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On a Remarkable New Genus and Species of Alpheid Shrimps (Malacostraca: Decapoda: Caridea) from the Tropical Western Atlantic †

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Abstract: *Synalpheopsis* gen. nov. is established for a remarkable new alpheid species, *Synalpheopsis laureae* sp. nov., presently known only from the male holotype collected at 111–162 m east of La Désirade, Guadeloupe, Lesser Antilles. *Synalpheopsis* gen. nov. peculiarly combines features of two genera, *Alpheopsis* Coutière, 1897 and *Synalpheus* Spence Bate, 1888; however, it is presumably closer to the former genus. The new genus is characterised by the moderately developed orbital hoods, well-developed rostrum and orbital teeth, sixth pleonite without articulated flap, tip of the third maxilliped with crown of spiniform setae, chelipeds with two strong teeth on distolateral margin and lacking snapping mechanism on finger cutting edges, and gill formula without mastigobranchs and setobranchs.

Keywords: new species; mesophotic; deep-water shrimp; West Atlantic; Caribbean Sea; French Antilles

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1. Introduction

The alpheid shrimp fauna of the western Atlantic is composed largely by species of *Alpheus* Fabricius, 1798 [1] and *Synalpheus* Spence Bate, 1888 [2]. These two genera combined account for more than 75% of the alpheid diversity in the Caribbean Sea, Gulf of Mexico, Florida, and Brazil (e.g., Chace 1972 [3]; Dardeau 1984 [4]; Christoffersen 1998 [5]; Ríos & Duffy 2007 [6]; Felder et al. 2009 [7]; Anker et al. 2012 [8]; De Grave & Anker 2017 [9]; Poupin 2018 [10]). Other important alpheid genera in this part of the Atlantic Ocean are *Salmoneus* Holthuis, 1955, *Alpheopsis* Coutière, 1897, *Leptalpheus* Williams, 1965 and *Automate* De Man, 1888, each with at least three species (Chace 1972 [3]; Wicksten 1984 [11]; Felder & Manning 1986 [12]; Anker et al. 2006a [13]; Anker 2007a [14], 2010a [15], 2011a [16], 2011b [17], 2017 [18], 2020 [19]; De Grave & Anker 2017 [10]; Poupin 2018 [11]; Vera Caripe et al. 2021 [20]).

The remaining alpheid genera of the western Atlantic are represented in the region by only one or two species: *Metalpheus* Coutière, 1908 (one species, however, genus nested within *Alpheus*—see Anker et al. 2006b [21]; Hurt et al. 2021 [22]); *Fenneralpheus* Felder & Manning, 1986 (two species); *Harperalpheus* Felder & Anker, 2007 (one species); *Coutieralpheus* Anker & Felder, 2005 (monotypic); *Pseudalpheopsis* Anker, 2007 (monotypic); *Leslibetaeus* Anker, Poddoubtchenko & Wehrtmann, 2006 (one species); *Potamalpheops* Powell, 1979 (two species, one of them in freshwater caves); *Parabetaeus* Coutière, 1897 (one species); *Prionalpheus* Banner & Banner, 1960 (one species); *Mohocaris* Holthuis, 1973 (monotypic); and *Athanas* Leach, 1814 (two species, both introduced) (Holthuis 1973 [23]; Felder & Manning 1986 [12]; Martínez-Iglesias & Carvacho 1991 [24]; Anker & Felder 2005 [25]; Felder & Anker 2007 [26]; Anker 2007b [27], 2011c [28]; Pachelle et al. 2011 [29]; Anker & De Grave 2012 [30]; Almeida et al. 2012 [31]; Soledade et al. 2014 [32]). Four genera, namely, *Fenneralpheus*, *Coutieralpheus*, *Pseudalpheopsis*, and *Mohocaris*, are presently known only from the western Atlantic (Holthuis 1973 [23]; Felder & Manning 1986 [12]; Anker & Felder 2005 [25];

Anker 2007b [27], 2011a [16]). Two further genera, namely, *Leslibetaeus* and *Harperalpheus*, have a transisthmian distribution, with one species in the western Atlantic and one species in the eastern Pacific (Anker et al. 2006c [33]; Anker 2011d [34]; Anker & Lazarus 2017 [35]). Each of the type species of the three monotypic genera *Coutieralpheus*, *Pseudalpheopsis*, and *Mohocaris*, as well as the western Atlantic species of *Leslibetaeus*, are known from only one or two type specimens and have not been recorded since their original descriptions. Similarly, *Harperalpheus*, *Prionalpheus*, and *Fenneralpheus* are each known from very few (sometimes only two) specimens (Felder & Anker 2007 [26]; Anker 2011b [17]; Anker & De Grave 2012 [30]; De Grave & Anker 2017 [10]). This brief account of the diversity of the western Atlantic alpheid fauna shows that monotypic endemic genera (i.e., restricted to western Atlantic) and transisthmian genera (i.e., restricted to western Atlantic and eastern Pacific) with low diversity are exceedingly rare. Thus, further new alpheid lineages, especially in deeper water and/or associated with larger burrowing animals, are expected to be discovered.

During the KARUBENTHOS 2 expedition in June 2015 (see Acknowledgements), a single specimen of a peculiar alpheid shrimp was dredged at a depth of 111–162 m east of the small island La Désirade, part of the Guadeloupe Archipelago, Lesser Antilles. The body of the specimen was largely intact, except for the detached chelipeds. Only one (right) cheliped was found in the vial together with the body; however, the same size of the right and left coxae led to the assumption that the chelipeds of this alpheid were probably equal or at least subequal in size. The unique and remarkable combination of morphological features of this specimen leaves no doubt that it belongs to a completely new lineage within the Alpheidae. Therefore, a new alpheid genus is established to accommodate the below described new species. Unfortunately, no colour photo of the specimen was taken after its collection, as "species of small size, i.e., with a total length of less than 1–2 cm, were usually not photographed during the expedition because of lack of time" (Poupin & Corbari 2016 [36]).

The holotype of the new species is deposited in the collections of the Muséum National d'Histoire Naturelle, Paris, France (MNHN). The carapace length (cl) and total length (tl) were measured from the tip of the rostrum to the posterior margin of the carapace and the telson, respectively. Abbreviations used in the text include A1—antennule; Mxp—maxilliped; P—pereiopod.

2. Taxonomy

Family Alpheidae Rafinesque, 1815

Genus *Synalpheopsis* gen. nov.

Diagnosis. Body not compressed, moderately slender. Carapace without armature on dorsal or lateral surfaces. Rostrum well developed, with acute tip; dorsal carina present; ventral carina unarmed. Orbital hoods moderately swollen; orbital teeth well developed, sharp. Pterygostomial angle bluntly protruding. First to fifth pleonites distoventrally rounded or bluntly angular; sixth pleonite without articulated plate. Telson moderately slender, with two pairs of spiniform setae on dorsal surface; posterior margin rounded, with two pairs of spiniform setae; anal tubercles absent. Eyes well developed, concealed dorsally and laterally. Antennular peduncle moderately slender; stylocerite well developed, overreaching distal margin of first article of peduncle, distally acute, with small blunt process near dorsomesial margin; ventromesial carina with sharp tooth; lateral flagellum with accessory ramus largely fused to main ramus. Antenna with basicerite moderately stout, armed with sharp tooth; scaphocerite with well-developed blade and distolateral tooth; carpocerite slender, reaching beyond scaphocerite. Mouthparts typical for family. Mandible with two-articulated palp; molar and incisor processes well developed. Third maxilliped with well-developed exopod; coxa with small, acutely produced lateral plate; antepenultimate article with distodorsal spiniform seta; tip of ultimate article with crown of stout spiniform setae. First pereiopods (chelipeds) probably equal or subequal in size, of unknown degree of asymmetry, carried extended with dactylus in dorsolateral position;

ischium with dorsal and ventral margins distally armed with spiniform setae; merus with dorsal and ventromesial margins armed with spiniform setae, dorsal margin ending in strong sharp tooth, ventrolateral margin distally armed with two strong sharp teeth; carpus short, cup-shaped, without comb-like rows of setae on mesial surface; chela not particularly enlarged or swollen, palm somewhat crenulated, with spiniform seta on ventral margin and large, sharp, distodorsal tooth reaching beyond base of dactylus; fingers subequal to palm, cutting edges armed with low, blunt teeth, without snapping mechanism; adhesive discs absent. Second pereiopod moderately slender; coxa with spiniform seta ventrally; ischium unarmed; carpus with five subdivisions; chela not especially modified, with tufts of simple setae. Third, fourth, and fifth pereiopods slender; merus and ischium unarmed; propodus with slender spiniform setae, grooming brush of fifth pereiopod well developed; dactylus moderately slender, biunguiculate. Second male pleopod with appendix masculina exceeding appendix interna and reaching beyond endopod. Uropodal exopod and endopod not modified; diaeresis sinuous, with small lateral tooth adjacent to stout distolateral spiniform seta. Gill-exopod formula is presented in Table 1.

Table 1. Gill-exopod formula of *Synalpheopsis* gen. nov.

	Maxillipeds			**Pereiopods**				
Gills/Exopods	**Mxp1**	**Mxp2**	**Mxp3**	**P1**	**P2**	**P3**	**P4**	**P5**
Pleurobranchs	-	-	-	+	+	+	+	+
Arthrobranchs	-	-	+	-	-	-	-	-
Podobranchs	-	-	-	-	-	-	-	-
Epipods	+	+	+ [1]	-	-	-	-	-
Mastigobranchs [2]	-	-	-	-	-	-	-	-
Setobranches	-	-	-	-	-	-	-	-
Exopods	+	+	+	-	-	-	-	-

[1] Represented by lateral plate on coxa. [2] Mastigobranchs are epipods of Chace (1972) [3].

Type species. *Synalpheopsis laureae* sp. nov., by present designation and monotypy.

Etymology. The name of the new alpheid genus is a combination of two other generic names, *Synalpheus* and *Alpheopsis*, referring to a series of morphological features shared with both genera (see below); gender: feminine.

Distribution. Presently known only from the tropical western Atlantic.

Remarks. *Synalpheopsis* gen. nov. uniquely combines morphological features of *Alpheopsis* with those of *Synalpheus*. All features shared between *Synalpheopsis* gen. nov. and each of these two genera are not exclusive synapomorphic characters, i.e., most of them are variously present in other alpheid genera. The four most important features of the new genus shared with many species of *Alpheopsis* are: (i) the general shape of the cheliped(s), with the presence of spiniform setae on the ischium and merus, and simple teeth on the finger cutting edges; (ii) the ventromesial carina of the first article of the antennular peduncle armed with a sharp tooth; (iii) the second pereiopod chela with tufts of simple setae; and (iv) the male second pleopod with a well-developed appendix masculina (e.g., Banner 1953 [37]; Anker et al. 2005 [38]; Anker 2015a [39], 2017 [18]). The presence of these features in *Synalpheopsis* gen. nov. immediately separates the new genus from *Synalpheus*, which is characterised by (i) the presence of a powerful snapping mechanism (plunger + fossa) on the major chela; (ii) the ventromesial carina of the first article of the antennular peduncle being unarmed; (iii) the second pereiopod chela bearing short brushes of thickened, stiff setae; and (iv) the second pleopod of both sexes lacking appendix masculina (e.g., Coutière 1899 [40], 1905 [41]; Dardeau 1984 [4]; Ríos & Duffy 2007 [6]). On the other hand, *Synalpheopsis* gen. nov. shares with *Synalpheus* four important characters: (i) the well-developed, moderately swollen orbital hoods; (ii) the absence of a

subtriangular articulated plate on the sixth pleonite; (iii) the absence of mastigobranches on the coxae of the third maxilliped and all pereiopods (+ absence of setobranches on all pereiopods); and (iv) the tip of the third maxilliped armed with a crown of stout spiniform setae (present in most species of *Synalpheus*) (e.g., Coutière 1899 [40]; Dardeau 1984 [4]; Ríos & Duffy 2007 [6]). Using these four features, *Synalpheopsis* gen. nov. can be separated from *Alpheopsis*, in which (i) the orbital hoods are not noticeably swollen; (ii) the sixth pleonite has a subtriangular articulate plate; (iii) the mastigobranches are present on the coxae of the third maxilliped to the third or fourth pereiopods (with setobranches present accordingly on the coxae of the first to fourth or fifth pereiopods); and (iv) the tip of the third maxilliped ends in a corneous point, sometimes armed with one or two small, subdistal, or distal spiniform setae (Anker et al. 2005 [38]; Anker 2015a [39], 2017 [18]). In addition, in both *Synalpheopsis* gen. nov. and *Synalpheus*, the ischium of the third and fourth pereiopods is unarmed, whereas in most species of *Alpheopsis*, it is armed with one or two spiniform seta(e) (Banner 1953 [37]; Dardeau 1984 [4]; Anker 2001 [42]; Anker et al. 2005 [38], 2012 [8]; Anker 2015a [39], 2017 [18]). The presence of well-developed, sharp orbital teeth in the new genus is shared with some species of *Alpheopsis* (*A. trispinosa* (Stimpson, 1860) group) and many species of *Synalpheus* (e.g., Anker et al. 2005 [38], 2012 [8]).

Synalpheopsis gen. nov. also has two autapomorphic features, which are unique within the Alpheidae. The distal armature of the ventrolateral margin of the cheliped merus, which consists of two very stout and sharp teeth, is not present in this form in any other alpheid shrimp. The presence of a minute blunt process near the dorsomesial margin of the antennular stylocerite seems to be present only in *Synalpheopsis* gen. nov., although due to its small size, this process may have been overlooked in other alpheid genera. Other morphological features, not exclusive to the new genus, but adding to its distinctiveness, are: (i) the lateral antennular flagellum with the accessory ramus largely fused to the main ramus, i.e., non-individualised; (ii) the presence of a stout sharp tooth on the distal margin of the palm, reaching well beyond and mesially overhanging the base of the dactylus (similar to that of many species of the *Alpheus macrocheles* (Hailstone, 1835) group); (iii) the greatly elongated appendix masculina, reaching far beyond the distal margin of the endopod (uncommonly seen in some other alpheid genera, e.g., in some species of *Athanas* and *Potamalpheops*, as well as in *Yagerocaris* Kensley, 1988 and *Crosnierocaris* Anker, 2022; see Kensley 1988 [43]; Yeo & Ng 1997 [44]; Anker 2022 [45]); and (iv) the endopod of the first male pleopod armed with slender spiniform setae.

Synalpheopsis gen. nov. can be easily distinguished from all other alpheid genera, which have or may have affinities with *Alpheopsis*, such as the western Atlantic *Pseudalpheopsis* and *Coutieralpheus*, the transisthmian *Harperalpheus*, the pantropical *Prionalpheus*, and the Indo-West Pacific *Bruceopsis* Anker, 2010 (Banner & Banner 1960 [46]; Anker & Felder 2005 [25]; Felder & Anker 2007 [26]; Anker 2007b [27], 2010b [47]). Among these five genera, only *Prionalpheus* was confirmed to be closely related with *Alpheopsis* in the recent molecular phylogeny of the Alpheidae (Chow et al. 2021 [48]), whereas the remaining four genera were unavailable for DNA sequencing. It must be noted that the sequence of "*Coutieralpheus*" in Chow et al. (2021) [48] may, in fact, represent a species of the *Alpheopsis trigona* (Rathbun, 1901) [18] complex, an unfortunate identification error persisting since Bracken et al. (2009) [22]. Nonetheless, and as expected, *Alpheopsis* was recovered as paraphyletic and is presently being revised (Anker, in prep.).

Synalpheopsis gen. nov. can be easily distinguished from *Pseudalpheopsis*, *Coutieralpheus*, *Harperalpheus*, *Prionalpheus*, and *Bruceopsis* by a series of obvious and important morphological features (see Table 2). The superficially similar *Parabetaeus*, which was recovered at a considerable distance from *Alpheopsis* and *Prionalpheus* in Chow et al. (2021) [48], is also included in Table 2, as well as the above-discussed *Alpheopsis* and *Synalpheus*. Noteworthy is that *Synalpheopsis* gen. nov. and *Prionalpheus* share the same gill formula (without mastigobranchs and setobranchs), but greatly differ in many other characters, especially in the anterior region of the carapace, mouthparts, and uropod.

Table 2. Comparison of selected morphological characters between *Synalpheopsis* gen. nov. and other alpheid genera with possible phylogenetic affinities. Abbreviations: A1, antennule; Mxp3, third maxilliped; P, pereiopod. Literature used: Coutière 1899 [40]; Holthuis 1951, 1952 [23]; Banner & Banner 1960 [46]; Dardeau 1984 [4]; Martínez-Iglesias & Carvacho 1991 [24]; Anker 2001 [42], 2007a [14], 2007b [27], 2010b [47], 2015a [39], 2015b [49]; Anker et al., 2005 [38], 2012 [8]; Anker & Felder 2005 [25]; Felder & Anker 2007 [26]; Ríos & Duffy 2007 [6].

Genus	**Rostrum**	**Orbital hoods**	**Orbital teeth**	**Pterygostomial angle of carapace**
Synalpheopsis	Well developed, with carina	Moderately swollen	Present (sharp)	Bluntly produced
Alpheopsis	Well developed, without carina	Not swollen	Present (sharp) or absent	Rounded or with small tooth
Prionalpheus	Moderate, without carina, often with 2 short setae	Not swollen	Absent	Acutely produced
Pseudalpheopsis	Well developed, without carina	Not swollen	Present (sharp)	Rounded, with blunt tooth above
Coutieralpheus	Moderate, with 2 long terminal setae	Not swollen	Absent	Rounded
Harperalpheus	Moderate, without carina	Not swollen	Absent	Acutely produced
Bruceopsis	Well developed, without carina	Not swollen	Present (sharp or blunt)	Rounded or bluntly produced
Parabaetaeus	Absent or poorly developed, blunt	Not swollen	Present (sharp or blunt) or absent	Rounded
Synalpheus	Variable: well developed, moderate, or poorly developed	Moderately to strongly swollen	Present (sharp or blunt) or absent	Variable: usually bluntly or sharply produced
Genus	**Epistomial sclerite**	**Telson, posterior margin**	**Sixth pleonite**	**A1, ventromesial carina of 1st article**
Synalpheopsis	Unarmed	Rounded	Without articulated flap	With tooth
Alpheopsis	With sharp process	Rounded	With articulated flap	With tooth
Prionalpheus	With very long or stout, sharp process	Rounded	With articulated flap	With tooth
Pseudalpheopsis	With sharp process	Rounded	With articulated flap	With tooth
Coutieralpheus	With short, blunt process	Rounded	With articulated flap	With tooth
Harperalpheus	With short, blunt process	Rounded	Without articulated flap	With tooth
Bruceopsis	With sharp process	Rounded	With articulated flap	With tooth
Parabaetaeus	With short, blunt process	With acute point	With articulated flap	With tooth
Synalpheus	Unarmed or with short blunt process	Rounded or straight	Without articulated flap	Without tooth
Genus	**Accessory ramus of lateral A1 flagellum**	**Mandible**	**Mxp3, antepenultimate article**	**Mxp3, tip of ultimate article**
Synalpheopsis	Fused to main ramus, non-individualised	Not modified	Normal, with distodorsal spiniform sera	With crown of spiniform setae

Table 2. *Cont.*

Genus	Accessory ramus of lateral A1 flagellum	Mandible	Mxp3, antepenultimate article	Mxp3, tip of ultimate article
Alpheopsis	Well developed	Not modified	Normal, unarmed	Corneous, usually with 1–2 spiniform setae
Prionalpheus	Short, knob-like	Highly modified, with hypertrophied incisor process, without molar process	Expanded, unarmed	With simple setae
Pseudalpheopsis	Well developed	Not modified	Normal, with row of dorsal spiniform setae	Corneous, with 2 spiniform setae
Coutieralpheus	Well developed	Not modified	Normal, unarmed	With 2 short spiniform setae
Harperalpheus	Short, knob-like	Not modified	Normal, unarmed	Corneous, with 2 spiniform setae
Bruceopsis	Well developed	Not modified	Normal, with ventral spiniform seta	Corneous, with 2 spiniform setae
Parabaetaeus	Well developed	Not modified	Normal, unarmed	With 1–3 short spiniform setae
Synalpheus	Moderately developed to short, knob-like	Not modified	Normal, typically unarmed	With crown of spiniform setae (with exceptions)
Genus	**P1 ischium**	**P1 merus**	**P1 carpus**	**P1 chela, palm**
Synalpheopsis	Dorsal and ventral margins with spiniform setae	Ventromesial and dorsal margins with spiniform setae (+ distolateral margin with 2 strong teeth)	Mesial surface without setal rows	Ventral surface with 2 spiniform setae
Alpheopsis	Dorsal margin (and sometimes ventral margin) with spiniform setae or unarmed	All margins unarmed or ventromesial margin with spiniform setae	Mesial surface without setal rows	Ventral surface unarmed
Prionalpheus	Dorsal margin with distal spiniform seta	Dorsal margin unarmed or with row of spiniform setae	Mesial surface without setal rows	Ventral surface unarmed or crenulate
Pseudalpheopsis	Dorsal margin with spiniform setae	Proximal dorsal margin with spiniform seta	Mesial surface without setal rows (ventral surface with spiniform setae)	Ventral surface unarmed
Coutieralpheus	Dorsal margin unarmed (ventrolateral surface with spiniform seta)	All margins unarmed	Mesial surface with setal rows	Ventral surface unarmed
Harperalpheus	Dorsal margin unarmed or with distal spiniform seta	All margins unarmed	Mesial surface with setal rows	Ventral surface unarmed
Bruceopsis	Dorsal and ventral margins unarmed	All margins unarmed	Mesial surface with setal rows	Ventral surface unarmed
Parabaetaeus	Dorsal and ventral margins unarmed	All margins unarmed (except for 1 or 2 distal teeth)	Mesial surface without setal rows	Ventral surface unarmed

Table 2. *Cont.*

Genus	P1 ischium	P1 merus	P1 carpus	P1 chela, palm
Synalpheus	Dorsal and ventral margins unarmed	All margins unarmed (except for distal armature in many species)	Mesial surface without setal rows	Ventral surface unarmed
Genus	**P1 chela, finger armature**	**P2, number of carpal subdivisions**	**P2, chela**	**P3 and P4, ischium and merus**
Synalpheopsis	Simple teeth	5	With tufts of simple setae	Both unarmed
Alpheopsis	Simple teeth	5	With tufts of simple setae	Merus unarmed, ischium with 1–2 spiniform seta(e)
Prionalpheus	Simple teeth	3–5	With tufts of simple setae	Both unarmed or ischium with 1 spiniform seta
Pseudalpheopsis	Small teeth and large hiatus	5	With tufts of simple setae	Merus unarmed, ischium with 1–2 spiniform seta(e)
Coutieralpheus	Simple teeth	5	With tufts of simple setae	Both with 1–2 spiniform seta(e)
Harperalpheus	Simple teeth	5	With tufts of simple setae	Both with 1 spiniform seta
Bruceopsis	Simple teeth	5	With tufts of simple setae	Merus unarmed, ischium with 2 spiniform setae
Parabaetaeus	Simple teeth	5	With tufts of simple setae	Both with 2–4 spiniform seta(e)
Synalpheus	Plunger-fossa (snapping mechanism) on major chela	4–5	With short rows of thickened setae	Both unarmed
Genus	**P3–5, dactylus**	**Second male pleopod**	**Uropod**	**Mastigobranchs**
Synalpheopsis	Biunguiculate	With appendix masculina (exceeding appendix interna and endopod)	Diaeresis with single lateral tooth, endopod unarmed	Absent
Alpheopsis	Simple, rarely biunguiculate	With appendix masculina	Diaeresis with single lateral tooth, endopod unarmed	Present on Mxp3 and P1–4 or P1–3
Prionalpheus	Biunguiculate	With appendix masculina	Diaeresis with up to 5 lateral teeth, endopod unarmed	Absent
Pseudalpheopsis	Simple	With appendix masculina	Diaeresis with single lateral tooth, endopod with spiniform setae distally	Present on Mxp3 and P1–4
Coutieralpheus	Simple	With appendix masculina	Diaeresis with single lateral tooth, endopod unarmed	Present on Mxp3 and P1–4
Harperalpheus	Simple	With appendix masculina	Diaeresis with single lateral tooth, endopod unarmed	Present on Mxp3 and P1–4

Table 2. *Cont.*

Genus	P3–5, dactylus	Second male pleopod	Uropod	Mastigobranchs
Bruceopsis	Simple, with dorsal crenulation	With appendix masculina	Diaeresis with single lateral tooth, endopod unarmed	Present on Mxp3 and P1–4
Parabaetaeus	Simple	With appendix masculina	Diaeresis with single lateral tooth, endopod unarmed	Present on Mxp3 and P1–4 or P1–3
Synalpheus	Biunguiculate, with secondary modifications	Lacking appendix masculina	Diaeresis typically with single lateral tooth, endopod unarmed	Absent

***Synalpheopsis laureae* sp. nov.**

(Figures 1–4)

Type material. Holotype: male (cl 5.3 mm, tl 13.1 mm), MNHN-IU-2016-2120, Lesser Antilles, Guadeloupe, east of La Désirade, KARUBENTHOS 2 Expedition, N.O. "Antea", sta. DW4553, 16°21′ N/60°54′ W, depth 111–162 m, leg. MNHN team (L. Corbari et al.), 15 June 2015.

Description. Carapace (Figure 1A–C) largely glabrous, with few scattered erect setae on dorsal surface. Rostrum (Figure 1A,B) well developed, slender, about 1.6 times as long as wide, tapering distally; tip acute, slightly overreaching distal margin of first article of antennular peduncle; dorsal carina distinct, flattening between eyes; ventral margin unarmed. Orbital (=extra-corneal) teeth (Figure 1A,B) strong, sharp, falling short of level of rostral mid-length. Pterygostomial angle (Figure 1B,C) bluntly angular, slightly produced anteriorly. Posterolateral margin of carapace (Figure 1C) with deep cardiac notch.

Pleon (Figure 1D) with first to fifth pleura rounded distoventrally, fifth slightly more angular; sixth pleonite not elongated, without articulated plate. Telson (Figure 1E) relatively broad, subrectangular, gently tapering distally, about twice as long as proximal width, with two pairs of stout spiniform setae situated approximately at 0.45 (anterior) and 0.7 (posterior) length of telson, at some distance from lateral margins; posterior margin broadly rounded, with two pairs of spiniform setae, one at each posterolateral angle, mesial more than four times as long as lateral.

Eyes (Figure 1A,B) completely concealed in dorsal view and largely concealed in lateral view, with well-developed, normally pigmented corneas; anteromesial margin bluntly protruding, with small portion visible in lateral view.

Antennule (Figure 1A,B,F,G) relatively slender; stylocerite slender, not swollen laterally, with acute tip, latter reaching well beyond distal margin of first article, dorsomesial margin with small process near dorsomesial margin, ventromesial carina with slender, sharp, strongly anteriorly directed tooth; second article 2.3 times as long as wide; lateral flagellum with accessory ramus largely fused to main ramus, not individualised, with several groups of aesthetascs, first on fifth flagellar subdivision.

Antenna (Figure 1A,B) with basicerite rather small, armed with sharp distoventral tooth; scaphocerite well developed, not reaching distal margin of antennular peduncle; lateral margin almost straight to subtly concave; blade moderately broad, convex anteriorly, largely surpassed by stout, sharp, distolateral tooth; carpocerite slender, not overreaching antennular peduncle, but distinctly exceeding distolateral tooth of scaphocerite.

Mouthparts typical for family. Mandible (Figure 2A) with well-developed, biarticulated palp; incisor process slightly expanded, with eight blunt or subacute teeth; molar process broad, with semi-circular rows of microscopic setae and minute teeth. Maxillule (Figure 2B,C) with typical distal and proximal endites; palp distally bilobed, dorsal lobe with one fine seta, ventral lobe with one much stouter, spinule-like seta. Maxilla (Figure 2D) with typical distal and proximal endites, distal endite with deep cleft; palp not subdivided, of normal size; scaphognathite narrow. First maxilliped (Figure 2E)

with distal endite densely furnished with setae on distal and distomesial surface, proximal endite without setae; palp not subdivided, with some plumose setae; exopod long, with poorly developed caridean lobe. Second maxilliped (Figure 2F) with typical endopod composed of five articles; exopod very long; epipod rounded, without podobranch. Third maxilliped (Figure 2F–J) moderately slender, pediform; coxa with distally acute lateral plate, without mastigobranch; antepenultimate article about five times as long as greatest width; penultimate article short, slightly widening distally, almost cup-shaped, with stout spiniform seta on distodorsal margin; ultimate article about 0.7 times as long as antepenultimate article, gently tapering distally, setose, tip armed with crown of six stout spiniform setae; exopod well developed, overreaching distal margin of penultimate article.

First pereiopods (chelipeds) possibly equal or subequal in size (based on similar size of coxae), of unknown degree of asymmetry, carried extended forward or slightly bent ventrally, not completely folding. Right cheliped (Figure 3A–D) neither particularly robust nor slender. Coxa (Figure 3D) with blunt ventral process. Basis (Figure 3D) short, without notable features. Ischium (Figure 3A,B) short, widening distally; dorsal margin with one long spiniform seta distally; ventromesial margin with smaller spiniform seta subdistally. Merus (Figure 3A–C) trigonal in cross-section, distally widening, almost three times as long as distal width; dorsal margin ending in stout, sharp tooth distally, and with three (one apparently broken) spiniform setae of variable length in proximal half; ventromesial margin ending bluntly distally, with row of six spiniform setae of variable length; distolateral margin with two large, sharp teeth. Carpus (Figure 3A–C) short, cup-shaped, unarmed; mesial surface without rows of setae. Chela (Figure 3A–C) moderately enlarged, not particularly swollen or elongated. Palm (Figure 3A–C) slightly compressed, about twice as long as high (wide); dorsal surface slightly crenulated; dorsomesial margin ending in stout, sharp, distal tooth, latter reaching well beyond and mesially overhanging base of dactylus; ventral margin slightly crenulated proximally, with two spiniform setae, first situated in proximal quarter of palm, and second, more mesially located, near mid-length of palm; remaining surface of palm smooth, without grooves, notches, or tubercles. Fingers (Figure 3A–C) almost equal to palm in length, slightly gaping when closed, with crossing fingertips; pollex slightly shorter than dactylus, with gently curved tip, cutting edge with eight low teeth of variable size and width, proximal- and distal-most weakest, teeth near mid-length strongest; dactylus slightly flattened, with strongly curved tip, cutting edge with nine teeth similar to those of pollex, distal-most weakest. Left cheliped unknown.

Second pereiopod (Figure 4A) relatively slender; coxa with small spiniform seta on ventral surface; ischium almost six times as long as wide; merus 1.1 times as long as ischium, six times as long as wide; carpus slender, as long as ischium and merus combined, with five subdivisions, proximal longest, ratio of carpal subdivisions approximately equal to 3.0:1.5:1.0:1.0:1.5; chela simple, with fingers distinctly longer than palm.

Third to fifth pereiopods moderately slender. Third pereiopod (Figure 4B–D) with ischium almost four times as long as wide, ventrolateral surface unarmed; merus about 1.5 times as long as ischium, about 5.3 times as long as wide; carpus not noticeably slenderer than merus, about 0.6 times as long as merus, with stiff seta on distoventral margin; propodus significantly longer than merus, with seven spiniform setae on ventral margin and one pair of spiniform setae distally, near propodo-dactylar articulation; dactylus 0.3 length of propodus, moderately stout, not particularly elongated, gently curving, biunguiculate, with accessory unguis small, located at about 0.7 length of dactylus, slightly deviating from main axis of main unguis. Fourth pereiopod (Figure 4E) generally similar to third pereiopod, although noticeably slenderer; propodus with five spiniform setae on ventral margin in addition to one pair of spiniform setae flanking propodo-dactylar articulation. Fifth pereiopod (Figure 4F–I) slenderer than third and fourth pereiopods; ischium less than three times as long as wide; merus almost double length of ischium, six times as long as wide; carpus 0.7 times as long as merus; propodus much longer than merus, with seven appressed spiniform setae on ventromesial margin, including one distal seta near propodo-dactylar articulation, and well-developed grooming brush, consisting of

10 rows of microserrulate setae; dactylus biunguiculate, similar to those of third and fourth pereiopods.

Uropod (Figure 1M) with lateral lobe of protopod bearing acute point; exopod with stout distolateral tooth and adjacent spiniform seta; diaeresis sinuous, with subtriangular tooth near distolateral spiniform seta; endopod ovoid, with comb-like row of raised setae proximally; distal margins of exopod and endopod without spiniform setae.

Gill–exopod formula as given for genus.

Colour in life not recorded.

Etymology. The species is named after Dr. Laure Corbari (MNHN) for her continuous support of the author's taxonomic studies of the Alpheidae and collaboration in the field.

Type locality. East of La Désirade, Guadeloupe, French Antilles.

Distribution. Currently known only from the type locality.

Ecology. Largely unknown, except for the mesophotic depth range, 111–162 m. Other notable animals collected at the station DW4553 were the crabs *Moreiradromia antillensis* (Stimpson, 1859 [38]), *Cyclozodion tuberatum* Williams & Child, 1989 [50] and *Pyromaia acanthina* Lemaitre, Campos & Bermúdez, 2001 [51], the hermit crab *Agaricochirus alexandri* (A. Milne-Edwards & Bouvier, 1893 [52]) (Poupin & Corbari 2016), and three rare species of cone snails, *Conus* spp., including two species presently considered to be endemic to Guadeloupe (Rabiller & Richard 2019 [53]).

Remarks. See under genus.

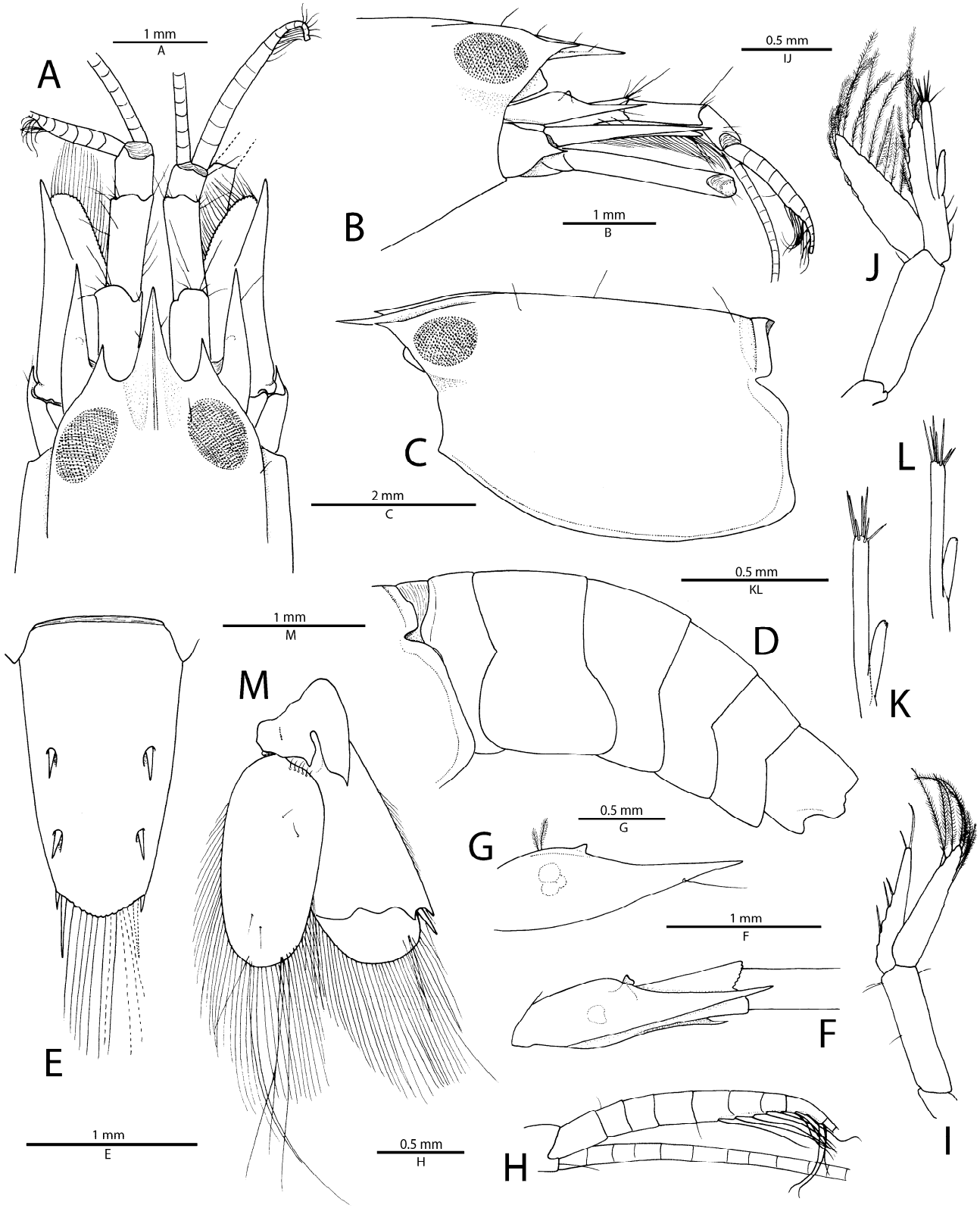

Figure 1. *Synalpheopsis laureae* gen et sp. nov., holotype, male (cl 5.3 mm, tl 13.1 mm) collected east of La Désirade, Guadeloupe (MNHN-IU-2016-2120): (**A**) frontal region, dorsal; (**B**) same, lateral; (**C**) carapace, lateral; (**D**) pleon, lateral; (**E**) telson, dorsal; (**F**) right antennule, first article and basal part of second article, lateral; (**G**) same, stylocerite, dorsolateral; (**H**) same, flagella, lateral; (**I**) first pleopod, lateral; (**J**) second pleopod, lateral; (**K**) same, appendix masculina and appendix interna, lateral; (**L**) same, appendix masculina and appendix interna, anterolateral.

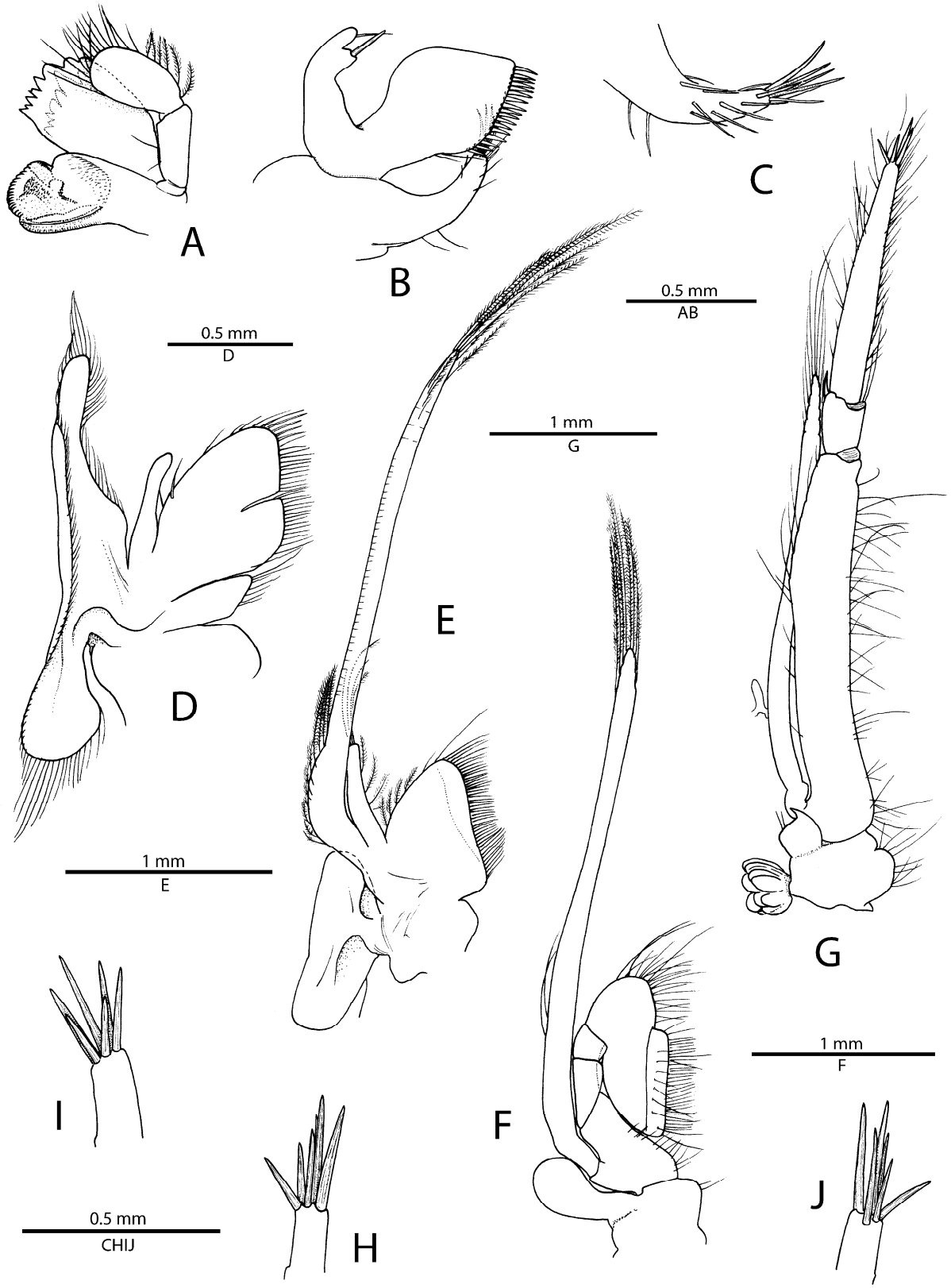

Figure 2. *Synalpheopsis laureae* gen et sp. nov., holotype, male (cl 5.3 mm, tl 13.1 mm) collected east of La Désirade, Guadeloupe (MNHN-IU-2016-2120): (**A**) right mandible, mesial; (**B**) right maxillule, lateral; (**C**) same, detail of proximal endite, lateral; (**D**) right maxilla, lateral; (**E**) right first maxilliped, lateral; (**F**) right second maxilliped, lateral; (**G**) right third maxilliped, lateral; (**H**,**I**,**J**) same, detail of tip of ultimate article, lateral (**H**), dorsal (**I**), and mesial (**J**).

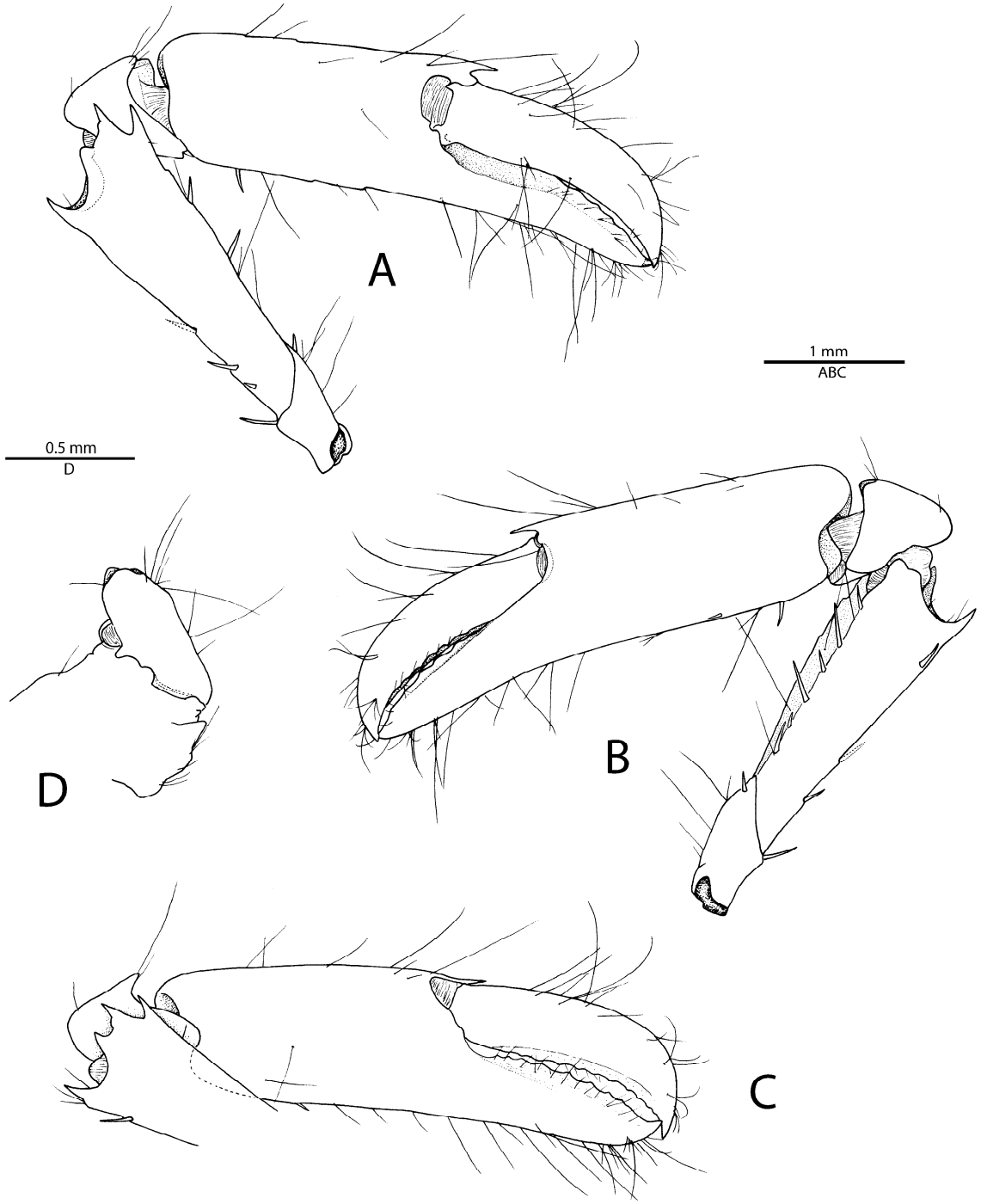

Figure 3. *Synalpheopsis laureae* gen et sp. nov., holotype, male (cl 5.3 mm, tl 13.1 mm) collected east of La Désirade, Guadeloupe (MNHN-IU-2016-2120): (**A**) right cheliped (detached at basis-ischium articulation), lateral; (**B**) same, mesial; (**C**) same, distal portion of merus, carpus and chela, lateral; (**D**) same, coxa and basis, lateral.

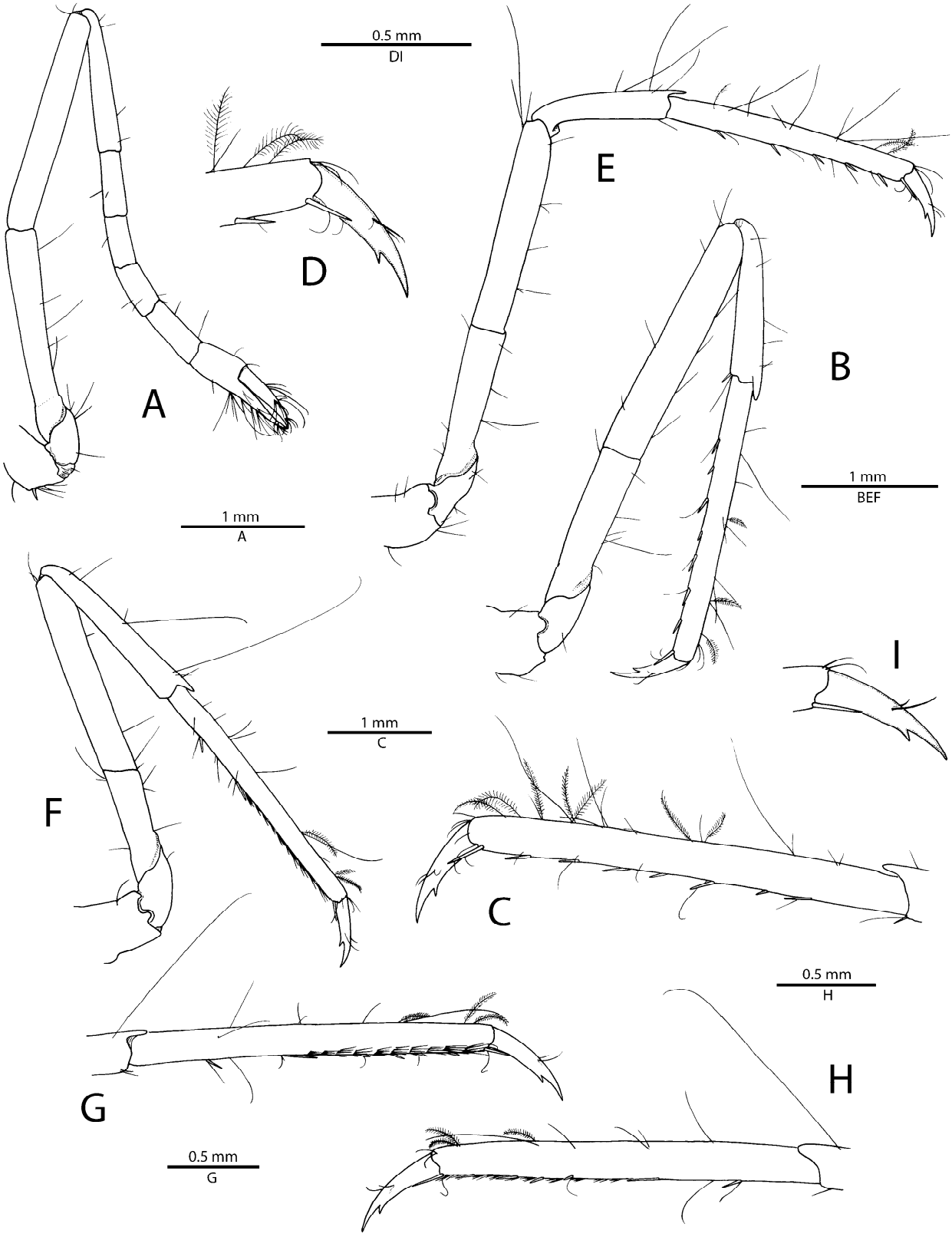

Figure 4. *Synalpheopsis laureae* gen et sp. nov., holotype, male (cl 5.3 mm, tl 13.1 mm) collected east of La Désirade, Guadeloupe (MNHN-IU-2016-2120): (**A**) right second pereiopod, lateral; (**B**) right third pereiopod, lateral; (**C**) same, propodus and dactylus, mesial; (**D**) same, distal portion of propodus and dactylus, lateral; (**E**) right fourth pereiopod, lateral; (**F**) right fifth pereiopod, lateral; (**G**) same, propodus and dactylus, lateral; (**H**) same, propodus and dactylus, mesial; (**I**) same, dactylus, lateral.

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