

Description of *Periclimenes wirtzi* sp. nov., a new pontoniine shrimp from Madeira and the Azores, with a checklist of Eastern Atlantic and Mediterranean Pontoniinae (Crustacea, Decapoda, Caridea)

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Abstract

A new *Periclimenes* from Madeira and the Azores, *P. wirtzi* sp. nov. is described. This pontoniine shrimp has an extremely long and unusually narrow rostrum with only a few teeth on the distal half of its dorsal border. It was found in large numbers on black corals of the genus *Antipathes* at 29-40 m depth. A provisional checklist of Eastern Atlantic and Mediterranean Pontoniinae is given.

Key words: *Periclimenes*, Pontoniinae, Decapoda, taxonomy, checklist, Eastern Atlantic, Mediterranean.

Résumé

Une nouvelle *Periclimenes* de Madère et des Açores est décrite. Cette crevette Pontoniinae possède un rostre extrêmement long et inhabituellement étroit avec un nombre de dents singulièrement réduit sur la moitié distale de son bord dorsal. Elle a été trouvée en grand nombre sur des coraux noirs du genre *Antipathes* à des profondeurs allant de 29 à 40 m. Une liste commentée provisoire des Pontoniinae de l'Atlantique Oriental et de la Méditerranée est également donnée.

Mots-clés: *Periclimenes*, Pontoniinae, Decapoda, taxonomie, checklist, Atlantique Oriental, Méditerranée.

Introduction

During SCUBA diving investigations in the Azores and Madeira Prof. Dr. Peter WIRTZ (University of Funchal) discovered a small pontoniine shrimp of the genus *Periclimenes* associated with black corals of the genus *Antipathes* at 29-40 m depth. He sent a large number of specimens to the present author. This species not only proves to be new for science but also to be unique by the shape and morphology of its rostrum: extremely long and extremely narrow with only a few dorsal teeth on its distal half. Full description and illustrations of the species are given here. In addition to the description of *P. wirtzi* sp. nov., a checklist of other Eastern Atlantic and Mediterranean Pontoniinae is provided.

Systematics

Periclimenes wirtzi sp. nov. (Figs. 1-7)

MATERIAL - Madeira, small seamount in front of the bay of Machico, 23.VIII.1995, from *Antipathes* bushes at 30-40 m depth, coll. P. Wirtz, 37 ex. including many ovigerous females [type series] (male holotype and 27 paratypes, I.R.Sc.N.B./K.B.I.N., Brussels, I.G. 28337; 3 paratypes N.N.M., Leiden, RMNH D 46798; 3 paratypes M.N.H.N., Paris, Na 13.059; 3 paratypes U.S.N.M., Washington D.C., USNM cat. 278086).- Azores, Faial Island, Monta da Guia, from an *Antipathes* bush at 29 m depth, 10.VIII.1995, coll. P. WIRTZ, sample 12.5, 1 ovigerous female; same locality, *Antipathes* bushes at 29-40 m, 8-11.VIII.1995, coll. P. WIRTZ, 34 ex. including many ovigerous females (I.R.Sc.N.B./K.B.I.N., I.G. 28336). Additional Madeiran specimens (not examined by myself) have been deposited by P. WIRTZ at the Museu Municipal do Funchal, Madeira.

ETYMOLOGY - It is a pleasure to dedicate the new shrimp to Prof. Dr. Peter WIRTZ, who discovered the species.

DESCRIPTION - Outline slender. Carapace smooth, glabrous. Rostrum upcurved, always distinctly longer than carapace and extremely slender, always overreaching scaphocerite (except in small juveniles with carapace length less than 1 mm). 6 (sometimes 5 or 7) dorsal teeth: 2 postrostral teeth and 4 (sometimes 3 or 5) rostral teeth. First dorsal tooth (epigastric tooth) on 6/10 or 7/10 of carapace, followed by large toothless space. Second tooth just behind orbit, immediately followed by first dorsal rostral tooth; a second and usually third proximal dorsal rostral tooth separated by slightly longer or distinctly longer space; occasionally with dorsal tooth on mid rostrum or on various parts of distal half of rostrum; always with subdistal dorsal tooth. Ventral border of dorsal teeth often microscopically serrate. 5-6 (sometimes 7) regularly spaced ventral teeth on distal 4/5 of rostrum. Rostrum of juveniles as illustrated. No supraorbital spines. No postorbital groove. Inferior orbital angle

strongly produced. Antennal spine long, almost reaching apex of inferior orbital angle. Immovable hepatic spine at same height as antennal spine, anterior to first postrostral tooth and posterior to second postrostral tooth, almost as long as antennal spine. Anterolateral margin of branchiostegite not produced, bluntly rounded. Carapace narrow; ratio length / height about 1.4-1.7. Thoracic sternites unarmed.

Abdomen smooth, glabrous, without dorsal carina. Pleura of five first pleonites rounded. Third pleonite not posterodorsally produced, with dorsal posterior border entire, not serrate. Sixth pleonite with small triangular postero-lateral tooth. Ratio dorsal length / height of sixth pleonite about 2.2-2.4. Ratio dorsal length of sixth and fifth pleonite about 1.9-2.0. Telson as long as sixth pleonite, narrow without proximal transverse row of setae but with some scattered short very slender isolated setae, with dorsolateral spines at 4/10 and 7/10 of its length; apex broadly triangular with blunt apical tubercle; 3 pairs of apical spines: a lateral pair short and glabrous, an intermediate pair quite long and glabrous (much longer than telson width at base of outer spines), submedian pair medium-sized and pectinate. Telson with long slender seta arising near base of each intermediate spine, another seta arising from base of each submedian spine. Abdominal sternites unarmed.

Eyestalks well developed, broad, slightly overreaching stylocerite. No accessory eyespot. In dorsal view cornea as broad or narrower than stalk, in lateral view slightly broader than stalk. Stalk longer than cornea.

First segment of antennular peduncle with 1 distal outer spine and 1 ventromesial spine on its median part; stylocerite acute, reaching half of first segment (distal outer spine included); statocyst well developed; setae as illustrated. Outer antennular flagellum with 3-5 fused articles; accessory branch long, with 4-6 articles (distal segment very short).

Scaphocerite narrow, overreaching antennular peduncle; ratio length / width: 4.2 in dissected female. Outer margin very slightly concave. Both margins parallel over almost whole length. Distal outer tooth not reaching tip of blade (but often almost reaching it). Tip of blade well developed and rounded. Proximal segment of antennular peduncle with small distolateral tooth. Distal segment of antennular peduncle very long and narrow, about 4 times as long as broad, almost reaching tip of first segment of antennular peduncle.

Mandible without palp. Incisor process with 3 or 4 teeth, molar process setose. Palp of first maxilla with sharp tooth directed forward. Second maxilla with blunt glabrous palp and bilobed setose endite. First maxilliped: palp with 1 subdistal setulose seta; no podobranch. Second maxilliped without podobranch. Third maxilliped reaching stylocerite apex, with epipodite and with small arthrobranch divided in lobes; exopodite reaching 0.86 of antepenultimate segment in dissected female.

Each pereopod with pleurobranch, without any other kind of gill, without epipodite.

P1 slightly overreaching antennular peduncle, nearly reaching tip of scaphocerite. Merus nearly as long as carpus. Propodus 0.6 times as long as carpus. Propodus nearly as long as ischium. Dactylus about 0.7 times as long as palm. Coxa, basis, ischium, merus and carpus unarmed. Outer side of carpus with a subdistal oblique transverse row of robust setulose setae. Outer side of propodus with 5 rows of short setulose setae (distal row comprising only one seta) on its proximal part in dissected female. Chela toothless but each finger with terminal unguis.

Both P2 very distinctly overreaching rostrum; coxa, basis, ischium, merus and carpus toothless.

Morphology and size of each P2 very different, with the large P2 sexually dimorphic.

Female with large P2 stout. In dissected specimen, carpus 3.1 times as long as broad; merus 1.2 times as long as ischium, 2.1 times as long as carpus, 0.6 times as long as propodus; propodus 3.2 times as long as carpus; fingers 0.4 times as long as palm. Dactylus with one terminal spine, immovable finger with two terminal spines. Dactylus with triangular tooth on proximal fourth of cutting edge interlocking between two teeth of immovable finger. Dactylus shape: seen from above, broad, oblong-shaped, flattened; seen laterally from outer side, thin, sloping from inner to outer edge; seen laterally from inner side (mesial side), hollow and concave, spoon-like.

Male with large P2 slender but with chela morphologically similar to that of female. In dissected male, carpus 6.6 times as long as broad; merus 1.2 times as long as ischium, 1.2 times as long as carpus, 0.9 times as long as propodus; propodus 1.4 times as long as carpus; fingers 0.4 times as long as palm.

Small P2 very slender, both fingers with terminal unguis. In dissected female, carpus 7.6 times as long as broad; merus 1.1 times as long as ischium, 1.3 times as long as carpus, 0.9 times as long as propodus; propodus 1.5 times as long as carpus; fingers 0.5 times as long as palm. In dissected male, carpus 9.2 times as long as broad; merus 1.2 times as long as ischium, 1.2 times as long as carpus, 1.0 times as long as propodus; propodus 1.3 times as long as carpus; fingers 0.5 times as long as palm.

P3-5 slender and very similar. Dactylus flexor border with minute tubercle. Propodus flexor border with 5-6 small slender spines. P3 slightly overreaching tip of antennular peduncle, P4-5 reaching approximately tip of antennular peduncle. $P3 < P4 < P5$ (size differences very slight). In dissected female: ratio length / height of P3-5 carpus respectively 7.0, 7.4 and 7.7; carpus of P3-4 slightly longer than ischium; carpus and ischium of P5 equal; P3-5 propodus 5.9-6.2 times as long as dactylus; P3-5 carpus 3.1-3.4 times as long as dactylus.

Endopod of first pleopod with a finger-like process and 5 lateral pectinate setae in dissected male.

Appendix masculina slightly but distinctly shorter than appendix interna and much shorter than endopod, with 5 apical setae and one row of 4 marginal setae in dissected male.

Exuropod with tooth immediately followed by one well developed movable spine (spine distinctly longer than

tooth). Exuropod with series of ventral setae. Enduropod with a series of dorsal setae. Edge of enduropod and exuropod with a comb of broad pectinate setae and some slender setae directed upwards.

COLOUR PATTERN OF OVIGEROUS FEMALES - Transparent. A longitudinal red stripe on ventral side of pleon and thorax. Intestine and viscera with a few faint red marks. Neither spot nor V-shaped pattern on dorsal part of third pleonite. Eyes: cornea blackish, stalk with a broad ventral longitudinal red stripe. Mesial side of antennular stalk and inner antennular flagella red. Basal part of one of the walking pereopods (? third pereopod) red. Pleopods red. Tail fan completely transparent. Eggs yellowish. These observations are based on colour slides. A colour photograph of *P. wirtzi* is given by WIRTZ (1996) as "unbeschriebene *Periclimenes*-Art".

SIZE - Total length up to about 20 mm in females and 19 mm in males. Carapace length up to 4 mm.

DISTRIBUTION AND ECOLOGY - For the time being *P. wirtzi* sp. nov. is only known from Madeira and the Azores but it is probably more widely distributed. Very common on black corals of the genus *Antipathes* at 29-40 m together with one or two unidentified *Periclimenes* species of the group *amethysteus* (RISSO). Slides provided

by P. WIRTZ showing the shrimp on *Antipathes* indicates that its colour pattern is very cryptic. The *Antipathes* species on which *P. wirtzi* sp. nov. lives is currently being studied by D. OPRESKO (Smithsonian Institute, Washington D.C.); its identity is apparently problematic (WIRTZ, in lit.).

DISCUSSION - The rostrum shape of *P. wirtzi* sp. nov. is unique within the genus *Periclimenes* O.G. COSTA, 1844 which comprises over 160 known species (CHACE & BRUCE, 1993). There are very few known species with a very long styliform rostrum, for example the Indo-Pacific *Periclimenes tenuipes* BORRADAILE, 1898 (KEMP, 1922; BRUCE, 1978) and *Periclimenes psamathe* (DE MAN, 1902) (MONOD, 1976). However in the latter the rostral formulae are quite different. On the other hand there are striking similarities between the rostrum of *Periclimenes wirtzi* sp. nov., and some non-pontoniine Palaemonidae such as *Urocaridella* spp. (CHACE & BRUCE, 1993). However in the latter the mouthparts are quite different. In *Urocaridella* spp. the second maxilliped has a well developed podobranch which is absent in *Periclimenes wirtzi* sp. nov. The first maxilliped has a much larger epipodite in *Urocaridella* spp. than in *Periclimenes wirtzi* sp. nov. Most other morphological characters of *P. wirtzi* sp. nov. are not unusual for the genus *Periclimenes* O.G. COSTA. The occurrence of an arthrobranch on the third

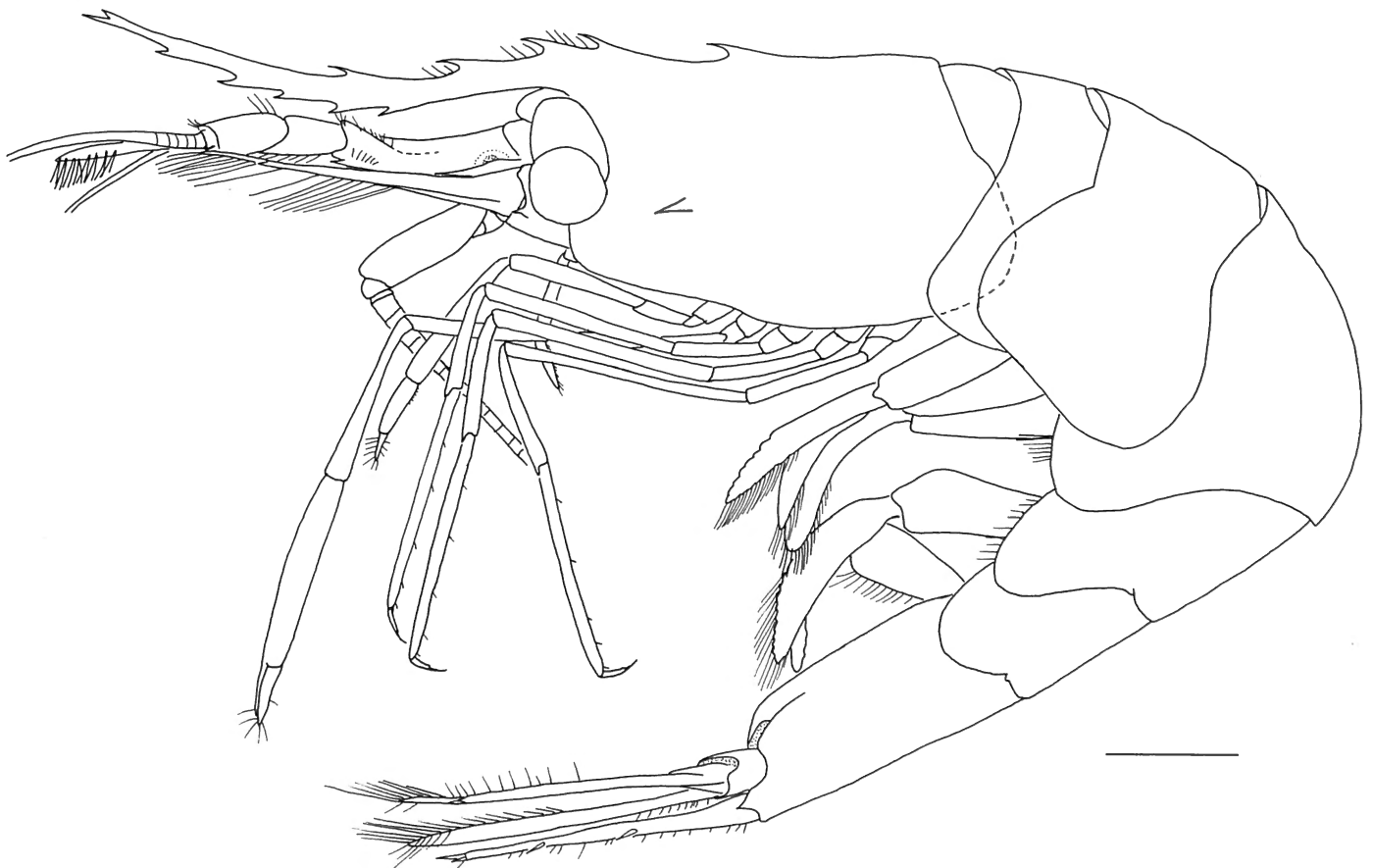


Fig. 1. - *Periclimenes wirtzi* sp. nov. (♂ holotype, Madeira), lateral view. Scale = 1 mm.

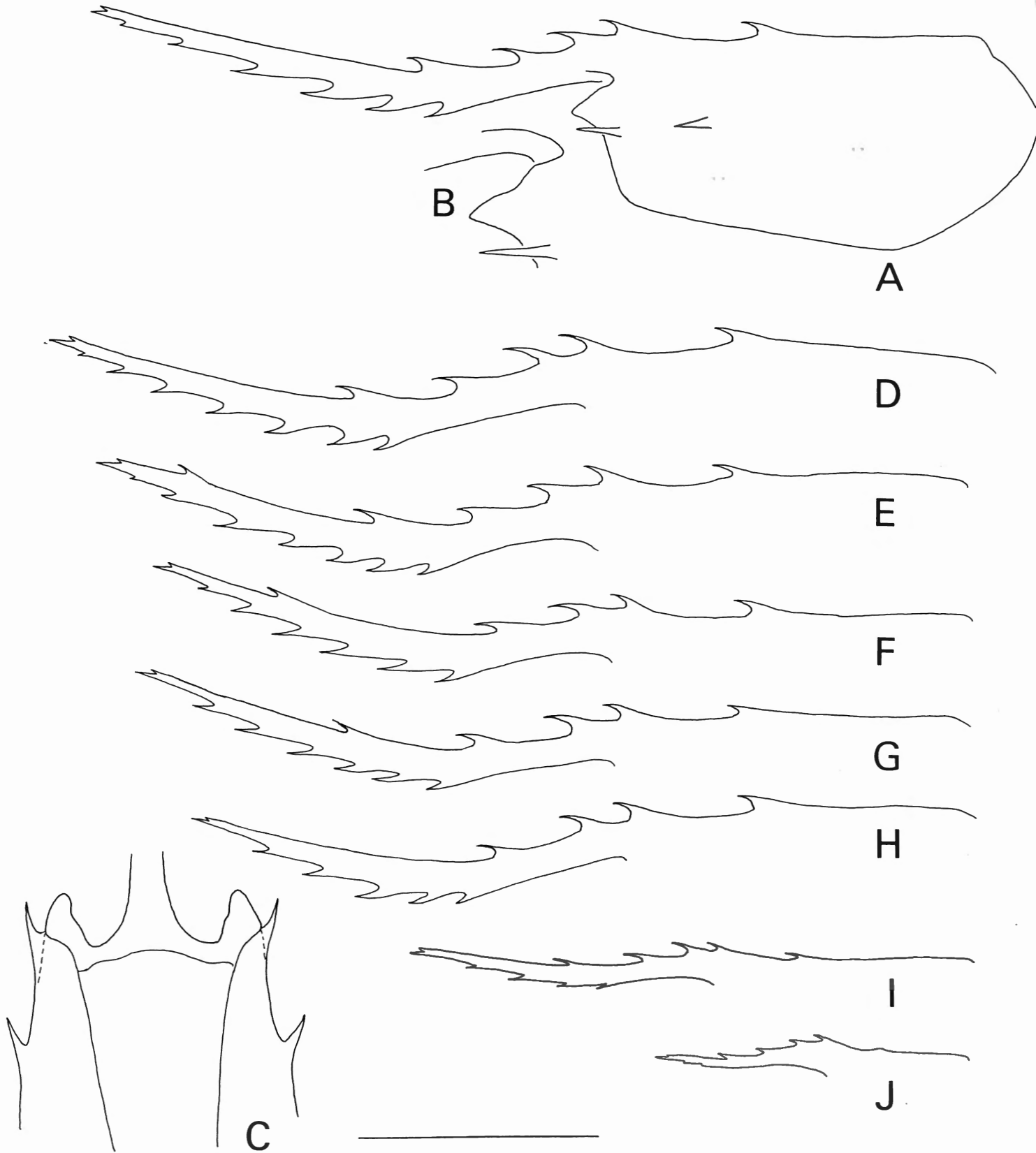


Fig. 2. — *Periclimenes wirtzi* sp. nov. (paratypes, Madeira; A-H: adult ♀♀; I: juvenile; J: small juvenile).
 A: carapace in lateral view; B: detail of anterior part of carapace in lateral view (same specimen); C: anterior part of carapace in ventral view (same specimen); D-J: rostrum and dorsal part of carapace of various specimens. Scale = 2 mm for A, D, E, F, G, H, I, J; 1.6 mm for C; 1 mm for B.

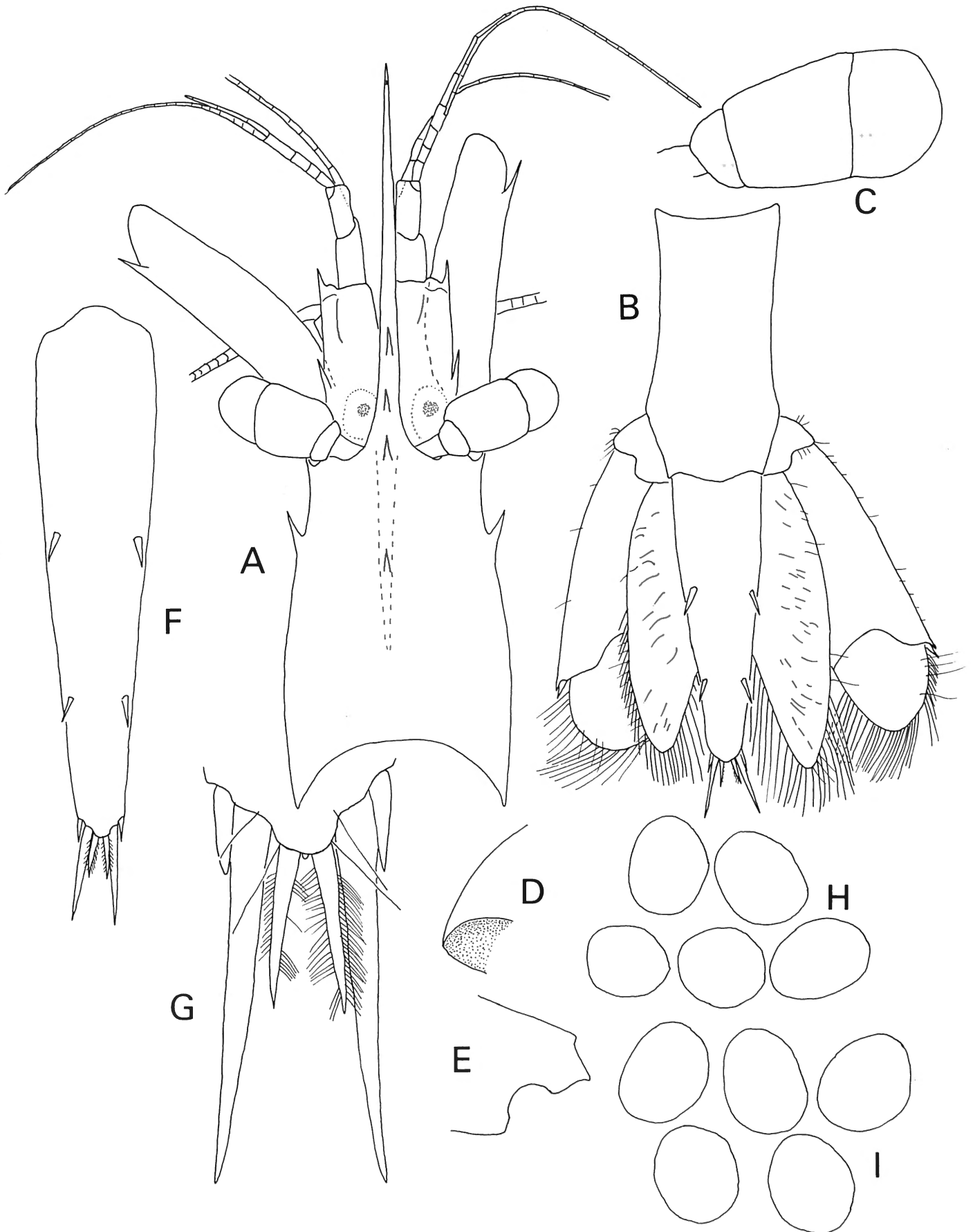


Fig. 3. — *Periclimenes wirtzi* sp. nov. (paratypes, Madeira; A-B, D-I: ♀♀; C: ♂).

A: carapace with cephalic appendages in dorsal view; B: caudal fan (same specimen as fig. 2H and 3A); C: right eyestalk in lateral view; D: posterior part of third pleonite (showing the absence of denticulations); E: posterior part of sixth pleonite; F: telson after dissection; G: apex of telson (Fig. D-F: same specimen); H: eggs recently laid; I: eggs with embryos. Scale = 2 mm for A; 1.6 mm for B, 1.0 mm for C, D, E, F, H, I; 0.3 mm for G.

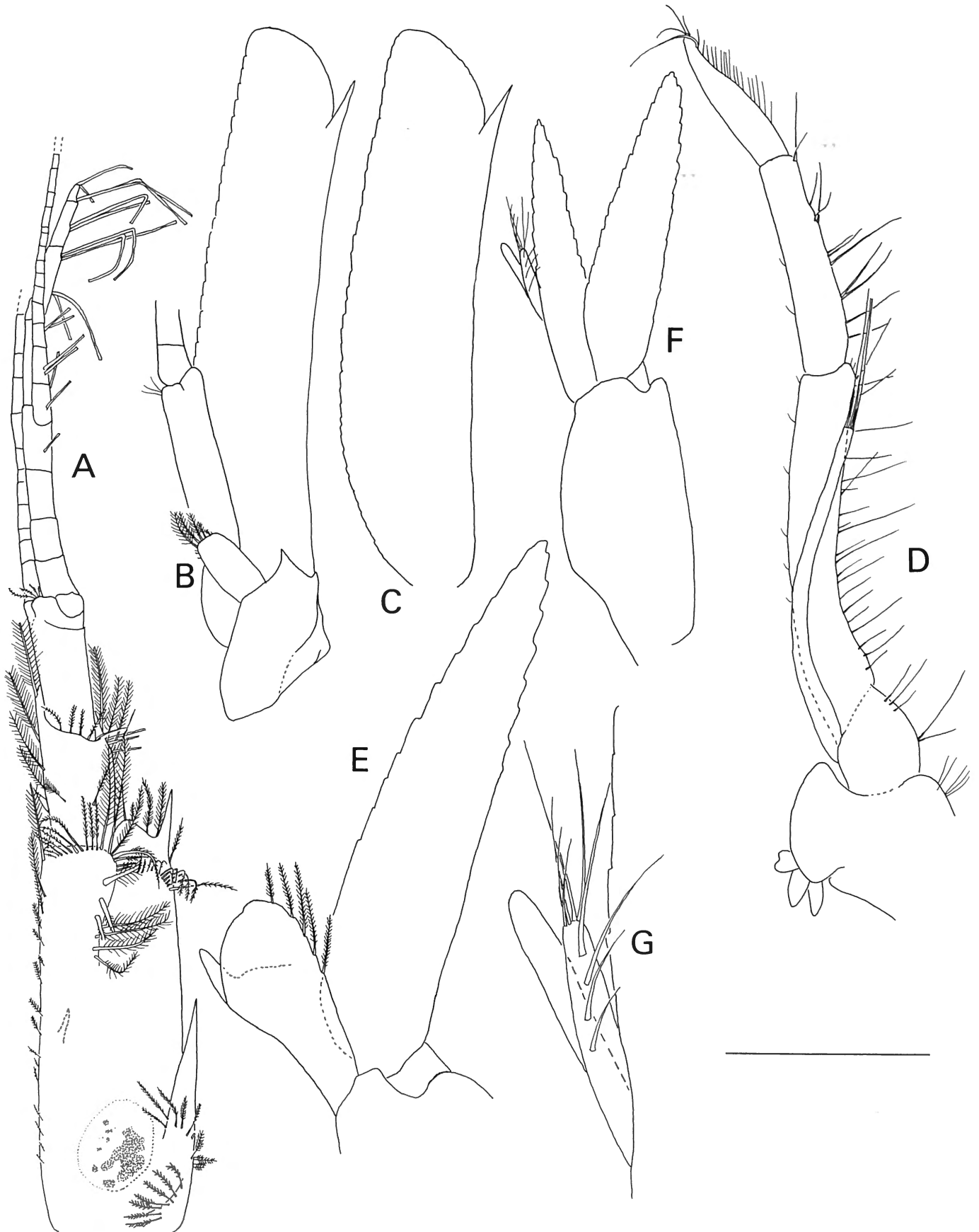


Fig. 4. — *Periclimenes wirtzi* sp. nov. (paratypes, Madeira; A-D: ♀; E-G: ♂).

A: right antennula; B: basal part of left antenna; C: scaphocerite of the same after dissection; D: left Mxp3; E: male first right pleopod; F: male second right pleopod; G: idem, detail of appendix masculina and interna. Scale = 1 mm for B, C, F; 0.8 mm for A; 0.5 mm for D, E; 0.3 mm for G.

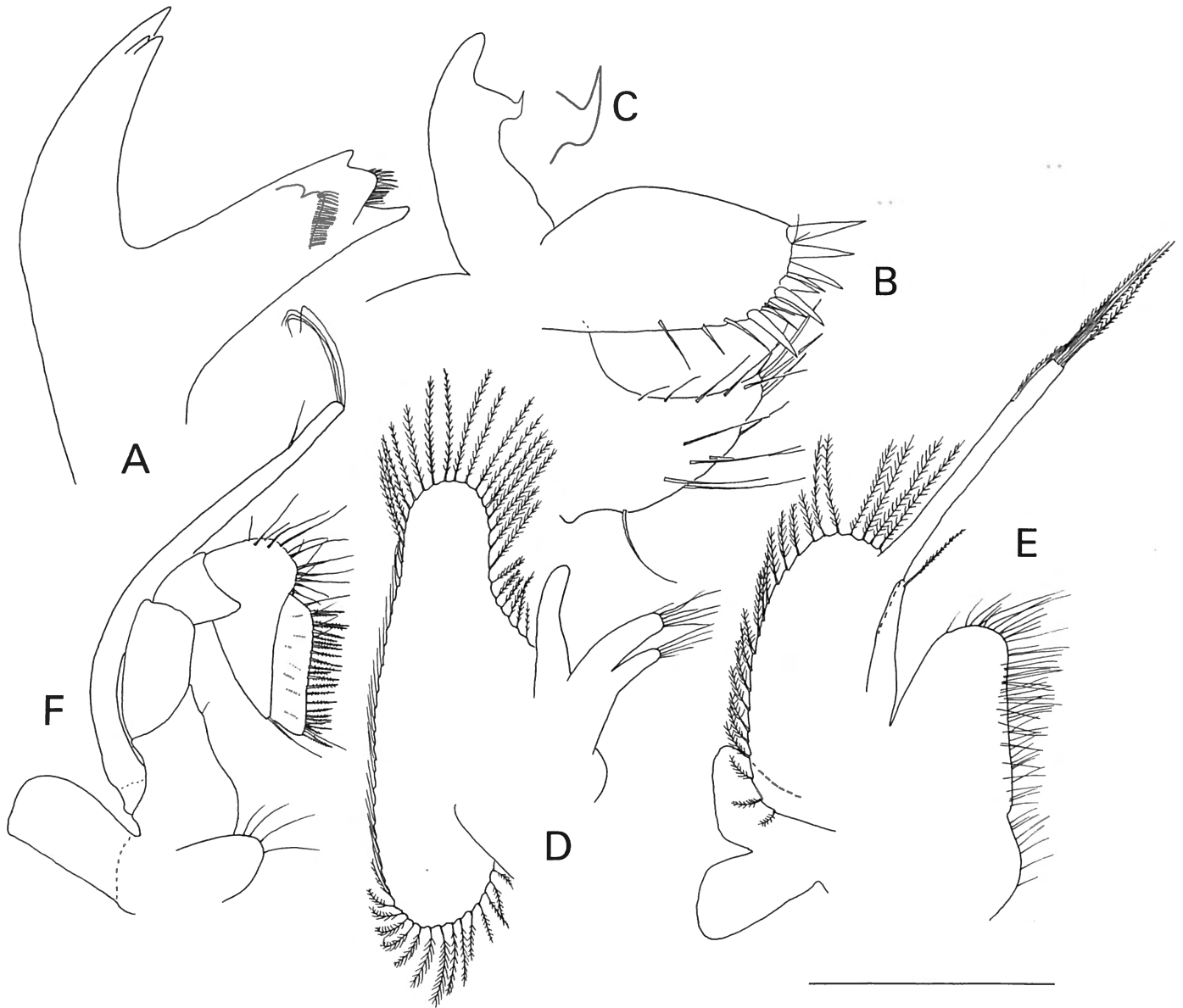


Fig. 5. – *Periclimenes wirtzi* sp. nov. (paratype, Madeira, ♀).

A: right Md; B: right Mx1; C: detail of the same; D: right Mx2; E: right Mxp1; F: right Mxp2. Scale = 0.5 mm for D, E, F; 0.3 mm for A, B; 0.08 mm for C.

maxilliped is probably a primitive character but it has been recorded in several other *Periclimenes*.

In its present conception the genus *Periclimenes* includes shrimps displaying a considerable range of morphological variation and it is not at all sure that it is a monophyletic assemblage. It seems likely that *P. wirtzi* sp. nov. will sooner or later be removed from it but this could only be done within the framework of a revisory study including a precise cladistic analysis of the genus and related forms.

It is remarkable to observe that some other pontoniine shrimps – not closely related to *P. wirtzi* sp. nov. – associated with antipatharians such as *Neopericlimenes thornei* HEARD, SPOTTE & BUBUCIS and *Periclimenes antipathophilus* SPOTTE, HEARD & BUBUCIS have the same longitudinal ventral red stripe (HEARD *et al.*, 1993; SPOTTE *et al.*, 1994).

The present data suggest that *P. wirtzi* sp. nov. is an obligate associate of antipatharians but it is not known if it is associated with only a single species of this group. Associations with antipatharians have been recorded for 7 other *Periclimenes* (SPOTTE *et al.*, 1994).

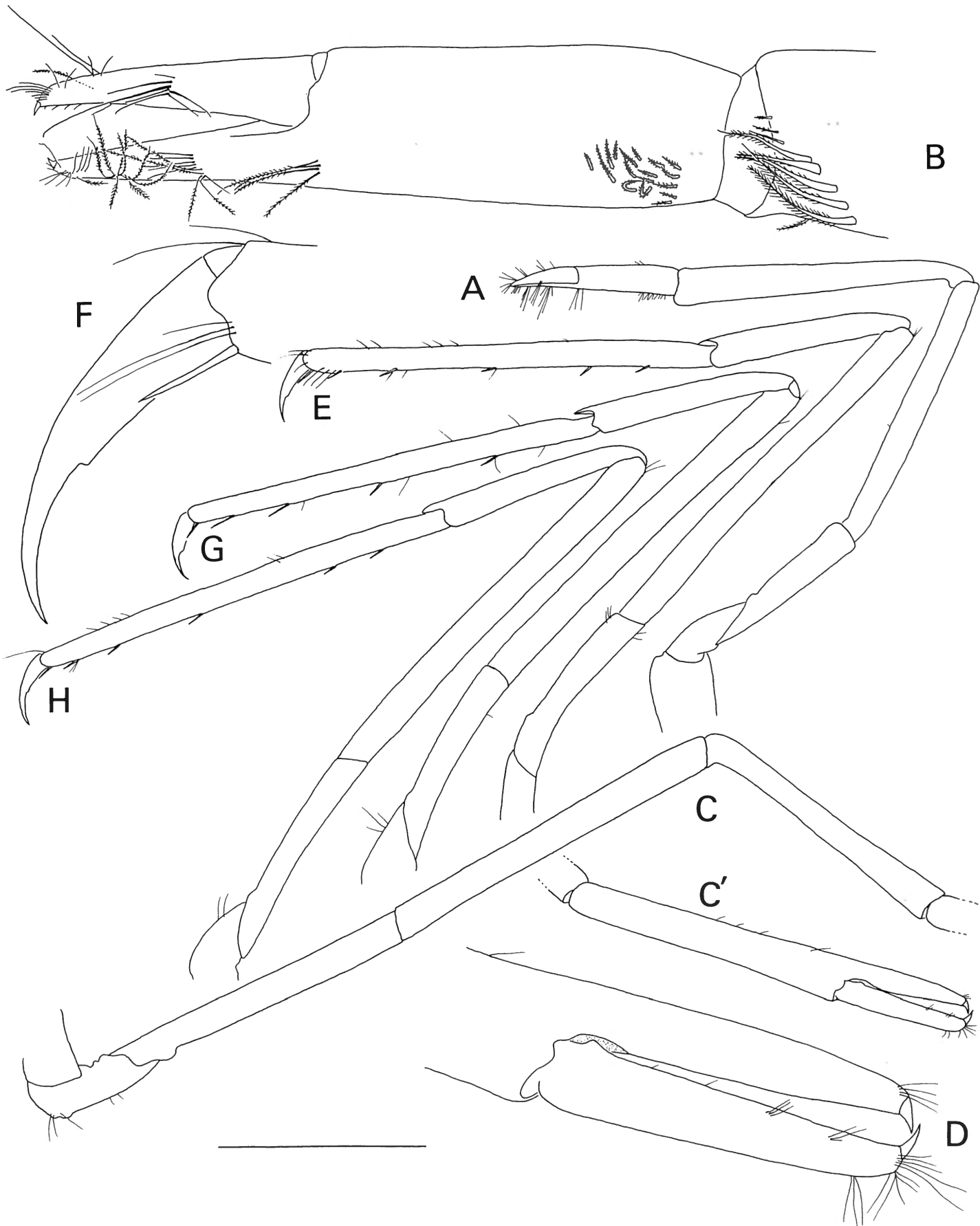


Fig. 6. — *Periclimenes wirtzi* sp. nov. (paratype, Madeira, ♀).

A: left P1; B: idem, anterior part; C-C': right (small) P2; D: idem, anterior part; E: left P3; F: idem, dactylus; G: left P4; H: left P5. Scale = 1 mm for A, C, C', E, G, H; 0.3 mm for B; 0.2 mm for D, F.

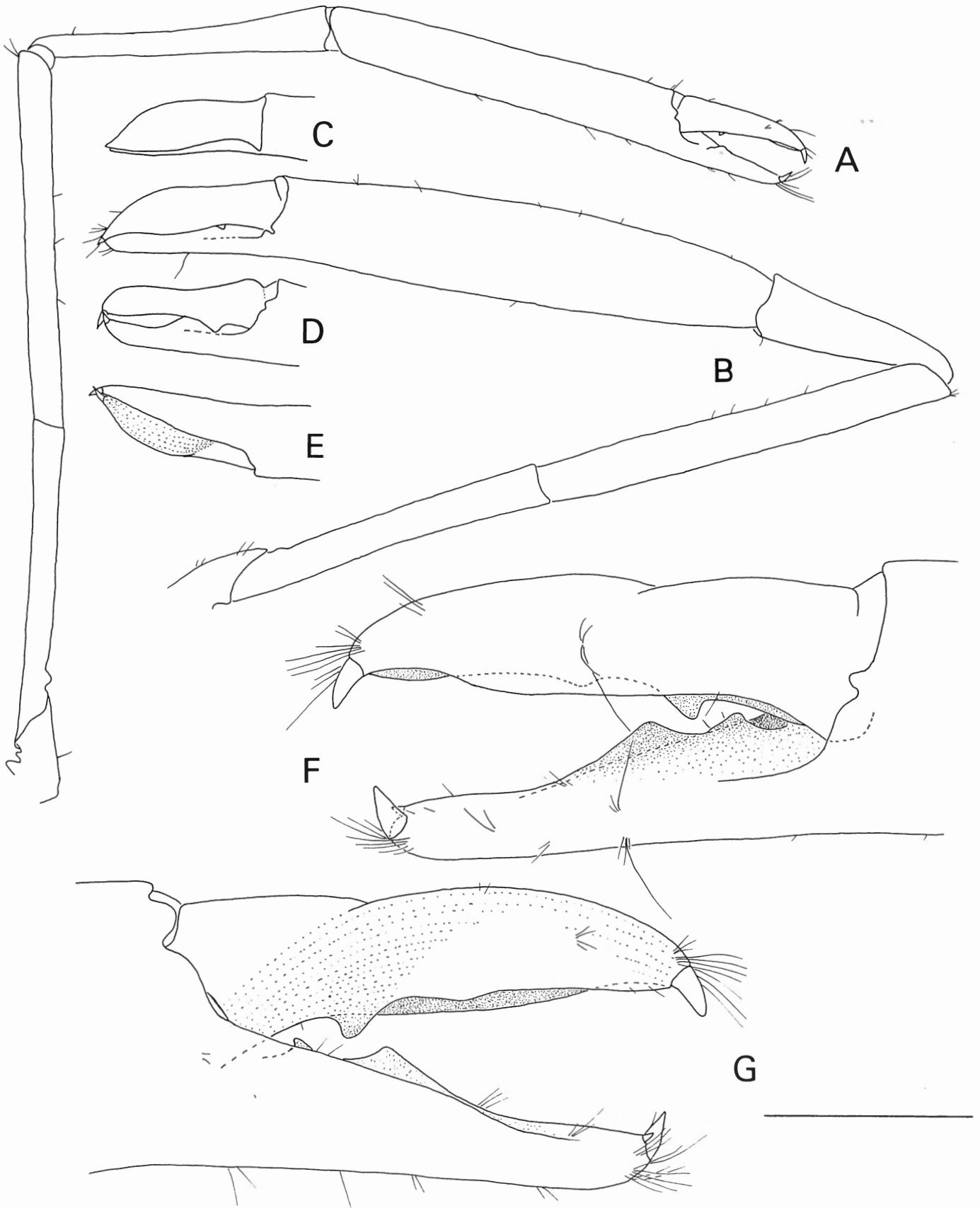


Fig. 7. – *Periclimenes wirtzi* sp. nov. (paratypes, Madeira).

A: large (right) P2 of the male; B-G: large (left) P2 of the female; B: whole appendage; C: dorsal view; D: outer view; E: ventral view; F: outer view; G: inner (mesial) view. Scale = 1 mm for A-E; 0.3 mm for F-G.

Checklist of Eastern Atlantic and Mediterranean Pontoniinae

Periclimenes wirtzi sp. nov. belongs to the family Palaemonidae and the subfamily Pontoniinae. Often associated with sponges, cnidarians, molluscs, echinoderms or tunicates, particularly diversified in the Indo-Pacific, the Pontoniinae are widespread all the world round in tropical and warm-temperate seas. This subfamily consists of over 400 species and forms (CHACE & BRUCE, 1993) of which only 23 are known in the Eastern Atlantic and the Mediterranean. However the real number of species in this area is certainly greater. In order to stimulate further studies a checklist of the known species is provided here. This list does not include *Pontonia vagans* GOURRET, a species described from the area of Marseilles at a depth of 35 fathoms. Gourret's description (GOURRET, 1888: 39) is insufficient to understand its identity. *Periclimenes nomadophila* BERGGREN could eventually be found in the future in the Mediterranean. For the time being this species is only known in the Indian Ocean (BERGGREN, 1994). However since its host the scyphozoan *Rhopilema nomadica* GALIL has recently colonized the Eastern Mediterranean (via the Suez canal) it is not impossible that they have migrated together.

Balssia gasti (BALSS, 1921)

Amphipalaemon Gasti BALSS, 1921: 524, figs. 1-8
Balssia gasti; ZARIQUIEY CENARRO, 1935: 101, figs. 1-14;
 HOLTHUIS, 1951b: 161; ZARIQUIEY ALVAREZ, 1968: 177, figs. 75a-b; NOËL, 1992: 63

Adriatic (ŠTEVČIĆ, 1990), Western Mediterranean, Canary Islands and West Africa, 12-120 m deep, associated with sponges and various octocorallians, (MANCONI & MORI, 1990).

Balssia sp.

Balssia n. sp. NOËL, 1992: 63

NOËL (1992) briefly describes this species in a key, without giving any information on its ecology and its distribution (except the fact that it occurs in Europe). This species is currently being studied by A.J. BRUCE.

Palaemonella atlantica HOLTHUIS, 1951

Palaemonella atlantica HOLTHUIS, 1951b: 152, figs. 31a-n;
 CHACE & BRUCE, 1993: 88 (key)

Gabon, coralligen bottoms, 57-65 m deep (ROSSIGNOL, 1962); Cape Verde Islands, bottoms with foraminifers and corals, bottoms with corals, 40 m deep (HOLTHUIS, 1951b), on *Antipathes* sp., 5 m deep (TÜRKAY, 1982).

Palaemonella rotumana (BORRADAILE, 1898)

Periclimenes rotumana BORRADAILE, 1898: 383
Palaemonella vestigialis KEMP, 1922: 123, fig. 1, 2, 7a, pl. 3 fig. 2; HOLTHUIS, 1952: 24, figs. 2a-b, 3a-e
Palaemonella rotumana; BRUCE, 1970: 274, 276-279, pl. 1 figs. e-f; BRUCE, 1975, 181, fig. 6h; CHACE & BRUCE, 1993: 88-89

Eastern Mediterranean [Lessepsian species] (HOLTHUIS & GOTTLIEB, 1958); Red Sea; and Eastern Africa to Philippines and Indonesia; eastwards to Hawaii; associated with dead coral on muddy bottoms, shallow water to 126 m deep (CHACE & BRUCE, 1993).

Periclimenes amethysteus (RISSO, 1827)

Alpheus amethysteus RISSO, 1827: 77, pl. 4, fig. 16
Periclimenes insignis O.G. COSTA, 1844: 291; O.G. COSTA, 1846: 1, pl. 6 figs. 1-6
Pelias scripta; HELLER, 1862: 406, pl. 2, fig. 34
Anchistia scripta; HELLER, 1863: 256, pls. 8, figs. 18-19; GOURRET, 1888: 37, 173, pl. 15 figs. 5-17
Periclimenes elegans GOURRET, 1888: 37 (non PAULSON, 1875)
Periclimenes amethysteus; PESTA, 1918: 126, fig. 42; ZARIQUIEY ALVAREZ, 1946: 85, figs. 108-109; HOLTHUIS, 1952a: 8, 32, ? figs. 4a-f (mouthparts); HOLTHUIS, 1961: 21; ZARIQUIEY ALVAREZ, 1968: 179-180, figs. 2d, 75f and 76e; LAGARDÈRE, 1971: 69-72, figs. 123-125 (after ZARIQUIEY ALVAREZ); GEORGE & GEORGE, 1980: 82, pl. 67 fig. 8 (colour photograph); DEBELIUS, 1982: 426, colour photographs; DEBELIUS, 1983: 92, colour photograph; NOËL, 1983: 153, figs. 1, 2, 3a-e (good drawings); BIRKHOLZ, 1989: 432, colour photograph; BAENSCH & DEBELIUS, 1992: 527, colour photograph; GÖTHEL, 1992: 165, colour photograph; HOLTHUIS, 1993: 164, fig. 155; WEINBERG, 1993: 282, colour photograph; FAASSE, 1994: 60-64, fig. 1 (colour photograph: nocturnal colour pattern), fig. 2, colour photograph on front cover; MOOSLEITNER & PATZNER, 1995: 117, colour photograph; GRIPPA & d'UDEKEM d'ACOZ, 1996: 403, fig. 2d, pl. 1 fig. a (colour photograph)
Periclimenes scriptus; BIRKHOLZ, 1989: 432, colour photograph

Not *Periclimenes amethysteus*; FIALA-MEDIONI *et al.*, 1987: 118, fig. 96 (colour photograph)

Western Mediterranean, Adriatic, Aegean Sea (Crete) (GRIPPA & d'UDEKEM d'ACOZ, 1996). There are a few recent Atlantic records (LEDOYER, 1967; ALMEIDA, 1992; 1994) which are probably all erroneous and based on *P. sagittifer sagittifer*. The real identity of the Mediterranean *Pelias amethysteus* of HELLER (1862), *Anchistia amethystea* of HELLER (1863) and *Periclimenes amethysteus* of FALCIAI & MINERVINI (1992) is not clear and, it is possible that some previous Mediterranean records of *P. amethysteus* are in fact based on *P. sagittifer aegylios*. Between 1 and 10 m deep, on the sea-anemones *Anemonia viridis* (FORSKÅL) and *Aiptasia mutabilis* (GRAVENH.) (GRIPPA & d'UDEKEM d'ACOZ, 1996). BIRKHOLZ (1989) observed that it eats the tip of the tentacles of its host in aquarium. *P. amethysteus*, *P. sagittifer sagittifer*, *P. sagittifer aegylios* and *P. scriptus*

constitute a group of very closely related forms (the group *amethysteus*). The most urgent problems of this group have been solved by GRIPPA & d'UDEKEM d'ACUZ (1996) but further studies are required.

Periclimenes andresi MACPHERSON, 1988

Periclimenes andresi MACPHERSON, 1988: 52, figs. 1a-g, 2a-f, 3a-d, 4a-c

Off Namibia, 17°15'S 11°27'E, 185 m deep.

Periclimenes calmani TATTERSALL, 1921

Periclimenes calmani TATTERSALL, 1921: 385, pl. 27 fig. 11, pl. 28 figs. 14-15; BRUCE, 1987a: 1415, figs. 1, 2a-e, 3a-j, 4a-j, 5a-j; BRUCE, 1987b: 123; GRIPPA & d'UDEKEM d'ACUZ, 1996: 409 (key)

An Indo-Pacific and Red Sea species which has reached the Eastern Mediterranean Sea (Port Said) through the Suez Canal (FOX, 1927; GURNEY, 1927). 2-36 m deep, apparently free-living (MÜLLER, 1993).

Periclimenes eleftherioui KOUKOURAS in NOËL, 1993 (*nomen nudum*)

Periclimenes eleftherioui KOUKOURAS in NOËL, 1993: 38

Europe, no further published data.

Periclimenes granulatus HOLTHUIS, 1950

Periclimenes granulatus HOLTHUIS, 1950: 109, pl. 1 figs. a-l, fig. 1m-n; ZARIQUIEY ALVAREZ, 1968: 179, 182; LAGARDÈRE, 1971: 69-71, figs. 115-118 (after HOLTHUIS); MACPHERSON, 1988: 56; GRIPPA & d'UDEKEM d'ACUZ, 1996: 409 (key)

Western Mediterranean, circalittoral. Algeria, near to Alger, 100 m deep bottom with alcyonarians and "avicules" [*Pteria hirundo* (L.)] (HOLTHUIS, 1950); area of Barcelona, no ecological data (ZARIQUIEY ALVAREZ, 1968). There is also a second record off the Spanish Catalan coast at 623-803 m depth (ABELLÓ et al., 1988) which needs confirmation.

Periclimenes kornii (LO BIANCO, 1903)

Anchistia Kornii LO BIANCO, 1903: 250, pl. 7 fig. 3

Periclimenes Kornii; KEMP, 1910: 411

Periclimenes kornii; de SAINT LAURENT & GARCÍA-RASO, 1993: 101, fig. 1a-i; GRIPPA & d'UDEKEM d'ACUZ, 1996: 409 (key); d'UDEKEM d'ACUZ, in press, figs. 1a-j, 2a-i, 3a-h

Eastern Atlantic: northern part of the bay of Biscay and Gibraltar area, Western Mediterranean: Alboran Sea and

bay of Naples; 500-1000 m deep; possibly associated with deepwater corals (d'UDEKEM d'ACUZ, in press). It is not impossible that the *Periclimenes* sp. found in Catalan waters at 393/450 m depth by CARTES et al. (1994) is also a *P. kornii*.

Periclimenes platalea HOLTHUIS, 1951

Periclimenes (Harpilius) platalea HOLTHUIS, 1951b: 157, fig. 32a-o

West Africa, 9°23'N 15°07'W and Cape Verde Islands, 15-30 m deep, bottoms of foraminifers and corals and sandy bottoms (HOLTHUIS, 1951b). Apparently related to *Periclimenes iridescens* LEBOUR, 1949 and other allied Western Atlantic species.

Periclimenes sagittifer aegylios GRIPPA & d'UDEKEM d'ACUZ, 1996

Periclimenes sagittifer; GEORGE & GEORGE, 1980: 83, pl. 68 fig. 2 (colour photograph); DEBELIUS, 1982: 426, colour photographs; DEBELIUS, 1983: 92, colour photograph; BAENSCH & DEBELIUS, 1992: 527, colour photograph; GÖTHEL, 1992: 134, colour photograph; MOOSLEITNER & PATZNER, 1995: 116, colour photograph

Periclimenes scriptus; RIEDL, 1983: 477, pl. 175 unnumbered fig.

Periclimenes amethysteus; FIALA-MEDIONI et al., 1987: 118, fig. 96 (colour photograph)

Periclimenes sagittifer aegylios GRIPPA & d'UDEKEM d'ACUZ, 1996, fig. 1, fig. 2b, pl. 1 fig. b (photograph in colour)

Western Mediterranean and Adriatic, 1.5-10 m deep; associated with the sea-anemones *Anemonia viridis* (FORSKÅL) and *Condylactis aurantiaca* (DELLE CHIAJE) (GRIPPA & d'UDEKEM d'ACUZ, 1996). It is probable that the specimen identified as *Periclimenes sagittifer* found on the sea-anemone *Cribrinopsis crassa* (ANDRES) by SVOBODA & SVOBODA (1975) belongs to the present form. The two subspecies of *P. sagittifer* are morphologically nearly identical (the Mediterranean subspecies is somewhat more variable than the Atlantic one) but their colour patterns present important constant differences. The morphological account of *P. sagittifer* given by ZARIQUIEY ALVAREZ (1968) and the coloured illustration of FALCIAI & MINERVINI (1992) agree neither with *P. sagittifer aegylios* nor with *P. sagittifer sagittifer*.

Periclimenes sagittifer sagittifer (NORMAN, 1861)

Dennisia sagittifera NORMAN, 1861: 278, pl. 13 figs. 8-13

Periclimenes sagittifer; NEVES, 1975: 17, fig. 6; SMALDON et al., 1993: 42 (in part), fig. 13 (bay of Biscay); WIRTZ, 1995a: 137, fig. 2 (photograph); WIRTZ, 1995b: 104, colour photograph

Periclimenes scriptus; DOMENECH et al., 1981: 139, fig. 27a-d
Periclimenes sagittifer sagittifer; GRIPPA & d'UDEKEM d'ACUZ, 1996, fig. 2c, pl. 1 fig. c (colour photograph)

Eastern Channel: an unique specimen found at Boulogne-sur-Mer (SOLLAUD, 1958 as *Periclimenes amethysteus*); South-Western Channel (NORMAN, 1861 as *Dennisia sagittifera*; NORMAN, 1907 as *Anchistia scripta*; SOLLAUD, 1958 as *Periclimenes amethysteus*; SOLLAUD, 1960; BOURDON, 1965; d'UDEKEM d'ACOZ, 1992; GRIPPA & d'UDEKEM d'ACOZ, 1996), bay of Biscay (SOLLAUD, 1958 as *P. amethysteus*; DOMENECH *et al.*, 1981 as *P. scriptus*; d'UDEKEM d'ACOZ, 1992), Portugal (NEVES, 1975), Algeciras bay [near Gibraltar] (colour photographs provided by J.I. GONZÁLEZ-GORDILLO), Madeira (WIRTZ, 1995a). I have reexamined most SOLLAUD's specimens, including the shrimp found at Boulogne-sur-Mer. Intertidal and shallow waters, on the sea-anemone *Anemonia viridis* (FORSKÅL). I observed that it eats the tip of the tentacles of its host in aquarium. It is often claimed that this species has symmetrical second pereopods. In fact it is not at all true, one of the second pereopod being very distinctly longer than the other.

Periclimenes scriptus (RISSO, 1822)

Alpheus scriptus RISSO, 1822: 247; RISSO, 1827: 78
Periclimenes scriptus; ZARIQUIEY ALVAREZ, 1946: 85, fig. 110; ZARIQUIEY ALVAREZ, 1968: 180, figs. 3a, 76a-d; LAGARDÈRE, 1971: 69-71, figs. 119-122 (after ZARIQUIEY ALVAREZ); DEBELIUS, 1982: 425, colour photograph; DEBELIUS, 1983: 91, [good] colour photograph (German edition only); GUILLÉN NIETO, 1990: 117, fig. 35; GRIPPA, 1991: 344; GÖTHEL, 1992: 163, colour photograph; MOOSLEITNER & PATZNER, 1995: 117, colour photograph; GRIPPA & d'UDEKEM d'ACOZ, 1996, fig. 2a, pl. 1 fig. d (colour photograph)

Not *Pelias scripta*; HELLER, 1862: 406, pl. 2, fig. 34
 Not *Anchistia scripta*; HELLER, 1863: 256, pls. 8, figs. 18-19; GOURRET, 1888: 37, 173, pl. 15 figs. 5-17
 Not *Periclimenes scriptus*; RIEDL, 1983: 477, pl. 175 unnumbered fig.; DOMENECH *et al.*, 1981: 139, fig. 27a-d; BIRKHOLZ, 1989: 432, colour photograph

Western Mediterranean (ZARIQUIEY ALVAREZ, 1968); Adriatic (ŠTEVČIĆ, 1990); Southern Peloponnese (personal observations); Aegean Sea (KOUKOURAS *et al.*, 1992), very rarely as shallow as 1 m (personal observations) down to 40 m depth (ŠTEVČIĆ, 1990), corraligen bottoms with *Halimeda tuna* (ELLIS & SOLLANDER) LAMOUROUX (GRIPPA, 1991) and on the sea-anemone *Condylactis aurantiaca* (DELLE CHIAJE) (SVOBODA & SVOBODA, 1975; GÖTHEL, 1992).

Periclimenes aff. scriptus

Urocaris de Mani BALSS, 1916: 29, fig. 10 (non *Periclimenes demani* KEMP, 1915)
Periclimenes scriptus; HOLTHUIS, 1949: 242, fig. 4a-g
Periclimenes (Periclimenes) scriptus; HOLTHUIS, 1951b: 155
Periclimenes sp. GONZÁLEZ PÉREZ, 1995: 72, photograph 14 (in colour)
Periclimenes cf. scriptus WIRTZ, 1996: 420, colour photograph

Continental West Africa between the Rio de Oro (HOLTHUIS, 1952b) and 6°0.2'S (HOLTHUIS, 1951b), the Azores (WIRTZ, 1996), Madeira (material collected by P. WIRTZ), Canary Islands (HOLTHUIS, 1949), Cape Verde Islands (HOLTHUIS, 1951b), between 12 and 65 m depth (HOLTHUIS, 1951b). ROSSIGNOL (1962) also identified as *Periclimenes* [sic] *scriptus* a *Periclimenes* that he found at Pointe-Noire (Congo) on an *Antedon* bottom; its real identity is unknown.

Periclimenes wirtzi sp. nov.

unbeschriebene *Periclimenes*-Art WIRTZ, 1996: 420, colour photograph

Madeira and the Azores, 29-40 m deep, associated with *Antipathes* sp.

Pontonia domestica GIBBES, 1850

Pontonia occidentalis GIBBES, 1848: xvi (*nomen nudum*)
Pontonia domestica GIBBES, 1850: 196; HOLTHUIS, 1951a: 122, pl. 38 figs. a-j; CHACE, 1972: 39; WILLIAMS, 1984: 88, fig. 60a-i (after HOLTHUIS)

West Atlantic: North Carolina, Caribbean Sea, Gulf of Mexico (WILLIAMS, 1984);? East Atlantic: Madeira (Porto Santo) (BORRADAILE, 1917 as *Conchodytes domestica*). Shallow water to 42 m. West Atlantic specimens were found in *Pinna* spp. and *Atrina* spp. The Madeiran material was found in *Pecten* sp. The occurrence of this species in Madeira should be confirmed. BORRADAILE indicated that his specimen or specimens were deposited in the British Museum.

Pontonia flavomaculata HELLER, 1864

Alcioppe heterochelus RAFINESQUE, 1814: 24; HOLTHUIS, 1954: 20 (name suppressed by I.C.Z.N.)
Pontonia flavomaculata HELLER, 1864: 51; de MAN, 1926: 67, figs. 1-7; LAGARDÈRE, 1971: 65-68, figs. 107-110 (after de MAN); PÉREZ SÁNCHEZ & MORENO BATET, 1991: 135, colour photograph
Pontonia Phallusiae MARION, 1877: 226; GOURRET, 1887: 187
Pontonia diazonae JOLIET, 1882: 118

West Africa 10°49'N 16°39'W (HOLTHUIS, 1951b), Canary Islands (PÉREZ SÁNCHEZ & MORENO BATET, 1991; GONZÁLEZ PÉREZ, 1995), Western Mediterranean (ZARIQUIEY ALVAREZ, 1968), Adriatic (ŠTEVČIĆ, 1990), Ionian Sea (personal observations), Aegean Sea (KOUKOURAS, 1979), southern part of Dardanelles (MULLER, 1986). Between 25 m (GRIPPA, 1991) and 50 m depth (ŠTEVČIĆ, 1990), in ascidians.

Pontonia pinnophylax (OTTO, 1821)

Alpheus Tyrrenus; RISSO, 1816: 94, pl. 2 fig. 2 (non *Astacus tyrrhenus* PETAGNA, 1792)

Palaemon pinnophylax OTTO, 1821: 12

Alpheus pinnophylax; OTTO, 1828: 341, pl. 21, figs. 1, 2

Pontonia parasitica ROUX, 1831: 26 (*nomen nudum*)

Pontonia custos; GUÉRIN-MÉNEVILLE, 1832: 36, pl. 37 fig. 1; ROSSIGNOL, 1957: 112, fig. 20 (non *Cancer custos* FORSKÅL, 1775)

Pontonia heterochelis GUÉRIN-MÉNEVILLE, 1832: 37

Pontonia tyrrhena; HELLER, 1863: 251, pl. 8 fig. 10-11; BORRADAILE, 1917: 390, pl. 57 fig. 29; SCHMITT, 1926: 40, fig. 66a-o

Pontonia pinnophylax; HOLTHUIS, 1947: 319 (synonymy); CHACE, 1966: 626, fig. 1a-c; ZARIQUIEY ALVAREZ, 1968: 173-175, figs. 2c, 6c, 8c, 11b, 12d, 15b, 73a-b, 74a-f; HOLTHUIS, 1977: 48 (synonymy); BRUCE, 1991: 616, figs. 7, 8, 9a-l, 10a-h, 11a-o, 12a-o, 13a-f; 14f; PÉREZ SÁNCHEZ & MORENO BATET, 1991: 134, colour photograph; GÖTHEL, 1992: 166, colour photographs in its host; MOOSLEITNER & PATZNER, 1995: 100, colour photograph; GONZÁLEZ PÉREZ, 1995: 72, photograph 15-17 (in colour)

West Africa: Congo (ROSSIGNOL, 1957; 1962), Gabon (J. ROUX, 1927; DELAMARE DEBOUDEVILLE, 1948), Northern Angola (SCHMITT, 1926); the Azores (BARROIS, 1888 as *P. tyrrhena*; PAULA et al., 1992); Canary Islands (PÉREZ SÁNCHEZ & MORENO BATET, 1991; GONZÁLEZ PÉREZ, 1995); Cape Verde Islands (TÜRKAY, 1982); St Helena (CHACE, 1966); Ascension Island (MANNING & CHACE, 1990); Western Mediterranean (ZARIQUIEY ALVAREZ, 1968); Adriatic (ŠTEVČIĆ, 1990); Ionian Sea (PASTORE, 1976); Aegean Sea (KOUKOURAS & KATTOULAS, 1974; KOCATAS, 1981); Cyprus (LEWINSOHN & HOLTHUIS, 1986). There is an unique record from the Baltic Sea (BRUCE, 1991) but I think that it is probably based on a mislabelled specimen or a shrimp escaped from an aquarium. Between 1 m (HOLTHUIS, 1961) and 137 m deep (LEWINSOHN & HOLTHUIS, 1986), usually in *Pinna* spp., sometimes free-living.

Tuleariocaris neglecta CHACE, 1969

Tuleariocaris neglecta, CHACE, 1969: 266, figs. 10a-x, 11a-g; WIRTZ et al., 1988: 169-170, fig. 1 (photograph); BERGGREN, 1994: 801; WIRTZ, 1995b: 106, colour photograph; GONZÁLEZ PÉREZ, 1995: 72, photograph 18 (in colour)

Western Atlantic: Caribbean Sea and Eastern Atlantic: Salvage Islands (CHACE, 1969), Madeira (WIRTZ et al., 1988); Canary Islands (PÉREZ SÁNCHEZ & MORENO BATET, 1991; GONZÁLEZ PÉREZ, 1995); 0.5-27 m deep, on the spines of the sea-urchins *Diadema antillarum* (PHILIPPI) (CHACE, 1969; WIRTZ et al., 1988), *Arbacia lixula* (LINNAEUS) (PÉREZ SÁNCHEZ & MORENO BATET, 1991) and *Astropyga magnifica* CLARK (CASTRO, 1974).

Typton ascensionis MANNING & CHACE, 1990

Typton ascensionis MANNING & CHACE, 1990: 10, fig. 4a-w

Ascension island, intertidal amongst rocks and coralline algae.

Typton gnathophylloides HOLTHUIS, 1951

Typton gnathophylloides HOLTHUIS, 1951a: 159, pl. 49 figs. o-p; CHACE, 1972: 46 (key);? GONZÁLEZ PÉREZ, 1995: 76, photograph 19 (in colour)

Dry Tortugas, Florida; 18 m. This Caribbean species is recorded by PÉREZ SÁNCHEZ & MORENO BATET (1991: 25) and GONZÁLEZ PÉREZ (1995) from Canary Islands. These dubious records need confirmation.

Typton spongicola O.G. COSTA, 1844

Typton spongicola O.G. COSTA, 1844: 289; O.G. COSTA, 1846, pl. 6bis figs. 1-6; HELLER, 1863: 254, pl. 8 figs. 12-17; NEVES, 1970: 401 fig. 12a-c; SMALDON et al., 1993: 14, fig. 14a-b

Pontonia pulsatrix NARDO, 1847: 5-6; NARDO, 1868: 249

Pontonella glabra HELLER, 1856: 629, pl. 9 figs. 1-15

Cancer pulsator NARDO, 1868: 240

Typton spongiosus BATE, 1868a: 283, pl. 3 fig. 1; BATE, 1868b: 119-120, pl. 11 fig. 1 (after BATE, 1868a)

Southwest England (NORMAN, 1868), Northern Brittany (BOURDON, 1965), Portugal (NEVES, 1970), Canary Islands (GONZÁLEZ PÉREZ, 1995), West Africa, southwards down to 9°20'N and Cape Verde Islands (HOLTHUIS, 1951b), Western Mediterranean (ZARIQUIEY ALVAREZ, 1968), Adriatic (ŠTEVČIĆ, 1990), Aegean Sea (KOUKOURAS, 1972; KOCATAS, 1981), sea of Marmara (MULLER, 1986), Mediterranean coast of Israel (HOLTHUIS & GOTTLIEB, 1958). In sponges, 8-100 m deep (SMALDON et al., 1993), sometimes as deep as 300 m (ŠTEVČIĆ, 1990).

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References

- ABELLÓ, P., VALLADARES, F.J. & CASTELLON, A., 1988. Analysis of the structure of decapod crustacean assemblages off the Catalan coast (North-West Mediterranean). *Marine Biology, Berlin*, 98: 39-49.
- ALMEIDA, A.J., 1992. L'importance des zostères dans la conservation des ressources marines. Colóquio "Conservação dos Recursos Vivos Marinhos", Lisboa, 25-27 set. 1989. *Publicações Avulsas do I.N.I.P., Lisboa*, 17: 447-461.
- ALMEIDA, A.J., 1994. Macrofauna acompanhante de zosteráceas. Importância na conservação do meio marinho. Professor Germano da Fonseca Sacarrão, Museu Bocage, Lisboa, pp. 125-144.
- BAENSCH, H.A. & DEBELIUS, H., 1992. Meerwasser Atlas. Mergus Verlag, Melle, 1216 pp.
- BALSS, H., 1916. Crustacea II: Decapoda Macrura und Anomura (ausser fam. Paguridae). In: MICHAELSEN, W., Beiträge zur Kenntnis der Meeresfauna Westafrikas, vol. 2, pp. 13-46.
- BALSS, H., 1921. Über eine neue Pontoniide aus dem Golf von Neapel. *Mitteilungen aus der Zoologischen Station zu Neapel*, 22 (15): 523-526.
- BARROIS, T., 1888. Catalogue des crustacés marins recueillis aux Açores. Le Bigot, Lille, 110 pp. + 4 pls.
- BATE, C.S., 1868a. Report of the Committee appointed to explore the Marine Fauna and Flora of the South Coast of Devon and Cornwall. - No. 2. Consisting of J. Gwyn JEFFREYS, F.R.S., Rev. Thomas HINCKS, Jonathan COUCH, F.L.S., Charles STEWART, F.L.S., J. Brooking ROWE, F.L.S., and J. RALFS, F.L.S. *Report of the British Association for advancement of Science, London*, year 1867: 275-286 + pls. 1-3.
- BATE, C.S., 1868b. Carcinological Gleanings. No. IV. *Annals and Magazine of Natural History*, (4) 2: 112-121 + pls. 9-11.
- BERGGREN, M., 1994. *Periclimenes nomadophila* and *Tuleariocaris sarec*, two new species of Pontoniine shrimps (Decapoda: Pontoniinae), from Inhaca Island, Moçambique. *Journal of Crustacean Biology*, 14 (4): 782-802.
- BIRKHOLZ, J., 1989. *Periclimenes scriptus* und *Periclimenes amethysteus* sind keine Symbiosegarnelen. *Das Aquarium, Zeitschrift für Aquarien- und Terrarienfrennd*, 241 (7): 432-434.
- BORRADAILE, L.A., 1898. A revision of the Pontoniinae. *Annals and Magazine of Natural History*, (7) 2: 376-391.
- BORRADAILE, L.A., 1917. The Percy Sladen Trust Expedition to the Indian Ocean in 1905, under the Leadership of Mr. J. Stanley GARDINER, M.A. Volume 6, No. VIII. - On the Pontoniinae. *Transactions of the Linnean Society of London*, (2) 17 (3): 323-396 + pls. 52-57.
- BOURDON, R., 1965. Inventaire de la faune marine de Roscoff. Décapodes - Stomatopodes. Éditions de la Station biologique de Roscoff, Roscoff, 45 pp.
- BRUCE, A.J., 1970. Observations on the Indo-West-Pacific species of the genus *Palaemonella* DANA, 1852 (Decapoda, Pontoniinae). *Crustaceana*, 19 (3): 273-287 + pl. 1.
- BRUCE, A.J., 1975. Further Observations on the Indo-West Pacific Species of the genus *Palaemonella* DANA, 1852 (Decapoda Natantia, Pontoniinae). *Crustaceana*, 29 (2): 169-185.
- BRUCE, A.J., 1978. The re-examination of some pontoniine shrimp types first described by L. A. BORRADAILE (Decapoda, Palaemonidae). *Crustaceana*, 34 (3): 251-268.
- BRUCE, A.J., 1987a. Re-description of two little-known Indo-West Pacific palaemonid shrimps, *Periclimenes calmani* TATTERSALL and *P. delagoae* BARNARD. *Journal of Natural History*, 21: 1415-1432.
- BRUCE, A.J., 1987b. *Periclimenes johnsoni* sp. nov., a new species of shrimp from Singapore (Crustacea: Decapoda: Palaemonidae). *Indo-Malayan Zoology*, 4: 113-126.
- BRUCE, A.J., 1991. *Notopontonia platycheles*, new genus, new species (Decapoda: Pontoniinae) from South Australia, with remarks on *Pontonia pinnophylax* (OTTO), the type species of *Pontonia* LATREILLE. *Journal of Crustacean Biology*, 11 (4): 607-628.
- CARTES, J.E., SORBE, J.C. & SARDÀ, F., 1994. Spatial distribution of deep-sea decapods and euphausiids near the bottom in the northwestern Mediterranean. *Journal of Experimental Marine Biology and Ecology*, 179: 131-144.
- CASTRO, P., 1974. A new host and notes on the behavior of *Tuleariocaris neglecta* CHACE, 1969 (Decapoda, Palaemonidae, Pontoniinae), a symbiont of diadematid sea urchins. *Crustaceana*, 26: 318-320.
- CHACE, F.A., 1966. Decapod Crustaceans from St. Helena, South Atlantic. *Proceedings of the United States National Museum*, 118 (3536): 623-661 + pls. 1-2.
- CHACE, F.A., 1969. A new genus and five new species of shrimps (Decapoda, Palaemonidae, Pontoniinae) from the Western Atlantic. *Crustaceana*, 16 (3): 251-272.
- CHACE, F.A., 1972. The Shrimps of the Smithsonian-Bredin Caribbean Expeditions with a Summary of the West Indian Shallow-water Species (Crustacea: Decapoda: Natantia). *Smithsonian Contributions to Zoology*, 98: I-X + 1-179.
- CHACE, F.A. & BRUCE, A.J., 1993. The Caridean Shrimps (Crustacea: Decapoda) of the Albatross Philippine Expedition 1907-1910, Part 6: Superfamily Palaemonoidea. *Smithsonian Contribution to Zoology*, 543: I-VII + 1-152.
- COSTA, O.G., 1844. Su due nuovi generi di Crostacei Decapodi Macrouri Nota. *Annali delle Accademia degli Aspiranti Naturalisti, Napoli*, 2: 285-290 (not seen).
- COSTA, O.G. & COSTA, A., 1838-1871. Crostacei ed Aracnedi. Fauna del Regno di Napoli ossia enumerazione di tutti gli animali che abitano le diverse regioni di questo regno e le acque che le bagnano contenente la descrizione de nuovi o poco esattamente conosciuti con figure ricavate da originali viventi e dipinte al naturale: foglia 1-43 (259 pages, 31 plates), 1-4 (30 pages, 1 plate), 1-5 (34 pages, 5 plates).
- DEBELIUS, H., 1982. Großkrebse im Aquarium 7. Teil: Über die Gattung *Periclimenes*. *Die Aquarien- und Terrarien-Zeitschrift [DATZ]*, 35 (11): 424-428.
- DEBELIUS, H., 1983. Gepanzerte Meeresritter. Kernen Verlag, Essen, 120 pp.
- DELAMARE DEBOUDEVILLE, C., 1948. Présence de *Pontonia pinnophylax* (Otto) [Crustacea] sur les côtes du Gabon. *Bulletin du Muséum national d'Histoire naturelle, Paris*, (2) 20: 444-445.
- DOMENECH, J.L., DE LA HOZ, M.M. & ORTEA, J.A., 1981. Crustáceos Decápodos de la Costa Asturiana. Nuevas Citas y Especies probables I. Macruros. *Boletín de Ciencias de la Naturaleza I.D.E.A.*, 27: 117-157.
- FAASSE, M.A., 1994. Juwelen en dronkenschap: over *Periclimenes amethysteus*. *Het Zee-Aquarium*, 44 (3): 60-64 + frontcover.

- FALCIAI, L. & MINERVINI, R. 1992. Guida dei Crostacei d'Europa. Franco MUZZIO editore, Padova, 282 pp + 18 pls.
- FIALA-MEDIONI, A., PÉTRON, C. & RIVES, C., 1987. Guide sous-marin de la Méditerranée. La Maison Rustique, Flammarion, Paris, 156 pp.
- FOX, H.M., 1927. Appendix II. to the Report on the Crustacea Decapoda (Natantia and Anomura). Zoological results of the Cambridge Expedition to the Suez Canal, 1924, XIV. *Transactions of the Zoological Society of London*, 22 (1): 229-230.
- GEORGE, D. & GEORGE, J., 1980. La vie marine. Encyclopédie illustrée des invertébrés marins. Maloine, Paris, 173 pp. + 128 pls.
- GIBBES, L.R., 1848. Catalogue of the Fauna of South Carolina. In : M. Tuomey, Report on the Geology of South Carolina, Appendix, pp. I-XXIV (not seen).
- GIBBES, L.R., 1850. On the Carcinological Collections of the Cabinets of Natural History in the United States: With an Enumeration of the Species Contained Therein and Descriptions of New Species. Proceedings of the Third Meeting of American Association for Advancement of Science, pp. 165-201 (not seen).
- GONZÁLEZ PÉREZ, J.A., 1995. Crustáceos Decápodos de las Islas Canarias. Gambas. Langostas. Cangrejos. Publicaciones Turquesa S.L., Santa Cruz de Tenerife, 282 pp.
- GÖTHEL, H., 1992. Farbatlas Mittelmeerfauna. Niedere Tiere und Fische. Verlag Eugen ULMER, Stuttgart, 318 pp.
- GOURRET, P., 1887. Sur quelques Crustacés parasites des Phallusies. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences, Paris*, 104: 185-187.
- GOURRET, P., 1888. Révision des Crustacés Podophthalmes du golfe de Marseille, suivi d'un essai de classification de la classe des Crustacés. *Annales du Musée d'Histoire naturelle de Marseille*, 3 (5): 1-212 + pls. 1-18.
- GRIPPA, G.B., 1991. Note sui Crostacei Decapodi dell'isola del Giglio (Arcipelago Toscano). *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano*, 131 (24): 337-363.
- GRIPPA, G.B. & d'UDEKEM d'ACCOZ, C., 1996. The genus *Periclimenes* COSTA, 1844 in the Mediterranean Sea and the Northeastern Atlantic Ocean: review of the species and description of *Periclimenes sagittifer aegylios* subsp. nov. (Crustacea, Decapoda, Caridea, Pontoniinae). *Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano*, 135(2): 401-412.
- GUÉRIN-MÉNEVILLE, F.E., 1832. 1^{re} Classe. Crustacés. In: BRULLÉ, A., Des Animaux articulés. - *Expédition scientifique de Morée. Section de Sciences Physiques*, 3 (1), Zool., 2: 30-50 + pl. 27.
- GURNEY, R., 1927. Report on the larvae of the Crustacea Decapoda. Zoological results of the Cambridge Expedition to the Suez Canal, 1924, XV. *Transactions of the Zoological Society of London*, 22 (1): 231-286.
- GUILLÉN NIETO, J.E. 1990. Guía de los Crustáceos Decápodos del litoral Alicantino. Instituto de cultura "Juan GIL-ALBERT", Diputación de Alicante, Alicante, 316 pp.
- HEARD, R.W., SPOTTE, S. & BUBUCIS, P.M., 1993. Pontoniine shrimps (Decapoda: Caridea: Palaemonidae) of the Northwest Atlantic. III. *Neopericlimenes thornei*, new genus, new species, from Pine Cay, Turks and Cacos Islands, British West Indies. *Journal of Crustacean Biology*, 13 (4): 793-800.
- HELLER, C., 1856. Beitrag zur Fauna der Adria. *Verhandlungen des zoologisch-botanischen Vereins in Wien*, 6: 629-634 + pl. 9.
- HELLER, C., 1862. Beiträge zur näheren Kenntniss der Macrouren. *Sitzungsberichte Akademie der Wissenschaften, Wien*, 45 (1): 389-426 + pls. 1-2.
- HELLER, C., 1863. Die Crustaceen des Südlichen Europa. Crustacea Podophthalmia. Wilhelm BRAUMÜLLER, Wien, XI + 336 pp. + 10 pls.
- HELLER, C., 1864. Horae dalmatinae. Bericht über eine Reise nach der Ostküste des adriatischen Meeres. *Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien*, 14: 17-64.
- HOLTHUIS, L.B., 1947. Nomenclatorial notes on European macrurous Crustacea Decapoda. *Zoologische Mededelingen, Leiden*, 27: 312-322.
- HOLTHUIS, L.B., 1949. The Caridean Crustacea of Canary Islands. *Zoologische Mededelingen, Leiden*, 30: 227-255.
- HOLTHUIS, L.B., 1950. Description d'une nouvelle espèce du genre *Periclimenes* des côtes algériennes. *Bulletin des Travaux Publiés par la Station Expérimentale d'Aquiculture et de Pêche de Castiglione, nouvelle série*, 2: 107-118 + pl. 1.
- HOLTHUIS, L.B., 1951a. A general revision of the Palaemonidae (Crustacea Decapoda Natantia) of Americas. I. The Subfamilies Euryrhynchinae and Pontoniinae. *Allan Hancock Foundation, Occasional Papers*, 11: 1-332 + pls. 1-63.
- HOLTHUIS, L.B., 1951b. The Caridean Crustacea of Tropical West Africa. *Atlantide Report*, 2: 7-187.
- HOLTHUIS, L.B., 1952a. The Decapoda of the Siboga Expedition, XI. The Palaemonidae collected by the Siboga and Snellius Expeditions with remarks on other species. II. Subfamily Pontoniinae. *Siboga Expedition Monographs*, 39a, 10: 1-252.
- HOLTHUIS, L.B., 1952b. Crustacés Décapodes, Macrures. *Expédition Océanographique Belge dans les Eaux Côtières de l'Atlantique Sud (1948-1949), Résultats Scientifiques*, 3 (2): 1-88.
- HOLTHUIS, L.B., 1954. C.S. RAFINESQUE as a carcinologist, an annotated compilation of the information on crustacea contained in the works of that author. *Zoologische Verhandelingen, Leiden*, 25: 1-43.
- HOLTHUIS, L.B., 1961. Report on a collection of Crustacea Decapoda and Stomatopoda from Turkey and Balkans. *Zoologische Verhandelingen, Leiden*, 47: 1-67 + pls. 1-2.
- HOLTHUIS, L.B., 1977. The Mediterranean decapod and stomatopod Crustacea in A. RISSO's published works and manuscripts. *Annales du Muséum d'histoire naturelle de Nice*, 5: 37-88.
- HOLTHUIS, L.B., 1993. The recent genera of the Caridean and Stenopodidean shrimps (Crustacea, Decapoda): with an appendix on the Amphionidacea. C.H.J.M. FRANSEN & C. VAN ACHTERBERG (Ed.). Nationaal Natuurhistorisch Museum, Leiden, 328 pp.
- HOLTHUIS, L.B. & GOTTLIEB, E., 1958. An annotated list of the decapod Crustacea of the Mediterranean coast of Israel, with an appendix listing the Decapoda of the eastern Mediterranean. *Bulletin of the Research Council Israel*, 7B: 1-126 + pls. 1-3.
- JOLIET, L., 1882. Observations sur quelques Crustacés de la Méditerranée. *Archives de Zoologie Expérimentale et Générale*, 10: 101-120 + pl. 6.

- KEMP, S.W., 1910. The Decapoda collected by the "Huxley" from the North Side of the Bay of Biscay in August, 1906. *Journal of the Marine Biological Association of the United Kingdom*, 8 (5): 407-420.
- KEMP, S.W., 1922. Notes on Crustacea Decapoda in the Indian Museum. XV. Pontoniinae. *Records of the Indian Museum*, 24 (2): 113-288 + pls. 3-9.
- KOCATAS, A., 1981. Liste préliminaire et répartition des crustacés décapodes des eaux turques. *Rapports et procès-verbaux des réunions. Commission Internationale pour l'Exploration Scientifique de la Mer Méditerranée*, 27 (2): 161-162.
- KOUKOURAS, A., 1972. A contribution to the study of Decapod Crustacea of Greece. *Hellenic Oceanology and Limnology*, 11: 745-779 (in Greek).
- KOUKOURAS, A., 1979. Some interesting zoogeographical notes on some species of the Benthic Fauna of the North Aegean Sea. *Biologia Gallo-Hellenica*, 8: 49-53.
- KOUKOURAS, A., DOUNAS, C., TÜRKAY, M., VOULTSIADOU-KOUKOURA, E., 1992. Decapod Crustacea Fauna of the Aegean Sea: New Information, Check List, Affinities. *Senckenbergiana maritima*, 22 (3/6): 217-244.
- KOUKOURAS, A., KATTOULAS, M., 1974. Benthic fauna of the Evvoia coast and Evvoia gulf III, Natantia (Crustacea, Decapoda). *Scientific Annals, Faculty of Physics and Mathematics, University of Thessaloniki*, 14: 369-383.
- LAGARDÈRE, J.-P., 1971. Les crevettes des côtes du Maroc. *Travaux de l'Institut Scientifique Chérifien et de la Faculté des Sciences, Rabat, Série Zoologique*, 36: 1-140.
- LEDOYER, M., 1967. Aperçu sur la faune vagile de quelques biotopes de l'archipel de Madère. Comparaison avec les biotopes méditerranéens homologues. *Arquivos do Museu Bocage*, (2) 1 (19): 415-424 + 1 map.
- LEWINSOHN, Ch. & HOLTHUIS, L.B., 1986. The Crustacea Decapoda of Cyprus. *Zoologische Verhandlungen, Leiden*, 230: 1-64.
- LO BIANCO, S., 1903. Le pesche abissali eseguite da F. A. KRUPP col yacht Puritan nelle adiacenze di Capri ed in altre località del Mediterraneo. *Mitteilungen aus der Zoologischen Station zu Neapel*, 16: 109-280 + pls. 7-9, map 1.
- MACPHERSON, E., 1988. New records of Decapods Crustaceans from the coast off Namibia / South West Africa, with the descriptions of two new species. *Investigación Pesquera, Barcelona*, 52 (1): 51-66.
- MAN, J.-G. de, 1926. *Pontonia flavomaculata* HELLER crustacé décapode habitant les ascidies. *Bulletin de la Société des Sciences Naturelles du Maroc*, 6 (1-6): 67-74.
- MANCONI, R. & MORI, M., 1990. New records of *Balssia gasti* (BALSS, 1921) (Decapoda, Palaemonidae) in the Western Mediterranean Sea. *Crustaceana*, 59 (1): 96-100.
- MANNING, R.B. & CHACE, F.A., 1990. Decapod and Stomatopod Crustacea from Ascension Island, South Atlantic Ocean. *Smithsonian Contribution to Zoology*, 503: V + 1-91.
- MARION, A.F., 1879. Crustacés de Marseille. In: L. de FOLIN & L. PERIER, Les fonds de la Mer. Étude internationale sur les particularités nouvelles des régions sous-marines, 3: 226.
- MONOD, Th., 1976. Sur quelques Natantia (Crust. Décapodes) de Nouméa (Nouvelle Calédonie). *Cahiers du Pacifique*, 19: 7-28.
- MOOSLEITNER, H. & PATZNER, R., 1995. Unterwasserführer Mittelmeer. Niedere Tiere. Delius KLASING, Edition Naglschmid, Stuttgart, 214 pp.
- MULLER, G.J., 1986. Review of the hitherto recorded species of Crustacea Decapoda from the Bosphorus, the sea of Marmara and the Dardanelles. *Cercetari marine*, 19: 109-130.
- MÜLLER, H.-G., 1993. Catalogue of the Indo-Pacific Pontonine Shrimps. Laboratory for Tropical Ecosystems, Wetzlar, 159 pp.
- NARDO, G.D., 1847. Sinonimia moderna delle specie registrate nell'opera intitolata: Descrizione de Crostacei, de Testacei e de Pesci che abitano le lagune e golfo veneto rappresentati in figure, a chiaro-scuro ed a colori dall' Abata Stefano CHEREGHINI, 127 pp. (not seen).
- NARDO, G.D., 1868. Annotazioni illustranti cinquantaquattro specie di crostacei podotalmi, endotalmi e succhiatori del mare Adriatico, alcune delle quali nuove o male conosciute, accompagnate da trentatre litografate, e precedute dalla storia della carcinologia adriatica antica e recente. *Memorie del reale Istituto Veneto di Scienze, Lettere ed Arti*, 14: 217-343 + pls. 12-14.
- NEVES, A.M., 1970. Notas sobre alguns Palaemonidae da Fauna Portuguesa com indicação de duas espécies novas para Portugal. *Arquivos do Museu Bocage*, (2) 2 (20): 379-406.
- NEVES, A.M., 1975. Sobre una coleção de Crustaceos Decapodos da Baía de Setúbal (Portugal). *Estudos sobre a Fauna Portuguesa*, 5: 1-48.
- NOËL, P.Y., 1983. Observations sur la pigmentation et la physiologie chromatique de *Periclimenes amethysteus* (Crustacea, Caridea). *Canadian Journal of Zoology*, 61: 153-162.
- NOËL, P.Y., 1992. Clé préliminaire d'identification des Crustacea Decapoda de France et des principales autres espèces d'Europe. Secrétariat de la Faune et de la Flore. Collection Patrimoine Naturels. Série Patrimoine Scientifique. Muséum National d'Histoire Naturelle, Paris, Vol. 7, 146 pp.
- NOËL, P.Y. (Coord.), 1993. Atlas des crustacés décapodes de France (espèces marines et d'eaux saumâtres). État d'avancement au 28/06/1993 - Paris, Secrétariat de la Faune et de la Flore et Biologie des Invertébrés Marins / Muséum National d'Histoire Naturelle, Conseil Supérieur de la Pêche, Ministère de l'Environnement, 96 pp.
- NORMAN, A.M., 1861. Contributions to British Carcinology. - I. Characters of undescribed Podophthalmia and Entomostraca. *Annals and Magazine of Natural History*, (3) 8: 273-281 + pls. 13-14.
- NORMAN, A.M., 1868. On the British Species of *Alpheus*, *Typ-ton*, and *Axius*, and on *Alpheus Edwardsii* of AUDOUIN. *Annals and Magazine of Natural History*, (4) 2: 173-178.
- NORMAN, A.M., 1907. Notes on the Crustacea of the Channel Islands. *Annals and Magazine of Natural History*, (7) 20: 356-371 + pls. 16-17.
- OTTO, A.G., 1821. Conspectus animalium quorundam maritimum nondum editorum pars prior quam Patri dilectissimo ad cineres usque venerando, Vrastislavia, 20 pp. (not seen).
- OTTO, A.G., 1828. Beschreibung einiger neuen, in den Jahren 1818 und 1819 in Mittelländischen Meere gefundener Crustaceen. *Nova Acta Academiae Caesareae Leopoldino Carolinae germanicae naturae curiosorum*, 14: 331-354 + pls. 1-3.
- PASTORE, M.A., 1976. Decapoda crustacea in the Gulf of Taranto and the Gulf of Catania with a discussion of a new species of Dromiidae (Decapoda Brachyura) in the Mediterranean Sea. *Thalassia Jugoslavica*, 8 (1): 105-117.

- PAULA J., CARTAXANA, A. & QUEIROGA, H., 1992. Decapod crustaceans collected by the "Expedition Azores 1989". *Arquipélago*, 10: 67-74.
- PÉREZ SÁNCHEZ, J.M. & MORENO BATET, E., 1991. Invertebrados Marinos de Canarias. Ediciones del Abildo Insular de Gran Canaria, Las Palmas de Gran Canaria, 335 pp.
- PESTA, O., 1918. Die Decapodenfauna der Adria. Versuch einer Monographie. Deuticke, Leipzig-Wien, X + 500 pp.
- RAFINESQUE, C.S., 1814. Précis des Découvertes et Travaux somiologiques de Mr. C.S. RAFINESQUE-SCHMALTZ. entre 1800 et 1814. Ou choix raisonné de ses principales Découvertes en Zoologie et en Botanique, pour servir d'introduction à ses ouvrages futurs, Palermo, 55 pp.
- RIEDL, R., 1983. Fauna und Flora des Mittelmeeres. Paul PAREY, Hamburg und Berlin, 836 pp. + 16 pls.
- RISSO, A., 1816. Histoire naturelle des Crustacés des environs de Nice, 175 pp + pls. 1-3.
- RISSO, A., 1822. Mémoire sur quelques nouveaux Crustacés observés dans la mer de Nice. *Journal de Physique, de Chimie, d'Histoire Naturelle et des Arts*, 95: 241-248 (not seen).
- RISSO, A., 1827. Histoire naturelle des principales productions de l'Europe méridionale et particulièrement de celles de Nice et des Alpes maritimes, vol. 5, VII + 403 pp. + pls. 1-10.
- ROSSIGNOL, M., 1957. Crustacés décapodes marins de la région de Pointe-Noire. In: COLLIGNON, J., ROSSIGNOL, M. & ROUX, C., Mollusques, crustacés, poissons marins des côtes d'A. E. F. en collection au centre d'océanographie de l'Institut d'Études centrafricaines de Pointe-Noire, O.R.S.T.O.M., Paris, pp. 73-136.
- ROSSIGNOL, M., 1962. Catalogue des Crustacés Décapodes Brachyours, Anomours et Macrours littoraux en collection au centre d'Océanographie de Pointe-Noire. *Travaux du Centre Océanographique de Pointe-Noire, O.R.S.T.O.M.*, 2: 111-138.
- ROUX, J., 1927. Note sur une collection de Crustacés décapodes du Gabon. *Bulletin de la Société Vaudoise des Sciences naturelles*, 56: 237-244.
- ROUX, P., 1831. Mémoire sur la classification des Crustacés de la tribu des Salicoques, Marseille, 39 pp.
- SAINT-LAURENT, M. de, & GARCÍA-RASO, J.E., 1993. A new record and redescription of *Periclimenes kornii* (LO BIANCO, 1903) (Crustacea, Decapoda, Palaemonidae) from the Straits of Gibraltar. *Scientia Marina*, 57 (1): 101-104.
- SCHMITT, W., 1926. The macruran, anomuran, and stomatopod crustaceans collected by the American Museum Congo Expedition, 1909-1915. *Bulletin of The American Museum of Natural History*, 53: 1-67, pls. 1-9.
- SMALDON, G., HOLTHUIS, L.B. & FRANSEN, C.H.J.M., 1993. Coastal shrimps and prawns. *Synopses of the British Fauna (New Series)*, 15 (Second Edition): 1-142, Henry LING Ltd, Dorset Press, Dorchester.
- SOLLAUD, E., 1958. Sur deux espèces de crevettes nouvelles pour la faune marine des côtes de Bretagne: *Periclimenes amethysteus* (RISSO) et *Hippolyte leptocerus* (HELLER), (Decapoda Natantia). *Bulletin du Laboratoire Maritime de Dinard*, 44: 4-6.
- SOLLAUD, E., 1960. Fréquence inhabituelle d'une crevette du genre *Periclimenes* dans la région de Dinard. *Bulletin du Laboratoire Maritime de Dinard*, 46: 46-47.
- SPOTTE, S., HEARD, R.W. & BUBUCIS, P.M., 1994. Pontoniine shrimps (Decapoda: Caridea: Palaemonidae) of the Northwest Atlantic. IV. *Periclimenes antipathophilus* new species, a black coral associate from the Turks and Caicos Islands and Eastern Honduras. *Bulletin of Marine Sciences, Miami*, 55 (1): 212-227.
- ŠTEVČIĆ, Z., 1990. Check-list of the Adriatic Decapod Crustacea. *Acta Adriatica*, 31 (1/2): 183-274.
- SVOBODA, A. & SVOBODA, B., 1975. The Mediterranean anemone shrimps of the genus *Periclimenes*, COSTA, (Decapoda: Palaemonidae). *Publicaciones della Stazione Zoologica di Napoli*, 39: 345-346.
- TATTERSALL, W.M., 1921. Report on the Stomatopoda and Macrurous Decapoda collected by Mr. Cyril CROSSLAND in the Sudanese Red Sea. *Journal of the Linnean Society, London*, 34 (229): 345-396 + pls. 27-28.
- TÜRKAY, M., 1982. Marine Crustacea Decapoda von den Kapverdischen Inseln mit Bemerkungen zur Zoogeographie des Gebietes. *Courier Forschungsinstitut Senckenberg*, 52: 91-129.
- UDEKEM d'ACÓZ, C. d', 1992. Note sur quelques crevettes littorales du sud-ouest de la France: *Alpheus dentipes*, *Hippolyte leptocerus*, *Hippolyte longirostris*, *Lysmata seticaudata* et *Periclimenes sagittifer*. *De Strandvlo*, 12(2): 35-42.
- UDEKEM d'ACÓZ, C. d', in press. New observations on *Periclimenes kornii* (LO BIANCO, 1903) (Crustacea, Decapoda, Pontoniinae). *Courier Forschungsinstitut Senckenberg*.
- WEINBERG, S., 1993. Découvrir la Méditerranée. Nathan, Paris, 352 pp.
- WILLIAMS, A.B., 1984. Shrimps, lobsters, and crabs of the Atlantic coast of the Eastern United States, Maine to Florida. Smithsonian Institution Press, Washington, D.C., XVIII + 550 pp.
- WIRTZ, P., 1995a. Krebs - Seeanemonen - Symbiosen bei Madeira. *Natur und Museum*, 125 (5): 137-142.
- WIRTZ, P., 1995b. Unterwasserführer Madeira Kanaren / Azoren. Niedere Tiere. Delius KLASING, Edition Naglschmid, 247 pp.
- WIRTZ, P., 1996. Madeira und Azoren. Garnelen an Schwarzen Korallen. *Aquarien- und Terrarien-Zeitschrift [DATZ]*, 49 (7): 420-422.
- WIRTZ, P., MÜLLER, B. & NAHKE, P., 1988. The Caribbean shrimp *Tuleariocaris neglecta* CHACE 1969 found in association with *Diadema antillarum* at Madeira, and two new records of decapod crustaceans from the Cape Verde Islands. *Courier Forschungsinstitut Senckenberg*, 105: 169-171.
- ZARIQUIEY ALVAREZ, R., 1946. Crustáceos Decápodos Mediterráneos. Instituto Español de Estudios Mediterráneos, Barcelona, 183 pp. + pls. 1-26.
- ZARIQUIEY ALVAREZ, R., 1968. Crustáceos Decápodos Ibéricos. *Investigación Pesquera, Barcelona*, 32: i-xv + 1-510.
- ZARIQUIEY CENARRO, R., 1935. *Balssia gastii* (BALSS), en la costa Catalana (España-Mediterráneo) (Crust. Decap.). *Eos, Madrid*, 11: 101-107.

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