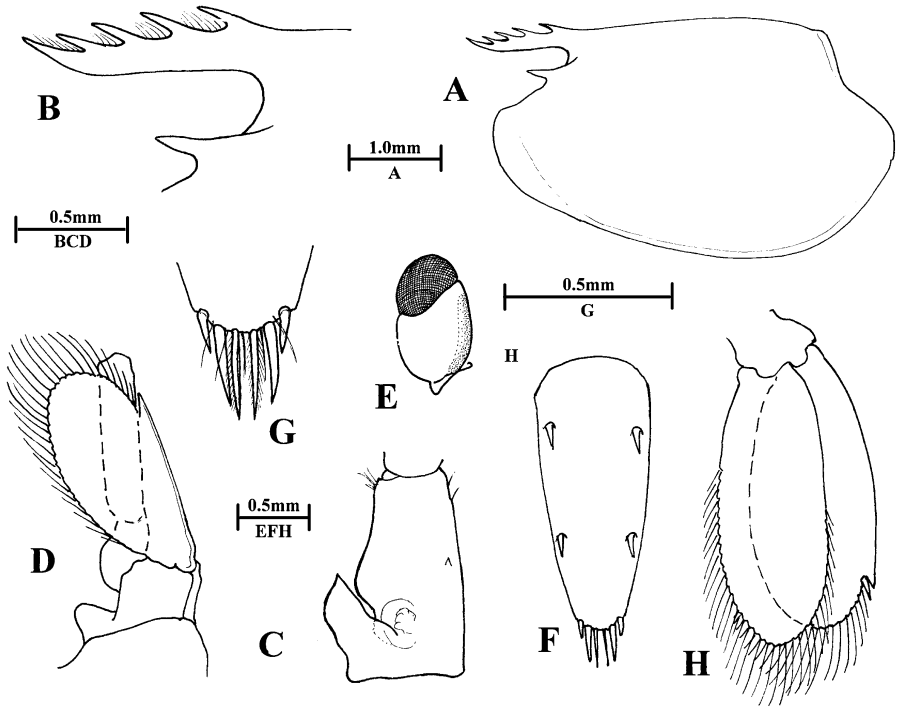

Fig. 3. *Periclimenaeus crassipes* (Calman, 1939), syntype, Oman, NHM 1939.10.9.304-305. A, carapace and rostrum; B, rostrum; C, antennule, proximal segment; D, antenna; E, eye, dorsal; F, telson; G, same, posterior spines; H, uropod.

times as long as broad, with rounded distal lamella well exceeding small acute distolateral tooth situated at about 0.75 of scaphocerite length.

Eye (fig. 3E) normal with oblique globular cornea, medial aspect of eyestalk flattened or feebly concave.

First pereiopod (fig. 4A) normal, with palm of chela (fig. 4B) sub-cylindrical, slightly tapering distally, about 2.5 times as long as deep, fingers slender, with numerous groups of long setae, about 0.9 of palm length, tapering, narrowly spatulate, cutting edges entire, with tridentate tips; carpus about 1.1 times chela length; merus subequal to carpal length; ischium and basis without special features, coxa with small distoventral process.

Major second pereiopod of syntype (i) (fig. 4C) with chela (fig. 4D) about 1.6 times CL, smooth, palm greatly swollen, subcylindrical, feebly tapering and compressed distally, about twice as long as deep, fingers (fig. 5B) about 0.4 of palm length, dactyl robust, about 2.1 times as long as deep, with stout hooked tip, cutting edge with large molar process proximally, distally with edge swollen, entire; fixed finger robust, tapering distally, with large fossa proximally, distal cutting edge entire, with stout hooked tip; carpus short and stout, less than 0.25

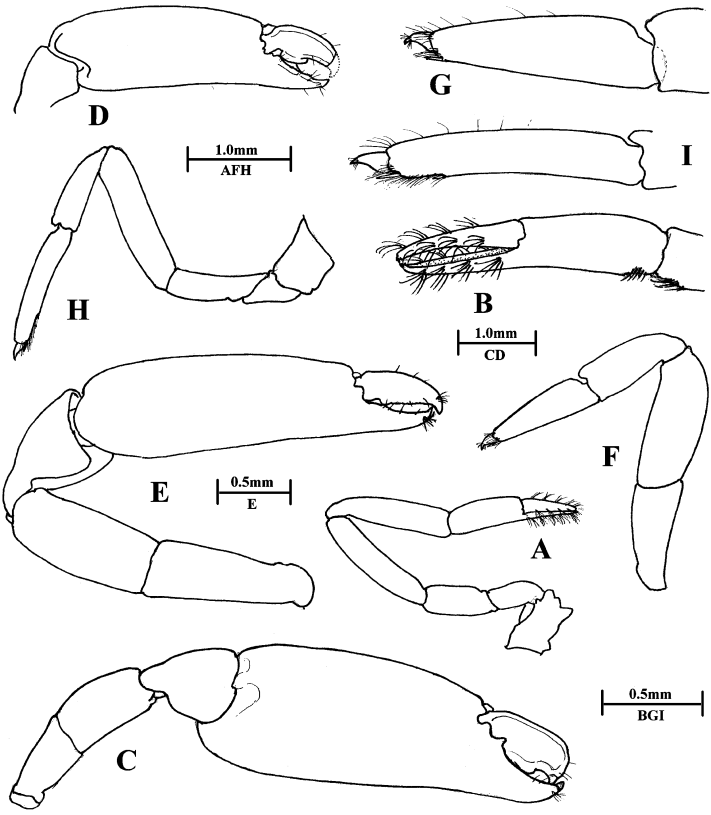

Fig. 4. *Periclimenaeus crassipes* (Calman, 1939), syntypes, Oman, NHM 1939.10.9.304-305. A, first pereiopod; B, same, chela; C, major second pereiopod; D, same, chela; E, minor second pereiopod; F, third pereiopod; G, same, propod and dactyl; H, fifth pereiopod; I, same, propod and dactyl. C, syntype (i); A, B, D-I, syntype (ii).

of chela length, unarmed; merus and ischium of subequal length, stout, unarmed, without ventral tubercles or denticles, merus 1.6 times as long as deep, equal to length of fingers; ischium more slender.

Minor second pereiopod of syntype (i) missing.

Minor second pereiopod of syntype (ii) (fig. 4E) has the chela about 0.65 of the major chela length with the palm 2.9 times as long as deep, smooth, without long ventral setae, slightly compressed and tapering distally; fingers (fig. 5C) slender, slightly compressed, about 0.27 of palm length, dactyl 2.8 times as long as proximal depth, dorsal margin evenly convex, cutting edge straight with small acute tooth proximally, with about 12 small irregular teeth extending onto feebly hooked subacute tip that extends well beyond the distal end of fixed finger; fixed finger about twice as long as proximal depth, cutting edge simple with small tooth

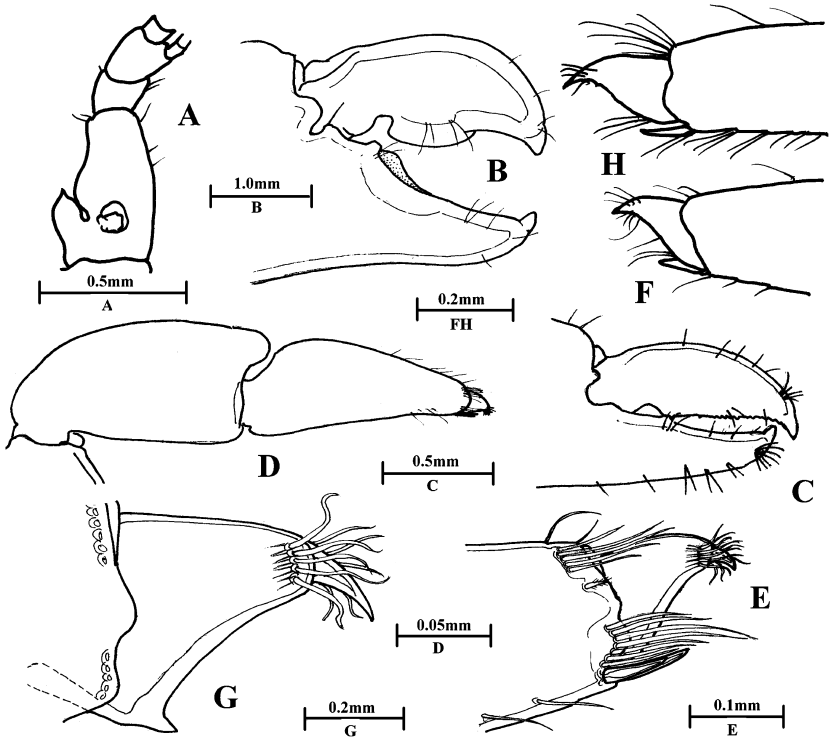

Fig. 5. *Periclimenaeus crassipes* (Calman, 1939), syntype(s), Oman, NHM 1939.10.9.304-305. A, antennular peduncle; B, major second pereiopod, fingers; C, minor second pereiopod fingers; D, third pereiopod, dactyl, propod and carpus; E, same, distal propod and dactyl; F, fourth pereiopod, distal propod and dactyl; G, fourth pereiopod, same, dactyl; H, fifth pereiopod, distal propod and dactyl.

proximally, distally feebly concave, entire, tip bluntly hooked. Proximal segments similar to those of major chela but smaller.

Third pereiopod robust (fig. 4F), with propod and carpus swollen (fig. 5D); dactyl (fig. 5E) short and stout, with small simple unguis, corpus with numerous sensory setae distally partly obscuring unguis, distal accessory tooth absent, ventral margin concave with small acute proximal tooth, propod (fig. 4G) with proximal dorsal region inflated, about 2.7 times as long as wide, tapering strongly distally, with pair of distoventral spines only and numerous setae obscuring the base of dactyl; carpus very strongly inflated, twice as long as deep, subequal to propod length, 1.3 times maximal propod width; merus similarly inflated, 2.3 times as long as wide, 1.4 times carpal length; ischium and basis normal. Fourth pereiopod (fig. 5F, G) similar to third but less markedly swollen. Fifth pereiopod (fig. 5H) slender, dactyl without proximal accessory tooth, propod 5.5 times as long as wide with single distoventral spine, single distal ventral spine and numerous setae.

Uropods (fig. 3H) normal; exopod broad, about 2.2 times as long as wide with lateral margin convex with small acute distal tooth with mobile spine medially; endopod without special features.

Systematic position. — *Periclimenaeus crassipes* most closely resembles *P. nobilii* Bruce, 1974, with which it shares the following characters: minor second pereiopod dactyl with cutting edge denticulate and third pereiopod with corpus of dactyl with an acute proximal tooth but without a distal accessory tooth and without ventral denticulations. *Periclimenaeus crassipes* may be distinguished from *P. nobilii* by the rostral dentition 4/0 (vs 2/0), minor second pereiopod with glabrous palm (vs markedly setose), dactyl that extends well beyond the fixed finger (vs fingers of similar length), has the cutting edge straight (vs sinuous), with about 12 small acute similar teeth (vs about 25 of diminishing size proximally), third ambulatory pereiopod with propod and carpus strongly inflated (vs less inflated), smaller dorsal telson spines, about 0.9 of telson length at about 0.23 and 0.65 of telson length (vs about 0.15, at 0.4 and 0.65). *Periclimenaeus crassipes* is also similar to *P. storchi* Bruce, 1989, which has a rostral dentition of 3/0, with a broader minor second pereiopod dactyl not exceeding fixed finger, with a convex cutting edge with about 20 acute recurved teeth of decreasing size proximally and dorsal telson spines at 0.35 and 0.65 of the telson length (Bruce, 1989). In this species, from an unidentified tunicate host, the third ambulatory pereiopod is robust, but less so than in *Periclimenaeus crassipes*.

Host. — Unknown.

Distribution. — Known only from the type locality, off Oman.

Remarks. — Calman did not designate a holotype specimen. The two specimens are ovigerous females of similar size with most of the appendages, but only one minor second pereiopod is preserved. This is attached to the specimen with a smaller major second pereiopod chela, which also shows less conspicuous inflation of the third ambulatory pereiopod propod and dactyl. Although reported as "pulled off calcareous sponges or removed from the debris in the jar containing them" (Calman, 1939), it is most likely that the host of this species was an ascidian.

Periclimenaeus calmani sp. nov.
(figs. 6-7)

Periclimenaeus crassipes — Bruce & Coombes, 1997, Proc. Sixth internat. mar. Biol. Workshop, Darwin Harbour: 304.

Material examined. — One ♂, East Point, Darwin, 12°25.0′S 130°39.0′E, 8-10 m, Northern Territory, Australia, 28 October 1982, coll. J. K. Lowry, SCUBA, NTM Cr.000326.

Diagnosis. — Rostral dentition 4/0, tip edentate, reaching to end of intermediate segment of antennular peduncle, supraorbital tubercles absent, inferior orbital

angle distinct, first abdominal somite without anterior dorsal lobe, carpocerite exceeding scaphocerite lamella, scaphocerite with lamella well exceeding distolateral tooth, first pereiopod with fingers of chela narrowly subspatulate, cutting edges entire, second pereiopods very unequal, palm smooth, merus and ischium non-spinulate ventrally, dactyl strongly incurved distally, with molar process huge, distal cutting edge very short, entire, minor second pereiopod dactyl well exceeding fixed finger, cutting edge finely denticulate, with about 35 (estimated) small acute teeth, ambulatory dactyls short, simple, unarmed, unguis short, corpus obliquely truncated distomedially, without basal process, ventral margin straight, third pereiopod propod inflated, telson with two pairs of well developed dorsal spines, about 0.17 of telson length (0.35 mm), at 0.26 and 0.67 of telson length, exopod of uropod with distal tooth and spine only.

Description. — Rostrum (fig. 6B) slender, slightly up-curved, exceeding intermediate segment of antennular peduncle, about 0.5 of CL, with four slender acute teeth dorsally on proximal 0.55 of rostral length, distal 0.45 slender, unarmed; carapace (fig. 6A) with small post-orbital ridge, without distinct supraorbital tu-

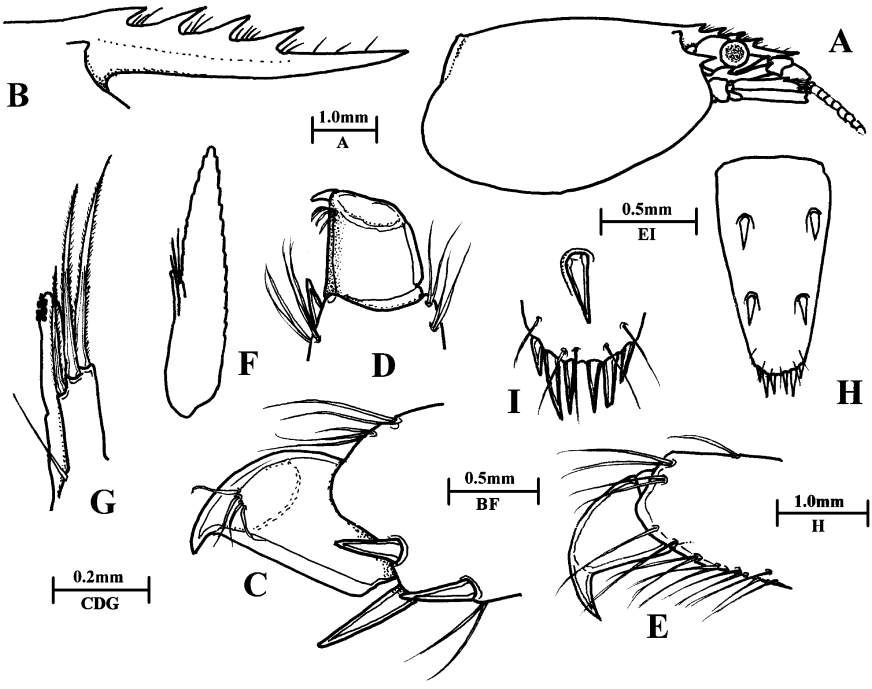

Fig. 6. *Periclimenaeus calmani* sp. nov., holotype male, Darwin, NTM Cr.000326. A, carapace and anterior appendages; B, rostrum; C, third pereiopod, distal propod and dactyl, medial; D, same, dorsal; E, fifth pereiopod, distal propod and dactyl; F, second pleopod, endopod; G, same, appendices; H, telson; I same, posterior spines, dorsal spine inset above.

bercles, antennal spine slender, paraorbital, inferior orbital angle distinct medial to antennal spine, anterolateral angle slightly produced, broadly rounded.

Abdomen without special features, first somite without anterodorsal lobe. Telson (fig. 6H) about twice as long as anterior width, with two pairs of well developed submarginal dorsal spines (fig. 6I, inset), about 0.17 of telson length (0.35 mm), at 0.26 and 0.67 of telson length, posterior margin (fig. 6I) broadly rounded, about 0.4 of anterior width, without median point, with 3 pairs of spines, intermediate spines longest, shorter and less robust than dorsal spines, submedian spines 0.8 of intermediate spine length, non-setulose.

Eyes and antennae (fig. 6A) without special features. Mouthparts not examined.

First pereiopod (fig. 7A) normal, slender, chela (fig. 7B) about 0.4 of CL, fingers subequal to palm length, narrowly spatulate, distal half of cutting edges laminar, entire, tips (fig. 7C) with 3 small hooked teeth, central teeth larger than adjacent teeth; carpus slender, 1.2 times chela length; merus 1.1 times carpal length; ischium, basis and coxa without special features.

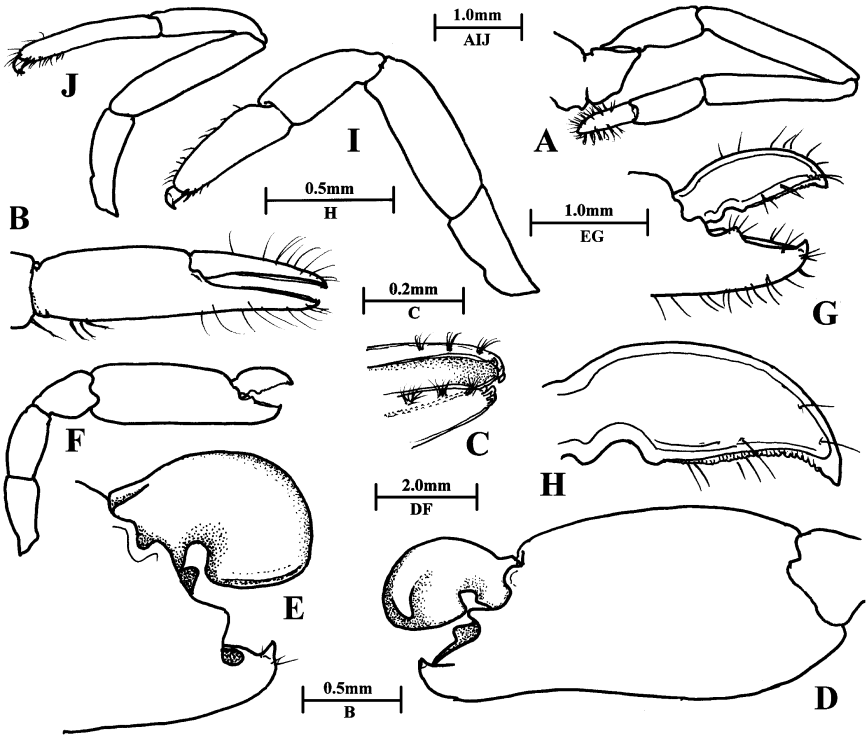

Fig. 7. *Periclimenaeus calmani* sp. nov., holotype male, Darwin, NTM Cr.000326. A, first pereiopod; B, same, chela; C, same, finger tips; D, major second pereiopod, chela; E, same, fingers, lateral; F, minor second pereiopod; G, same, fingers, lateral; H, same, dactyl; I, third pereiopod; J, fifth pereiopod.

Second pereiopods grossly unequal and dissimilar. Major second pereiopod with chela (fig. 7D) about 2.6 times CL, smooth, oval in section, tapering slightly distally, 1.7 times as long as maximal depth, glabrous, dactylus (fig. 7E) about 0.45 of palm length, strongly medially incurved distally, dorsal margin strongly convex, tip subacute, fixed finger (fig. 7E) cutting edge with massive molar process, distal cutting edge obsolescent, entire; proximal segments without special features, ventral surfaces without tuberculations. Minor second pereiopod (fig. 7F) with chela about 1.15 of CL, 0.45 of major chela length, palm oval in section, uniform, glabrous, 2.5 times as long as deep, fingers (fig. 7G) about 0.36 of palm length, dactylus (fig. 7H) exceeding fixed finger, about 2.5 times as long as maximal depth, dorsally strongly convex, tip stoutly acute, compressed, cutting edge with deep notch proximally, distal two- thirds sinuous, confluent with tip, mainly finely denticulate (abraded) with about 35 teeth, minute proximally becoming larger distally, with small rounded prominence proximally, fixed finger about 1.6 times as long as proximal depth, moderately setose, occlusal surface deeply grooved, margins mainly entire, medial lower than lateral with subrectangular tooth proximally, lateral margin with low obtuse tooth, proximal segments without special features, ventral surfaces without tuberculations.

Third pereiopod (fig. 6C, 7I) robust, with dactyl (fig. 6C) short, about 0.16 of propod length, unguis short, curved, about 0.15 of corpus length, poorly demarcated from corpus, unarmed, corpus robust, obliquely truncated distolaterally, surface oval, flattened, ventral margin compressed, sharp, straight, without distal accessory tooth, proximal tooth or ventral denticulations, corpus with several distal medial and lateral sensory setae; propod about 0.41 of CL, 2.8 times as long as maximal depth, swollen proximally, tapering distally, distal width about 0.5 of maximal width (fig. 6C, D), with well developed distolateral spine, smaller distomedial spine and similar distal ventral spine only; carpus about 0.8 of propod length, swollen, distal width about 0.5 of length; merus 1.3 times propod length, 3.0 times as long as wide, unarmed; ischium subequal to propod length, unarmed; proximal segments without special features.

Fourth pereiopod similar to fifth. Fifth pereiopod with dactyl (figs. 6E, 7J) without distal truncation of corpus, ventral margin unarmed, unguis well developed, length about half that of dorsal margin of corpus, twice length of third pereiopod unguis; propod slender, 1.1 times third pereiopod propod length, not swollen, about 6.5 times as long as proximal width, tapering slightly distally, without spines, with numerous distoventral setae, carpus 0.33 of propod length, not swollen, 3.5 times as long as distal width, merus 1.1 times propod length 5.0 times as long as central width.

Second pleopod endopod (fig. 6F) with appendix masculina (fig. 6G) corpus short, subcylindrical, 2.2 times as long as wide, about 0.11 of endopod length,

with 2 long setulose terminal spines, about 2.0 times corpus length and shorter similar preterminal spine.

Uropod without special features. Exopod with small distal tooth with mobile spine medially.

Measurements (mm). — Holotype male, postorbital carapace length, 3.6; carapace and rostrum, 5.2; total body length, 14.0 (approx.); major second pereiopod chela, 9.5; minor second pereiopod chela, 4.2.

Systematic position. — Only two species of *Periclimenaeus* have simple ambulatory dactyls, all others having a distal accessory tooth on the corpus, ventral denticulations on their ungues or ornamentation of the proximal ventral border of the corpus. These two are *P. hecate* (Nobili, 1904) and *P. serrula* Bruce, 1995.

Periclimenaeus calmani has the ambulatory dactyl with the ventral margin of the corpus straight (vs distinctly convex in *P. hecate*) and the unguis small, about 0.2 of ventral corpus length (vs 0.75 in *P. hecate*). *Periclimenaeus serrula* has a shorter, more strongly up-curved rostrum, and the dactyl of the minor second pereiopod has the cutting edge straight and entire, with a small hooked tip distally, and the telson has very small dorsal spines. Neither of these species have a distally truncate dactylar corpus on the third pereiopod.

Host. — *Didemnum psammatode* (Sluiter, 1895) [Ascidiacea], det. P. Kott.

Etymology. — The species is named in honour of Dr William Thomas Calman, (1871-1952), of the British Museum (Natural History), London, who reported on the carideans collected by the John Murray Expedition and described *Periclimenes crassipes*.

Distribution. — Known only from the holotype specimen from Darwin, Australia.

Remarks. — Initially confused with *P. crassipes* (Calman), from which it was recently distinguished when it was found that the third ambulatory dactyl of the type material of *P. crassipes* possessed an acute process on the proximal corpus. More detailed examination revealed further differences, the most noticeable being the distally truncated form of the third ambulatory dactylar corpus. This is unique in the Pontoniinae. It is exactly the same on left and right pereiopods precluding the possibility of accidental origin.

Periclimenaeus serenei sp. nov.

Periclimenaeus hecate — Marin, Britaev & Anker, 2005, Arthropoda Selecta, **13**(4): 205-207, fig. 5a-h.

Material. — One ovigerous ♀, holotype, Tam Island, Nha Trang Bay, Vietnam, LEMMI unnumbered.

Description. — Briefly described by Marin et al. (2004) with illustrations of the whole specimen, anterior carapace and antennae, rostrum, first pereiopod, fingers

of second pereiopod, third pereiopod, distal propod and dactyl of third pereiopod, and distolateral angle of uropodal exopod.

Systematic position. — Closely resembling *P. hecate* (Nobili, 1904), but differing particularly in the fingers of the minor second pereiopod in which the dactyl has a straight cutting edge with about 15 rather coarse small teeth (Marin et al., 2005, fig. 5e). This contrasts with the dactyl in *P. hecate* in which the cutting edge is also straight but is armed with about 40 uniform, slender denticulations (Bruce, 1974: 1575, fig. 12G). The cutting edge of the fixed finger also differs from that of *P. hecate* as it is also coarsely denticulate over the distal two-thirds, as opposed to being entire in *P. hecate*. The third ambulatory dactyls appear similar in the two species but the surface of the corpus appears extensively pitted in *P. serenei* and without such pitting in *P. hecate*. These pits may represent the articulations of detached or abraded setae. The ambulatory propod in *P. hecate* has a pair of slender distoventral spines and a similar preterminal spine, in *P. serenei* only a single distal spine is present. The spines appear more acute in *P. serenei* and the ventral margin of the dactylar corpus is more highly convex in *P. hecate*.

Etymology. — The species is dedicated to the memory of Dr. Raoul Serène, 1909-1980, the French carcinologist, who studied the decapod and stomatopod fauna of the Nha Trang region for many years, and always found time to provide the author with ready assistance.

Host. — Uncertain, found on *Seriatopora* colony (Marin et al., 2004), but probably from an associated ascidian host.

Distribution. — Known only from the ovigerous female holotype specimen from Tam Island, Nha Trang Bay, Vietnam.

Remarks. — Further specimens of *Periclimenaeus hecate* from Nha Trang were reported by Marin & Savinkin (2007: 196, tab. 2), who provided two colour figures of a pair and a single specimen, (Marin & Savinkin, 2007, fig. 87C, D). It is unclear if these refer to *P. hecate* (Nobili, 1904) or *P. serenei* sp. nov. (cf. Marin & Savinkin, 2007, fig. 87C, D).

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