The Bopyridae (Crustacea, Isopoda) parasites of the Stylodactylidae (Crustacea, Decapoda, Caridea)

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ABSTRACT
Two new species of bopyrid isopods, *Pseudione stylopoda* n. sp. and *P. clevai* n. sp., are reported from species in the family Stylodactylidae and are the first species described from members of this enigmatic caridean family. One of the new species is very close to the New Zealand taxon *P. pontocari* Page, 1985, especially in the form of the distinctive styliform shape of the endopods of pleopods IV and V in the female. The second new species has some similarity to *P. elongata elongata* (Hansen, 1897) in the shape of the female pleotelson, but is otherwise very distinctive within the genus. Additional literature records of bopyrids from species of Stylodactylidae for which specimens cannot be located are discussed.

KEY WORDS
Crustacea,
Isopoda,
Bopyridae,
Pseudione,
Stylodactylus,
Parastylodactylus,
New Caledonia,
new species.

RÉSUMÉ
Les Bopyridae (Crustacea, Isopoda) parasites de Stylodactylidae (Crustacea, Decapoda, Caridea).
Deux nouvelles espèces d'isopodes bopyrides, *Pseudione stylopoda* n. sp. and *P. clevai* n. sp., sont rapportées pour la première fois sur des espèces appartenant à la famille caridéenne énigmatique des Stylodactylidae. Une de ces espèces est très proche d'un taxon de Nouvelle-Zélande, *P. pontocari* Page, 1985, en particulier au niveau de la forme vraiment styliforme des endopodes des pléopodes IV et V chez les femelles. La seconde espèce nouvelle possède quelques similitudes avec *P. elongata elongata* (Hansen, 1897) sur la forme du pléotelson femelle, mais est d'un autre côté très distincte à l'intérieur du genre. Des données bibliographiques additionnelles sur les bopyrides à partir d'espèces de Stylodactylidae pour lesquelles les spécimens n'ont pas été localisés sont discutées.

MOTS CLÉS
Crustacea,
Isopoda,
Bopyridae,
Pseudione,
Stylodactylus,
Parastylodactylus,
Nouvelle-Calédonie,
nouvelles espèces.

INTRODUCTION

Cleva (1990a, 1997), in his revisionary work on Indo-Pacific members of the enigmatic caridean family Stylodactylidae Bate, 1888, carefully cited all instances where specimens he examined were parasitized by bopyrid isopods. No other bopyrids have been recorded from among the many specimens and species of Pacific Stylodactylidae cited in the literature (Cleva 1990a, 1994, 1997), and no bopyrids are known from any Atlantic Stylodactylidae (Cleva 1990b).

A search was made of the collections of Stylodactylidae in the Muséum national d'Histoire naturelle, Paris (MNHN) for bopyrids, in order to determine whether these parasites exhibit specificity for stylodactylid hosts, or, allowing for the possibility of host-parasite co-evolution, whether their association with hosts might shed light on the phylogenetic relationships between stylodactylids and other carideans. Not all of the material could be located (see Remarks under Indeterminate records), but what was available for study belonged to two undescribed species, described herein and provisionally placed in *Pseudione* Kossmann, 1881.

Pseudione is a heterogeneous (and probably paraphyletic) genus of approximately 53 taxa (including subspecies) that occur on a diverse assemblage of decapods, including carideans, nephropids, thalassinoids, galatheoids, pagurids, and lithodids, and it is in great need of revision. Eleven *Pseudione* taxa are parasites of caridean shrimp in four families: *P. affinis* (G. O. Sars, 1882) on one genus of Hippolytidae Dana, 1852 (*Nauticaris* Bate, 1888) and four genera of Pandalidae Haworth, 1825 (*Dichelopandalus* Caullery, 1896, *Notopandalus* Yaldwyn, 1960, *Pandalus* Leach, 1814, and *Plesionika* Bate, 1888); *P. ampla* Markham, 1988, on *Heterocarpus* A. Milne Edwards, 1881 (Pandalidae); *P. chiloensis* Román-Contreras & Wehrtmann, 1997, on *Nauticaris* (Hippolytidae); *P. cognata* Markham, 1985, on *Pontophilus* Leach, 1817 (Crangonidae Haworth, 1825); *P. elongata africana* Kensley, 1968, and *P. elongata elongata* (Hansen, 1897), both on *Nematocarcinus* A. Milne Edwards, 1881 (Nematocarcinidae Smith, 1884); *P. indica* Chopra, 1930, on *Plesionika* (Pandalidae) and *Pontophilus* (Crangonidae); *P. magna* Shiino, 1951, on *Heterocarpus* (Pandalidae); *P. parviramus* Adkison, 1988, on *Parapandalus* Borradaile, 1899 (Pandalidae); *P. pontocari* Page, 1985, on *Pontocaris* Bate, 1888 (Crangonidae); and *P. tattersalli* Nierstrasz & Brender à Brandis, 1923, on *Plesionika* (Pandalidae). The two new species described herein from hosts in the Stylodactylidae add an additional host-family to the list. Note that an additional taxon of *Pseudione* infesting caridean shrimp, *P. elongata normalis* Nierstrasz & Brender à Brandis, 1931, has been synonymized with the nominotypical subspecies of *P. elongata* (Markham 1999).

The type specimens of the new species, along with their hosts, are deposited in the MNHN.

The size of the isopods is given as total length from anterior cephalon to posterior of pleotelson (exclusive of uropods); carapace length (CL) (excluding rostrum) is provided as an indicator of specimen size for the hosts (see also Cleva 1990a, 1997).

SYSTEMATICS

Family BOPYRIDAE Rafinesque-Schmaltz, 1815
Subfamily PSEUDIONINAE Codreanu, 1967
Genus *Pseudione* Kossmann, 1881

Pseudione stylopoda n. sp.
(Figs 1-4)

"bopyre" Cleva 1997: 392, 398.

TYPE MATERIAL. — **Vanuatu.** MUSORSTOM 8, stn CP 1137, 15°41.52'S, 167°02.67'E, 350-371 m, 11.X.1994, in left branchial chamber of ♂ *Stylodactylus multidentatus multidentatus* Kubo, 1942, 10 mm CL (MNHN-Na 13217), holotype brooding sinistral ♀ 8.1 mm; allotype ♂ 3.2 mm (MNHN-Ep 905).

MATERIAL EXAMINED. — **New Caledonia.** BATHUS 1, stn CP 670, 20°54.0'S, 165°53.4'E, 394-397 m, 14.III.1993, in right branchial chamber of ovigerous ♀ *Parastylodactylus richeri* Cleva, 1990,

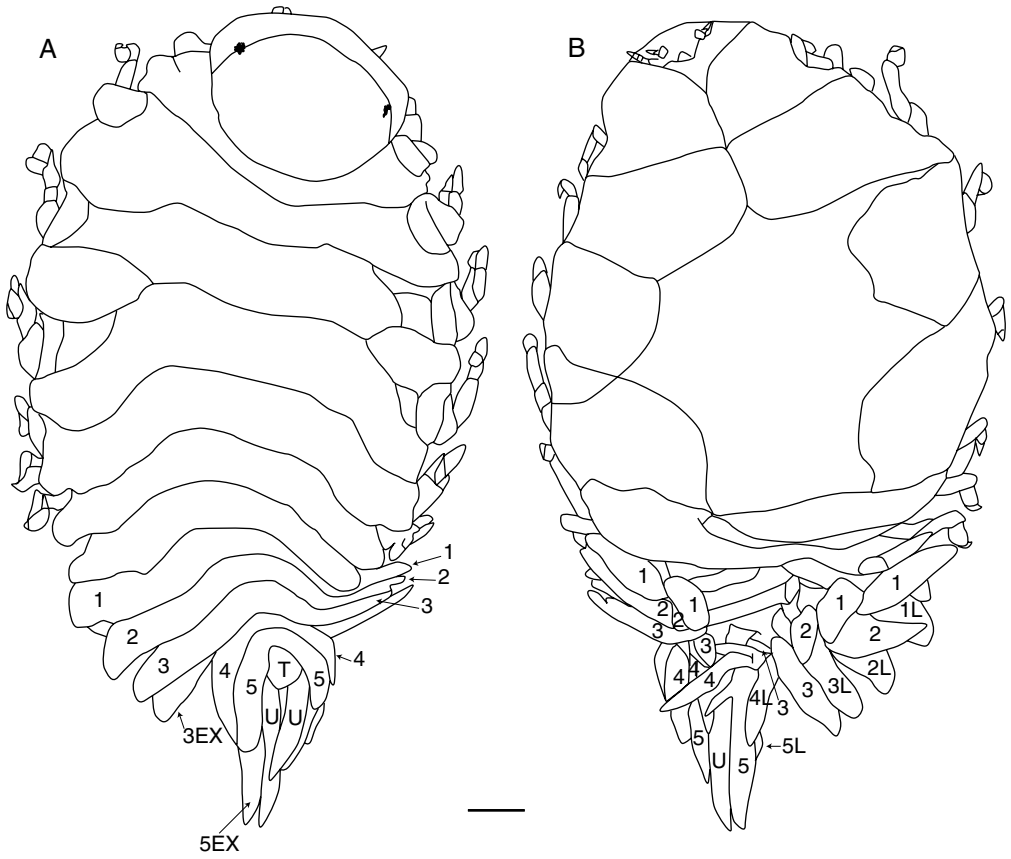

FIG. 1. — *Pseudione stylopoda* n. sp., holotype ♀ 8.1 mm (MNHN-Ep 905); **A**, dorsal view; **B**, ventral view. Abbreviations: **EX**, exopod; **L**, lateral plate; **T**, pleotelson; **U**, uropod; numbers indicate pleon segment. Scale bar: 0.75 mm.

5.0 mm (MNHN-Na 14631), 1 immature ♀ paratype 3.8 mm (MNHN-Ep 906).

ETYMOLOGY. — The specific name is given to denote the styliform endopodites of pleopods IV and V, as well as the occurrence of the species on hosts in the Stylodactylidae.

DISTRIBUTION. — Known from *Stylodactylus multidentatus multidentatus* from Vanuatu and *Parastylodactylus richeri* from New Caledonia. Depth: between 350 and 397 m.

DESCRIPTION

Female (Figs 1; 2)

Based on holotype. Body length 8.1 mm, maximal width 5.4 mm, head length 1.8 mm, head width 2.4 mm. Pereon somewhat sinuous but essentially straight, left side slightly longer than other (sinistral) (Fig. 1). All body regions and pereomeres distinctly separated.

Head broader than long, moderately produced with anterior lamina equal to approximately one-seventh length of head (Fig. 1A). Small eyes present. Antenna of five articles, antennule of three articles (Fig. 2A). Maxilliped (Fig. 2B) with thin distally rounded spur; palp narrow, distally tapering and rounded, non-articulating, with four thick, elongate setae distally and numerous short, thin setae on dorsal margin. Pereon of seven pereomeres, broadest across pereomere III, tapering anteriorly and posteriorly; pereomere I with convex posterior margin, II with slightly sinuous posterior margin, II-VII with strongly concave posterior margins; approximately three-fourths of

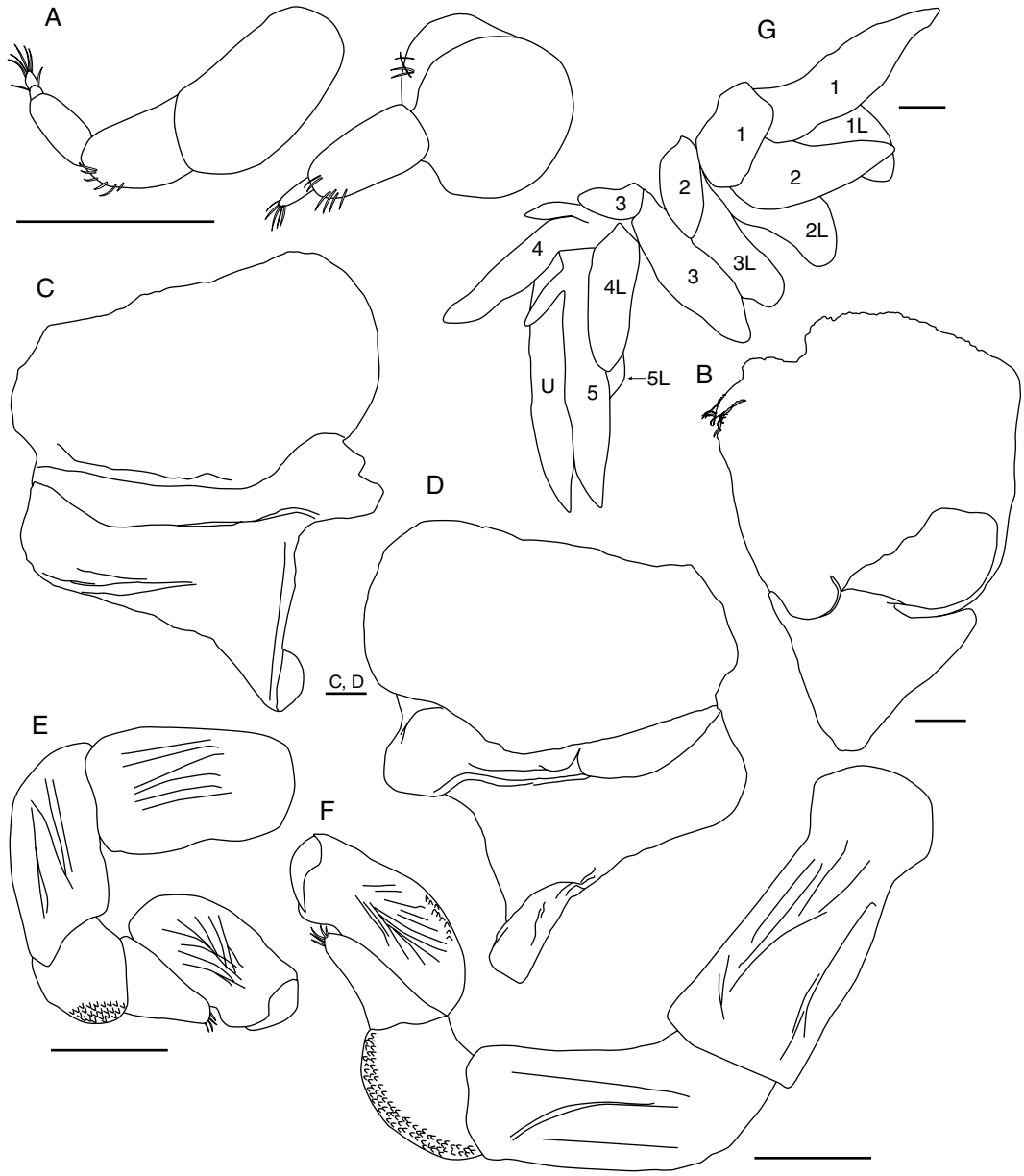

FIG. 2. — *Pseudione stylopoda* n. sp., holotype ♀ 8.1 mm (MNHN-Ep 905); **A**, left antenna and antennule; **B**, left maxilliped; **C**, left oostegite 1, external; **D**, left oostegite 1, internal; **E**, left pereopod 1; **F**, left pereopod 7; **G**, pleon, ventral view. Abbreviations: **L**, lateral plate; **U**, uropod; numbers indicate pleon segment. Scale bars: A-F, 0.1 mm; G, 0.75 mm.

pereomere I median obscured by head. First oostegite with proximal lobe subquadrate, distal lobe subtriangular, distally tapering and rounded, internal ridge with one small, smooth lobe proximally and one large, elongate lobe distally (Fig. 2C, D). Coxal plates as small lobes on pereomeres I-IV, clearly separated from pereomeres. Dorsolateral bosses clearly demarcated with left

and right sides subequal. Pereomeres III and IV with distinctly demarcated tergal area, not projecting. Oostegites enclosing only approximately half of marsupium. Pereopods V-VII longer than I-IV (Fig. 2E, F). Dorsal margin of propodus and ventral margin of merus with thin band of scales; propodus elongate. Bases of pereopods lacking bosses. First pair of pereopods surrounding head region; I-IV evenly spaced, V-VII closely approximated.

Pleon with five distinct pleomeres plus pleotelson; posterior margins of pleomeres I-III smoothly and moderately concave, those of IV and V sharply concave (Fig. 1A). Pleomeres I-V with biramous pleopods and uniramous lateral plates (Figs 1B; 2G); pleomeres I-III with subequal lamellar exopodites, broad proximally and distally tapering, endopodites as small lobes arising from common base with exopodites, endopods of pleopods I and II subequal, those of pleopod III smaller; pleomeres IV and V with exopodites long, thin, and only tapering at tip, endopodites thin, styliform, arising from lateral margin of exopodites; lateral plates on longer side lamellar and laterally separate, I-III directed laterally, IV and V sharply directed posteriorly, lateral plates on shorter side thinner with I-III pressed together; edges and surfaces of all lateral plates smooth; uropods uniramous, of nearly same shape and size as exopodite of pleopod V.

Male (Figs 3; 4)

Based on allotype. Length 3.2 mm, maximal width 1.0 mm, head length 0.4 mm, head width 0.6 mm, pleon length 1.0 mm.

Head subovate, widest posteriorly, distinct from first pereomere (Fig. 3A). Eyes present, small. Antenna of seven articles, distally setose, extending beyond margin of head; antennule of three articles, distally setose (Fig. 4A).

Pereomeres IV and V broadest, tapering anteriorly and posteriorly. Pereomeres I-V directed laterally, VI and VII directed slightly posterolaterally, distolateral margins of all pereomeres rounded. No detectable pigmentation. Pereopods (Fig. 4B, C) all subequal, all articles distinctly separated,

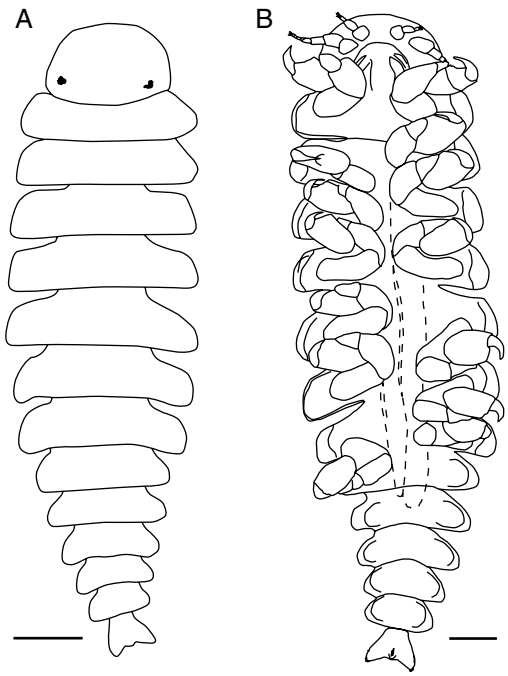

FIG. 3. — *Pseudione stylopoda* n. sp., allotype ♂ 3.2 mm (MNHN-Ep 905); **A**, dorsal view; **B**, ventral view. Scale bars: A, 0.188 mm; B, 0.1 mm.

palm of propodus with row of low blunt stout setae and surrounding region of granules, distoventral tip of carpus with granules and few distal setae.

Pleon of six separate pleomeres. Pleomeres I-II directed laterally, III-V directed slightly posterolaterally, distolateral margins of all pleomeres rounded. Pleomere VI (pleotelson) subtriangular with posterolateral lobes of approximately half its length; mediodistal margin with small anal cone, distal tips of posterolateral lobes with tufts of short setae (Fig. 3B). Pleopods as low, lateral, hemispherical swellings on pleomeres I-V (Fig. 3B). No midventral tubercles or uropods.

Variations

The only paratype is an immature female that shows no body distortion and has poorly developed oostegites and lateral plates on the pleomeres. This specimen would be difficult to identify, were it not

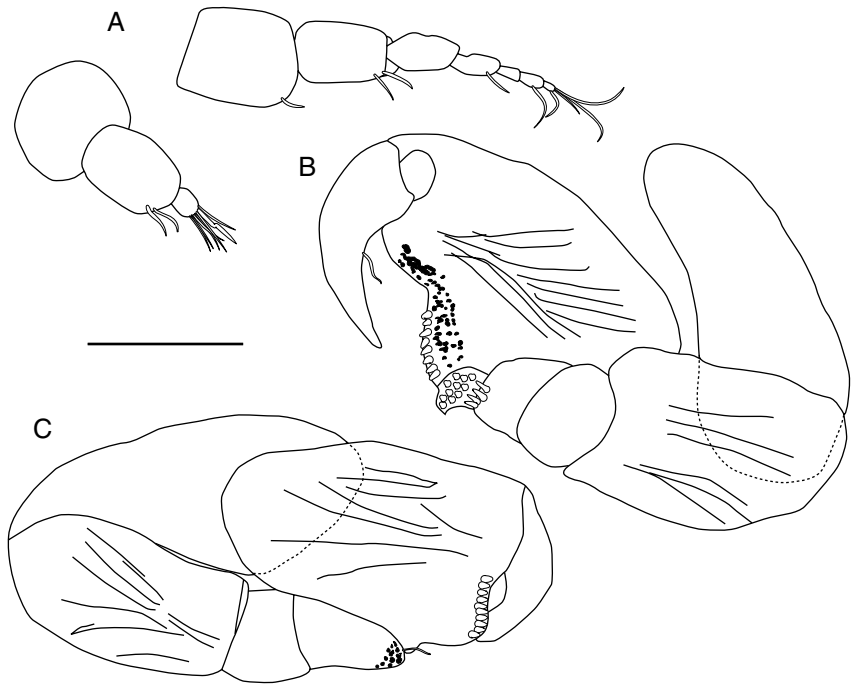

FIG. 4. — *Pseudione stylopoda* n. sp., allotype ♂ 3.2 mm (MNHN-Ep 905); **A**, right antenna and antennule; **B**, left pereopod 1; **C**, left pereopod 7. Scale bar: 0.1 mm.

for the shape and configuration of the endopodite and exopodite of pleopod V which are identical to those of the holotype.

REMARKS

The host of the immature female is an ovigerous specimen but, although not all species of bopyrids are absolute sterilizers of their hosts (Boyko pers. obs.), in this case it is likely that the juvenile state of the parasite was insufficient to influence the reproductive development of the host. Egg production by the host might have ceased as the parasite matured.

The species closest to *P. stylopoda* n. sp. is *P. pontocari* Page, 1985. Females of both species have the same distinctive styliform shape of the endopods of pleopods IV and V. The two species are also similar in the development of the female's maxilliped palp and shape of the pereopods (although the latter were incompletely described by Page [1985]) and the number of segments in the antenna and antennules of the male. Females of the two species differ in the shape of the lateral plates of the pleon (broad and produced only on the longer side in *P. pontocari* vs thin and well developed on both sides in *P. stylopoda* n. sp.), the inner ridge of the first oostegite (several short lobes in *P. pontocari* vs one long and one short lobe in *P. stylopoda* n. sp.), and the number of segments in the antennule and antenna (three and seven in *P. pontocari* vs three and five in *P. stylopoda* n. sp.). The males differ in the degree of development of the pleopods (more developed in *P. pontocari*) and the projection of the posterolateral pleotelson (longer in *P. pontocari*). The males also differ in characters such as the presence of eyes (only in *P. stylopoda* n. sp.) and the fusion of the head with pereomere I (only in *P. pontocari*), but these characters are often variable within a species and are of dubious utility in delimiting taxa (see also Boyko & Williams 2001).

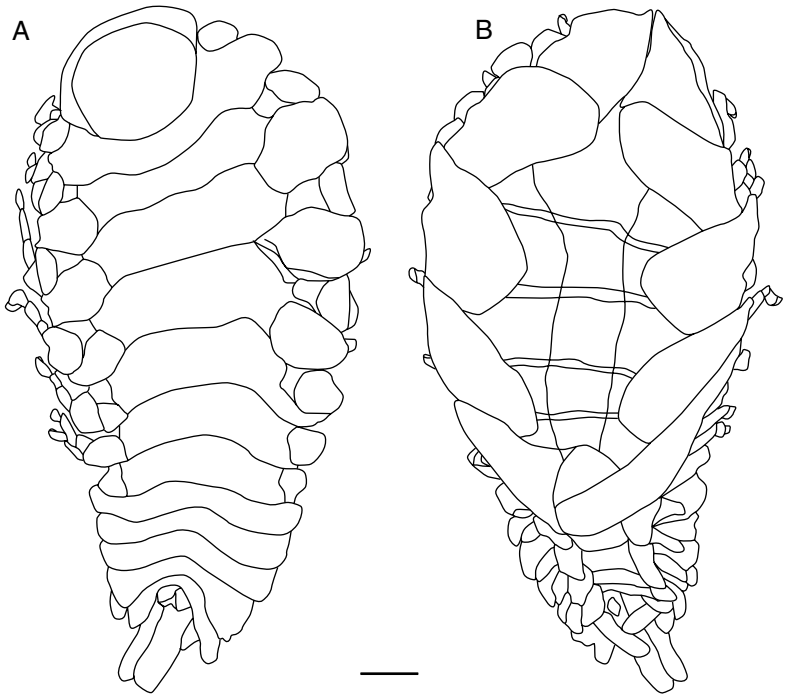

FIG. 5. — *Pseudione clevai* n. sp., holotype ♀, 7.2 mm (MNHN-Ep 907); **A**, dorsal view; **B**, ventral view. Scale bar: 0.75 mm.

Pseudione clevai n. sp.
(Figs 5-8)

?"un isopode bopyre" Cleva 1990a: 119.

"bopyre" Cleva 1997: 402.

TYPE MATERIAL. — **New Caledonia.** BATHUS 2, stn CP 738, 23°02.09'S, 166°56.61'E, 558-647 m, 13.III.1993, in right branchial chamber of ♂ *Parastylodactylus tranterae* Cleva, 1990, 8.9 mm (MNHN-Na 14628), holotype brooding dextral ♀ 7.2 mm; allotype ♂ 2.3 mm (MNHN-Ep 907).

MATERIAL EXAMINED. — **New Caledonia.** MUSORSTOM 6, stn CP 465, Îles Loyauté, 21°03.55'S, 167°32.25'E, 480 m, 2.II.1989, in right branchial chamber of ?♀ *P. tranterae*, 7 mm (MNHN-Na 11367), branchial swelling but no parasites present. — BATHUS 1, stn CP 657, 21°14.45'S, 165°54.93'E, 490-530 m, 12.III.1993, in left branchial chamber of ♀ *P. tranterae*, 7 mm (MNHN-Na 14622), paratypes, 1 brooding sinistral ♀ 8.3 mm; 1 ♂ 2.4 mm (MNHN-Ep 909). — BATHUS 3, stn CP 833, Norfolk Ridge, 23°03'S, 166°58'E, 441-444 m, 30.XI.1993, in right branchial chambers of two ♀♀ *P. tranterae*, 7.5, 8.5 mm (MNHN-Na 12161), branchial swellings but no parasites present; stn CP 846, 23°02.9'S, 166°57.97'E, 500-514 m, 1.XII.1993, in right branchial chamber of ♀ *P. tranterae*, 10.5 mm (MNHN-Na 14477), paratypes, 1 brooding dextral ♀ 9.8 mm; 1 ♂ 2.0 mm (MNHN-Ep 908).

ETYMOLOGY. — The species is named for Régis Cleva (MNHN) in honor of his exceptional work in identifying species diversity within the Stylodactylidae, and for his careful documentation of their parasites.

DISTRIBUTION. — Known only from *Parastylodactylus tranterae* from New Caledonia. Depth: with certainty between 490 and 647 m, possibly as shallow as 441 m.

DESCRIPTION

Female (Figs 5; 6)

Based on holotype. Body length 7.2 mm, maximal width 3.9 mm, head length 1.3 mm, head width 1.6 mm. Pereon with right side slightly longer than left (slightly dextral). All body regions and pereomeres distinctly separated.

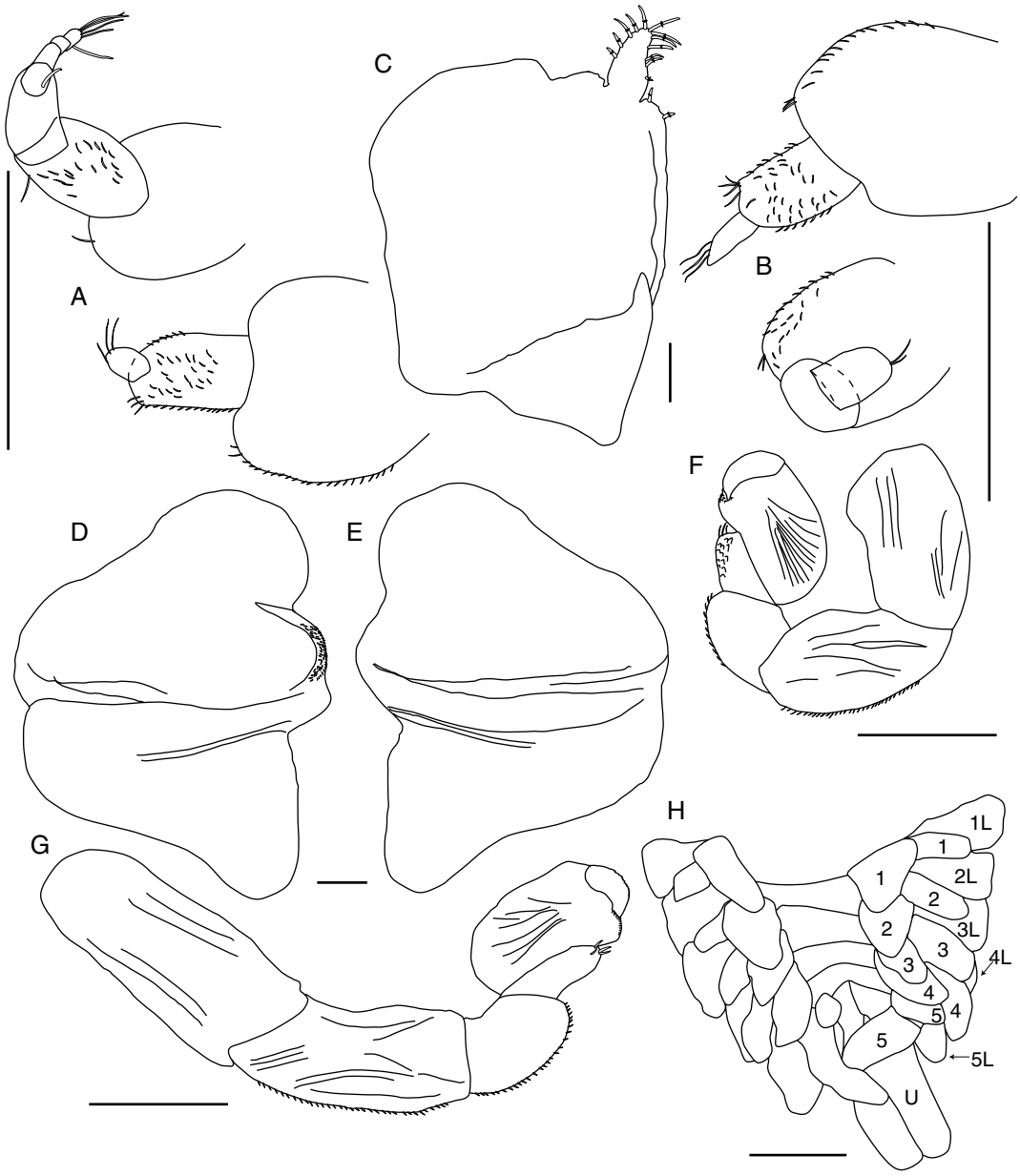

FIG. 6. — *Pseudione clevai* n. sp., holotype ♀ 7.2 mm (MNHN-Ep 907); **A**, right antenna and antennule; **B**, left antenna and antennule; **C**, left maxilliped; **D**, left oostegite 1, external; **E**, left oostegite 1, internal; **F**, left pereopod 1; **G**, left pereopod 7; **H**, pleon, ventral view. Abbreviations: **L**, lateral plate; **U**, uropod; numbers indicate pleon segment. Scale bars: A-G, 0.1 mm; H, 0.375 mm.

Head broader than long, moderately produced with anterior lamina equal to approximately one-tenth length of head (Fig. 5A). Eyes lacking. Antenna of six articles (right side) or three articles (left side), antennule of three articles (Fig. 6A, B). Maxilliped (Fig. 6C) with moderately broad distally rounded spur; upper margin subquadrate with broad, subtriangular, distally rounded, non-articulating palp; palp with 12 thick setae, evenly spaced, each seta with median ring of very short fine setae.

Pereon of seven pereomeres, broadest across pereomere III, tapering anteriorly and posteriorly; pereomere I with convex posterior margin, II-VII with concave posterior margins; approximately one-half of pereomere I median obscured by head. First oostegite proximal lobe ovate-triangular, distal lobe subtriangular, distally tapering and rounded, median of distal margin shallowly concave, internal ridge smooth (Fig. 6D, E). Coxal plates as small lobes on pereomeres I-V, clearly separated from pereomeres and larger on longer side. Dorsolateral bosses clearly demarcated with left and right sides subequal. Pereomeres II-VII with distinctly demarcated tergal area, not projecting, larger on longer side. Oostegites only enclosing approximately half of marsupium. Pereopods V-VII longer than I-IV (Fig. 6F, G). Ventral margin of merus and ischium with rows of short, thin setae; distoventral area of carpus with numerous subquadrate, plate-like setae and few long thin setae; distoventral area of propodus with low setae at insertion of tip of dactylus. Bases of pereopods lacking bosses. First pair of pereopods surrounding head region; I-IV evenly spaced, V-VII closely approximated.

Pleon with five distinct pleomeres plus pleotelson; posterior margins of pleomeres I-III smoothly and moderately concave, those of IV and V sharply concave (Fig. 5A); pleotelson subquadrate with median ridge and shallowly concave posterior margin. Pleomeres I-V with biramous pleopods and uniramous lateral plates; pleomeres I-IV with lamellar exopodites and endopodites, exopodites slightly smaller, pleomere V with endopodite subequal to those of I-IV but with exopodite twice as long as those of I-IV; lateral plates on left and right sides subequal, I-III distally subquadrate and laterally directed, IV and V distally tapered and posteriorly directed; edges and surfaces of all lateral plates smooth; uropods uniramous, elongate (twice as long as lateral plates of pleomere V) and subquadrate.

Male (Figs 7; 8)

Based on allotype. Length 2.3 mm, maximal width 0.7 mm, head length 0.2 mm, head width 0.5 mm, pleon length 0.7 mm.

Head subovate, widest posteriorly, fused with first segment of pereon (Fig. 7A). Eyes lacking. Antenna of eight articles, last five distally setose; extending beyond margin of head; antennule of three articles, distally setose (Fig. 8A).

Pereomeres IV broadest, tapering anteriorly and posteriorly. Pereomeres I-V directed laterally, VI and VII directed slightly posterolaterally, distolateral margins of all pereomeres rounded. No detectable pigmentation. Pereopods (Fig. 8B, C) all nearly alike in size and structure; in each pereopod, all articles distinctly separated, areas of subquadrate, plate-like setae on palm of propodus, distoventral region of carpus, and distoventral tip of merus; distoventral region of carpus with few long, thin setae.

Pleon of six pleomeres. Pleomeres I-V all directed slightly posterolaterally, with distolateral margins rounded. Pleomere VI (pleotelson) subtriangular with posterolateral lobes of approximately three-fourths its length; medial ventrodistal area with small anal cone, posterolateral lobes with tuft of short setae at distal tips and irregular crenulations on surface (Fig. 8D). Pleopods as low, ovate swellings on pleomeres I-V (Fig. 7B). No midventral tubercles or uropods.

Variations

Specimens occur in both dextral and sinistral forms. The numbers of segments in the antennae of the holotype are asymmetrical and not typical of the species, as all other specimens have five segments on each side. The width of the females' pleomere V lateral plates is somewhat variable, from half the width of the pleomere IV lateral

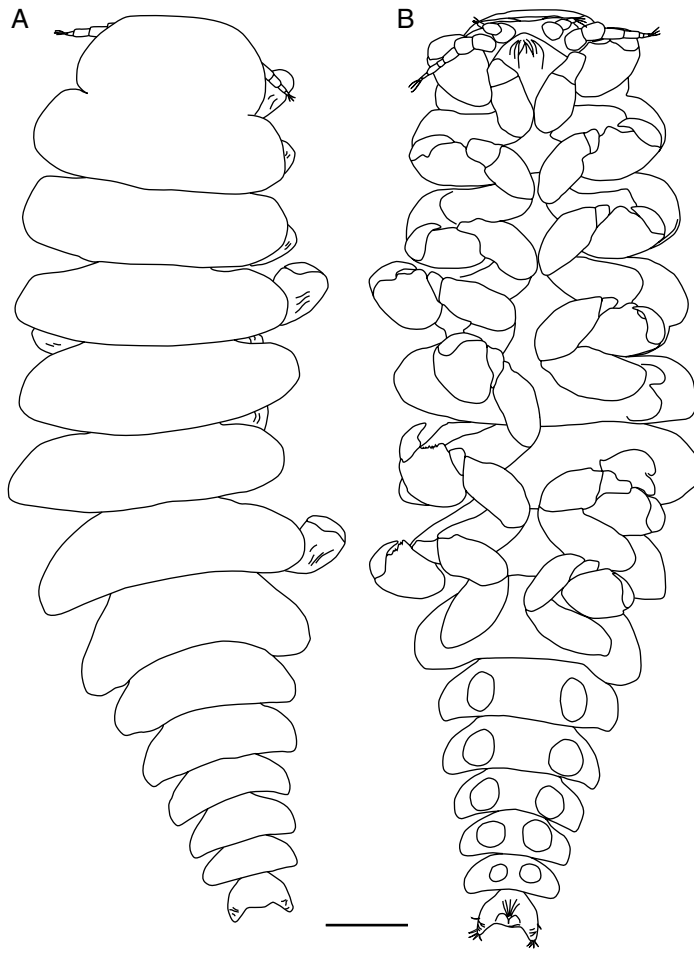

FIG. 7. — *Pseudione clevai* n. sp., allotype ♂ 2.3 mm (MNHN-Ep 907); **A**, dorsal view; **B**, ventral view. Scale bar: 0.1 mm.

plate (as in the holotype) to subequal in width to the pleomere IV lateral plate. The lateral plates and uropods in one female specimen (MNHN-Ep 908) are dorsoventrally inflated, but this is clearly an artifact of preservation.

REMARKS

The two lots of hosts lacking parasites (MNHN-Na 11367, 12161) probably contained specimens of *P. clevai* n. sp. based on the identity of the hosts and locality information, but they are included only provisionally as records of this species.

The affinities of *P. clevai* n. sp. to the other caridean-infesting species of the genus are obscure as it does not appear particularly closely related to any of the other described taxa. The female pleotelson is vaguely similar to that of *P. affinis*, but the two species differ in all other critical characters. Perhaps the closest taxon in overall shape and appearance is the nominal subspecies of *P. elongata*, but females of the two taxa differ in numerous characters such as the development of the tergal projections (much smaller in *P. e. elongata*), the shape of the oostegites, the shape of the pleomere lateral plates

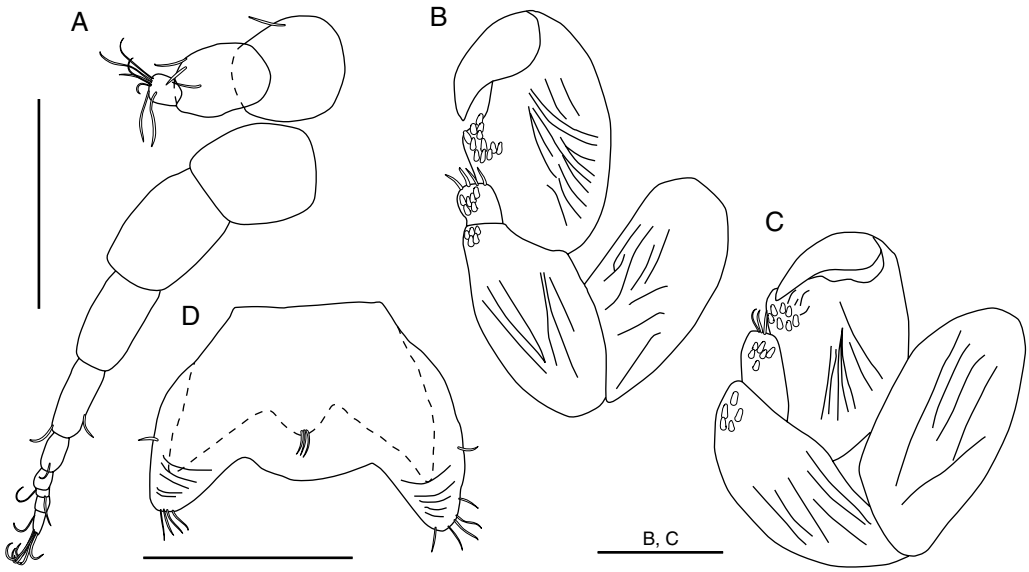

FIG. 8. — *Pseudione clevai* n. sp., allotype ♂ 2.3 mm (MNHN-Ep 907); **A**, right antenna and antennule; **B**, left pereopod 1; **C**, left pereopod 7; **D**, pleotelson, ventral view. Scale bars: 0.1 mm.

(more concave, laterally directed, and with irregular margins in *P. e. elongata*), and the shape of the uropods (shorter and not truncate distally in *P. e. elongata*). Males of *P. e. elongata* have a narrower pleotelson than those of *P. clevai* n. sp., and possess midventral tubercles that are lacking in *P. clevai* n. sp.

INDETERMINATE RECORDS

Bopyrid(s) of *Stylodactylus licinus* Chace, 1983

"bopyre" Cleva 1997: 390.

HOST EXAMINED. — **Indonesia.** KARUBAR, stn CP 20, 05°16.30'S, 132°58.20'E, 768-810 m, 25.X.1991, in left branchial chamber of ♀ *Stylodactylus licinus*, 10.5 mm CL (MNHN-Na 12134), branchial swelling but no parasites present.

LITERATURE RECORDS. — **Indonesia.** KARUBAR, stn CC 57, 08°15.48'S, 131°56.38'E, 603-622 m, 31.X.1991, in unknown branchial chamber of ♂ *Stylodactylus licinus*, 16 mm CL (MNHN-Na 12151), host and parasite not in MNHN; stn CP 19, 05°15.52'S, 133°00.01'E, 576-604 m, 25.X.1991, in unknown branchial chamber of ♀ *Stylodactylus licinus*, size unknown (MNHN-Na 12150), host and parasite not in MNHN.

REMARKS

None of the above cited specimens is present in MNHN; all were lent out several years ago and were never returned. Because no specimens are available for examination, and no other parasites of *S. licinus* have been examined, it cannot be determined whether these records refer to either of the new species described herein, to other described or undescribed bopyrid species of indeterminate genus, or to a combination of both. They are cited here for completeness and to bring attention to their occurrence in the event that the missing specimens eventually are returned to MNHN.

Bopyrid of *Parastylodactylus bimaxillaris* (Bate, 1888)

"bopyres" Cleva 1997: 397.

LITERATURE RECORD. — **Indonesia.** KARUBAR, stn CP 09, 05°19.21'S, 132°30.35'E, 361-389 m, 23.X.1991, in unknown branchial chamber of 1 ♂, 1 ♀, and/or 1 ovigerous ♀ *Parastylodactylus bimaxillaris*, size unknown (MNHN-Na 12152), hosts and parasites not in MNHN.

REMARKS

Like the above bopyrids of *S. licinus*, no suggestion can be made as to the possible identity of this unique infestation of *P. bimaxillaris* in the absence of directly examined material.

CONCLUSIONS

The affinities of the Stylodactylidae to other caridean families are unclear and further phylogenetic analyses with an emphasis on molecular characters are needed to develop a better understanding of precise sister taxon relationships (Cleva pers. comm.). Likewise, the affinities of the two new species of *Pseudione* found on stylodactylid shrimp are unclear. Both are placed in *Pseudione*, even though that genus is generally acknowledged to be paraphyletic (Adkison 1988; Boyko & Williams 2001), pending revisionary work. *Pseudione stylopoda* n. sp. appears to be the sister taxon to *P. pontocari*, in that females have an apomorphic condition of the endopodal pleopods of pleomeres IV and V not seen in other *Pseudione* species. However, this cannot be considered indicative of a particularly close relationship between their hosts (stylodactylids and crangonids). *Pseudione clevai* n. sp. does not appear to be particularly closely related to any other in the genus and, likewise, does not offer any insight into the relationships of the hosts to other caridean families.

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