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Description of *Pseudocoutierea wirtzi* sp. nov., a new cnidarian-associated pontoniine shrimp from Cape Verde Islands, with decalcified meral swellings in walking legs (Crustacea, Decapoda, Caridea)

by Cédric d'UDEKEM d'ACOZ

Abstract

A new pontoniine shrimp from Cape Verde Islands, *Pseudocoutierea wirtzi* sp. nov. is described here from specimens collected on the gorgonian *Leptogorgia gaini* STIASNY, 1940 and the antipatharian *Stichopathes lutkeni* Brook, 1889. This is the first record of the genus *Pseudocoutierea* HOLTHUIS, 1951 in the Eastern Atlantic. *P. wirtzi* sp. nov. has a blunt protuberance on the hepatic/postorbital area, which is lacking in the previously described *Pseudocoutierea* species. In the new species, the last three pairs of pereiopods have a large subdistal swelling on their merus. The proximal surface of these swellings is decalcified and their internal tissue is granular. It is not impossible that these structures are of glandular nature. The new pontoniine shrimp is briefly compared with other related or possibly related genera and species. Some previously overlooked but important morphological characters of the distantly related species *Balssia gasti* (BALSS, 1921) are also described and illustrated here.

Key-words: *Pseudocoutierea, Balssia*, Pontoniinae, Caridea, Decapoda, shrimp, taxonomy, Cape Verde Islands, Eastern Atlantic, commensalism, meral swellings, dactylar morphology.

RÉSUMÉ

Une nouvelle crevette Pontoniinae des îles du Cap-Vert et commensale de la gorgone *Leptogorgia gaini* STIASNY, 1940 et de l'antipathaire *Stichopathes lutkeni* BROOK, 1889 : *Pseudocoutierea wirtzi* sp. nov. est décrite ici. Il s'agit du premier signalement du genre *Pseudocoutierea* HOLTHUIS, 1951 dans l'Atlantique oriental. *P. wirtzi* sp. nov. présente une protubérance obtuse sur la région hépatique/postorbitale, laquelle est absente chez les autres représentants du genre *Pseudocoutierea*. Le mérus des trois dernières paires de péreiopodes de la nouvelle espèce présente un renflement subdistal. La surface proximale de ces renflements est décalcifiée et leur tissu interne est granuleux. Il n'est pas exclu que ces structures soient de nature glandulaire. La nouvelle Pontoniinae est succinctement comparée avec les autres genres et espèces apparentés ou potentiellement apparentés. Certains caractères importants mais précédemment passés inaperçus de sa parente éloignée *Balssia gasti* (BALSS, 1921) sont également décrits et illustrés ici.

Mots-clés: *Pseudocoutierea, Balssia*, Pontoniinae, Caridea, Decapoda, crevette, taxonomie, îles du Cap-Vert, Atlantique oriental, commensalisme, renflements méraux, morphologie dactylienne.

Introduction

During SCUBA diving investigations in Cape Verde Islands : São Tiago island : Tarrafal, Prof. Dr. Peter WIRTZ (University of Funchal) discovered a small (maximal total length = 15 mm) pontoniine shrimp associated with the gorgonian *Leptogorgia gaini* STIASNY, 1940 and the antipatharian *Stichopathes lutkeni* BROOK, 1889 at 20-30 m depth, and he sent 45 specimens to the present author. This shrimp proves to belong to a new species of *Pseudocoutierea* HOLTHUIS, 1951, a genus which was not previously recorded in the Eastern Atlantic. It presents a blunt protuberance on the hepatic/postorbital area, and differs by this character from all the previously described species of this genus : the Western Atlantic species *Pseudocoutierea antillensis* CHACE, 1972, *Pseudocoutierea conchae* CRIALES, 1981, *Pseudocoutierea edentata* CRIALES, 1981 and the Eastern Pacific species *Pseudocoutierea elegans* HOLTHUIS, 1951, which all have a totally smooth hepatic/postorbital area. In the new species, the merus of the last three pairs of pereiopods presents a large, partly decalcified swelling, filled by a granular tissue which is quite distinct from the adjacent muscular tissue. The nature of these swellings is currently unknown but in my opinion it is not impossible that it is a glandular structure.

A new definition of the genus *Pseudocoutierea* is at first given hereafter. Then, the new species is described and illustrated in detail, and is also compared to its closest relatives; the possible nature of its special structures in walking legs is briefly discussed.

Systematics

Pseudocoutierea HOLTHUIS, 1951

Original reference.- *Pseudocoutièrea* HOLTHUIS, 1951: 182 (this spelling is erroneous and should be corrected in *Pseudocoutierea* without accent; see International Code of Zoological Nomenclature art. 27 and art. 32.5.2).

Genus.- feminine

Type species.- *Pseudocoutierea elegans* HOLTHUIS, 1951
Other species.- *Pseudocoutierea antillensis* CHACE, 1972; *Pseudocoutierea conchae* CRIALES, 1981; *Pseudocoutierea edentata* CRIALES, 1981; *Pseudocoutierea wirtzi* sp. nov. CRIALES (1981) indicates that there would be two additionnal undescribed species in the Gulf of Mexico.

Diagnosis.- Proximal part of rostrum laterally expanded, wing-like; distal part styliform. Rostrum dorsally and ventrally unarmed, with or without tooth on distal outer part of wing-like process. True supraorbital spine absent. Hepatic/postorbital area with a blunt protuberance or totally smooth. Antennal spine present and of normal size, in very low position. Orbit very large. Lower anterior part of carapace with a deep circular sinus (here named pterygostomian sinus). Very strong longitudinal lateral carina on lower part of carapace. Third pleuron with or without posterior tooth. Fourth and fifth pleura with posterior tooth. Telson lanceolate, with 2 widely spaced pairs of dorsolateral spines. Telson tip with 3 pairs of mobile spines, without fixed teeth. Eyestalk large and robust. Cornea approximately as broad as unpigmented part of eyestalk. Stylocerite short. Outer antennular flagellum with 2 branches fused for about 3 joints. Scaphocerite well developed. Basicerite with strong ventrolateral tooth. Mandible with incisor process, without palp. Mx1 with lower lacinia well developed. Mx2 with palp and cleft basal endite, with well developed scaphognathite. Mxp1 with or without flagellum (if present inserted in lateral position on caridean lobe), with normally developed palp, with vestigial coxal endite, with well developed bilobed epipod. Mxp2 with or without exopod, with epipod. Mxp3 without exopod, with or without arthrobranch. Both P2 unequal, with short carpus. P3-P5 robust to very robust. P3-P5 merus slightly curved, with swelling on distal part of flexor border. P3-P5 carpus very short. P3-P5 propodus slightly curved with or without distal spinule on flexor border. P3-P5 dactylus short, robust and uniunguiculate. Exuropod with well developed fixed distolateral tooth, with or without mobile spine between the distolateral tooth and the blade.

Pseudocoutierea wirtzi sp. nov.
(Figs. 1-12)

Material.- **type specimens** : Cape Verde Islands, São Tiago island, 20 to 30 m depth, on the gorgonian *Leptogorgia gaini* STIASNY, 1940, SCUBA diving, Prof. Dr. Peter WIRTZ coll., december 1998 : 1 adult male (holotype), 1 young paratype male, 23 female paratypes (including ovigerous specimens and all illustrated females) deposited at the Institut royal des Sciences Naturelles de Belgique / Koninklijk Instituut voor Natuurwetenschappen van België, Brussels (IRScNB/KBIN); idem, february 2000 : 1 adult paratype male, 2 young paratype males, 15 paratype females including ovigerous specimens (the 3 males and 6 females are deposited at the IRScNB/KBIN; 3 female paratypes are deposited in the Nationaal Natuurhistorisch Museum, Leiden; 3 female paratypes are deposited in the Muséum National d'Histoire Naturelle, Paris; 3 female paratypes are deposited in the United States National Museum, Washington) – **non-type specimens** : Cape Verde Islands, São Tiago island, 20-30 m depth, on the whip-shaped antipatharian *Stichopathes lutkeni* BROOK, 1889, SCUBA diving, Prof. Dr. Peter Wirtz coll., february 2000 : 1 adult male and 1 ovigerous female deposited at the IRScNB/KBIN.

Etymology.- It is a pleasure to dedicate this remarkable new species to Prof. Dr. Peter WIRTZ who discovered it. The name is a genitive.

Description.- Rostrum nearly horizontal or slightly downwards-inclined, long, unarmed dorsally and ventrally; tip acute and slightly overreaching third segment of antennular peduncle; proximal 0.3 to 0.4 of rostrum expanded abruptly to form broad, anterolaterally rounded (toothless) eaves over orbits; distal 0.6 to 0.7 of rostrum slender and subcylindrical. Longitudinal median carina on expanded part of rostrum and extending on short distance onto carapace, as far as anterior part of hepatic/postorbital protuberance. Orbit very large. Carapace broad and depressed, with well developed antennal spine (posteriorly followed by a strong ridge delimiting depressed orbital region) and a blunt protuberance on hepatic/postorbital area. Anteroventral part of carapace forming a deep sinus (pterygostomian sinus). Mid of pterygostomian sinus border with angular discontinuity followed posteriorly by a long and sharp longitudinal carina which runs along all the lower part of carapace; in cross section the carapace makes a 90° angle at the level of this carina.

Pleuron of third pleonite posteriorly produced in a blunt tooth. Pleura of fourth and fifth pleonites acuminate posteriorly. Sixth pleonite 2.2 times as long as high, 1.5 times as long as fifth pleonite, 0.8 times as long as telson (apical spines not considered) in holotype (all lengths dorsally measured). Posterolateral tooth of sixth pleonite long and distally fairly slender; tip sharp. Telson with 2 widely spaced pairs of dorsolateral spines (at 0.56 and 0.85 of telson length in holotype). Telson tip slightly convex with 3 pairs of robust mobile spines, without fixed teeth; outer spines about 0.4 times as long as intermediate spines; mesial spines about 0.6 times as long as intermediate spines; mesial spines setose.

No sternal spines : neither on pereion, nor on pleon.

Eyestalks large, broad, more or less cylindrical, cornea not much broader than unpigmented part of eyestalk.

First segment of antennular peduncle with very short cordiform stylocerite, with strong distolateral tooth reaching about to level of 0.7 of second segment, and with acute tooth directed forward arising from near midlength of its ventral surface. Third segment of antennular peduncle 2 times as long as second segment. Outer antennular flagellum with 2 branches fused for 3 to 4 joints; free part of shorter branch with 3 joints, and nearly as long as fused part.

Scaphocerite slightly overreaching antennular peduncle, elliptical, 2.0 times as long as broad in dissected specimen; outer margin very slightly convex, inner margin distinctly convex, tip of blade forming a very regular curve (without

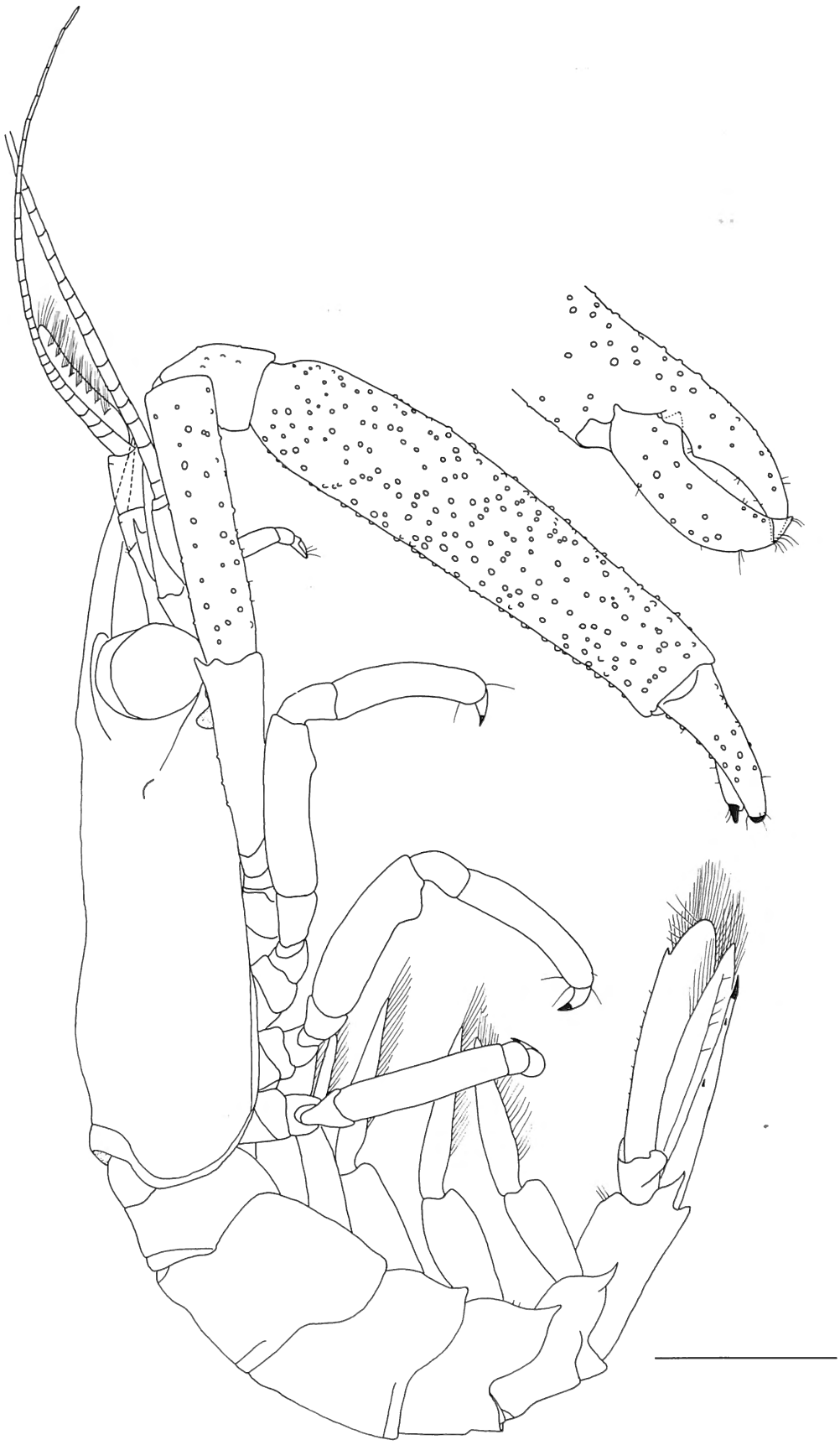

Fig. 1. – *Pseudocoutierea wirtzi* sp. nov. (male, holotype, Tarrafal). Shrimp in lateral view and tip of right P2 in dorsal view. Scale bar = 1 mm.

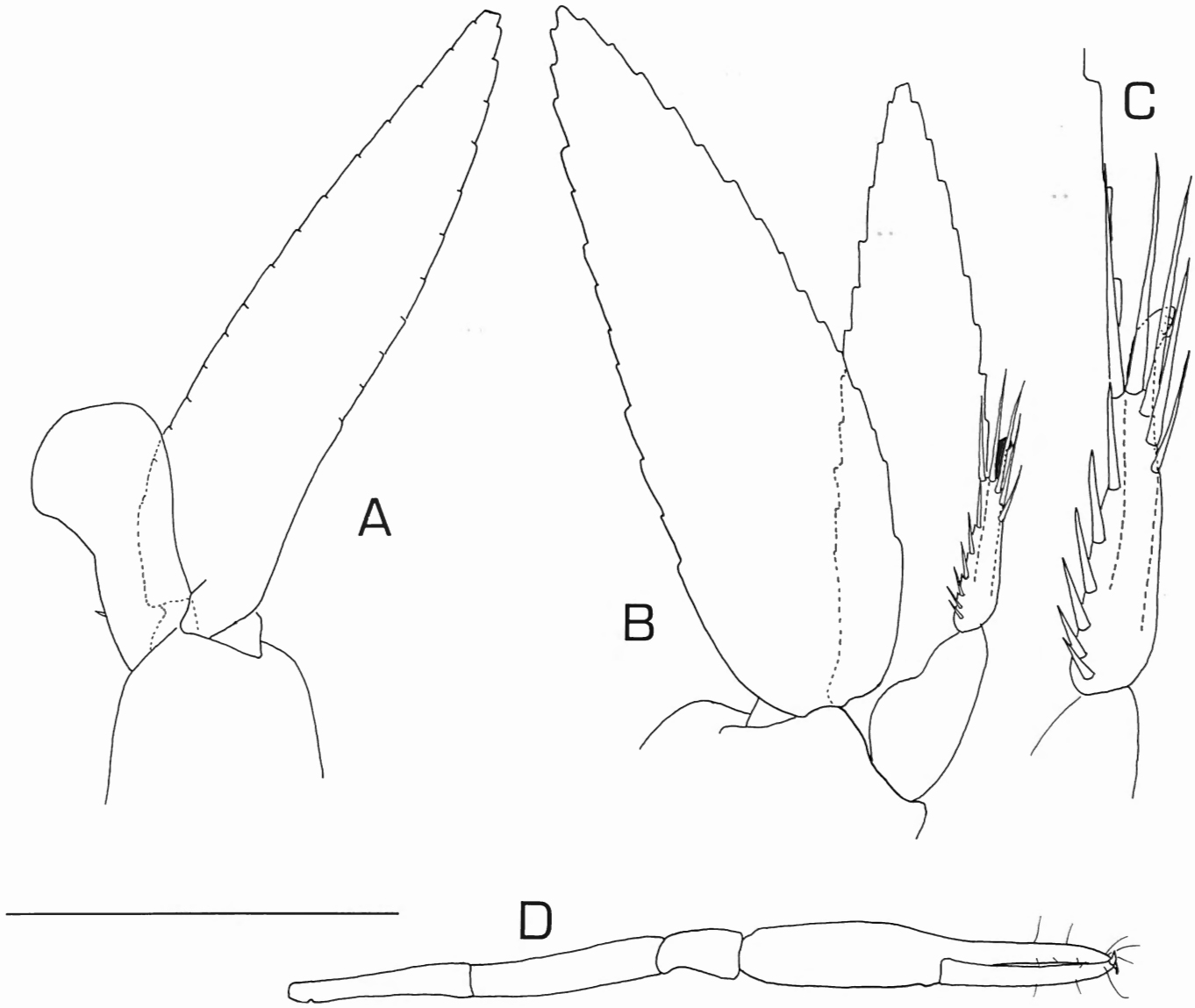

Fig. 2. – *Pseudocoutierea wirtzi* sp. nov. (males, Tarrafal : A-C, holotype, adult; D, paratype, probably immature). A: first left pleopod; B: second left pleopod; C: appendix masculina of second left pleopod; D: right P2 in dorsal view (small second pereiopod). Scale bar: D = 1.5 mm; A, B = 0.50 mm; C = 0.25 mm.

angular discontinuity); distal outer tooth far from reaching tip of blade. Basicerite with strong ventrolateral tooth. Distal segment of antennal peduncle 1.4 times as long as broad (when measured ventrally), and reaching 0.6 of scaphocerite.

Mandible with molar and 4-toothed incisor process, without palp.

Mx1 palp with a hook-like process directed downwards; upper and lower laciniae well developed, with strong spines and spiniform setae.

Mx2 with palp well developed and without setae; basal endite cleft and with apical setae; scaphognathite well developed, regularly rounded, with outer border very slightly convex.

Flagellum of Mxp1 present but reduced, laterally inserted on caridean lobe (not on tip), not reaching extremity of caridean lobe, with one apical seta. Mxp1 with short palp; with vestigial coxal endite, fused to basal endite; with well developed bilobed epipod (with both lobes apically broadly rounded). Basal endite with outer border straight on a large part of its length and with inner upper border almost straight (very slightly convex). Inner border of caridean lobe and of basal endite strongly divergent.

Mxp2 without exopod; with epipod well developed consisting of one elliptic lobe directed upwards and overreaching outer border of basis.

Mxp3 very short, reaching nearly to extremity of statocyst and to tip of ventrolateral tooth of basicerite. Mxp3 without

Fig. 3 – *Pseudocoutierea wirtzi* sp. nov. (female, Tarrafal, paratype, not the specimen used for dissection). Anterior part of shrimp in dorsal view. Scale bar = 1 mm.

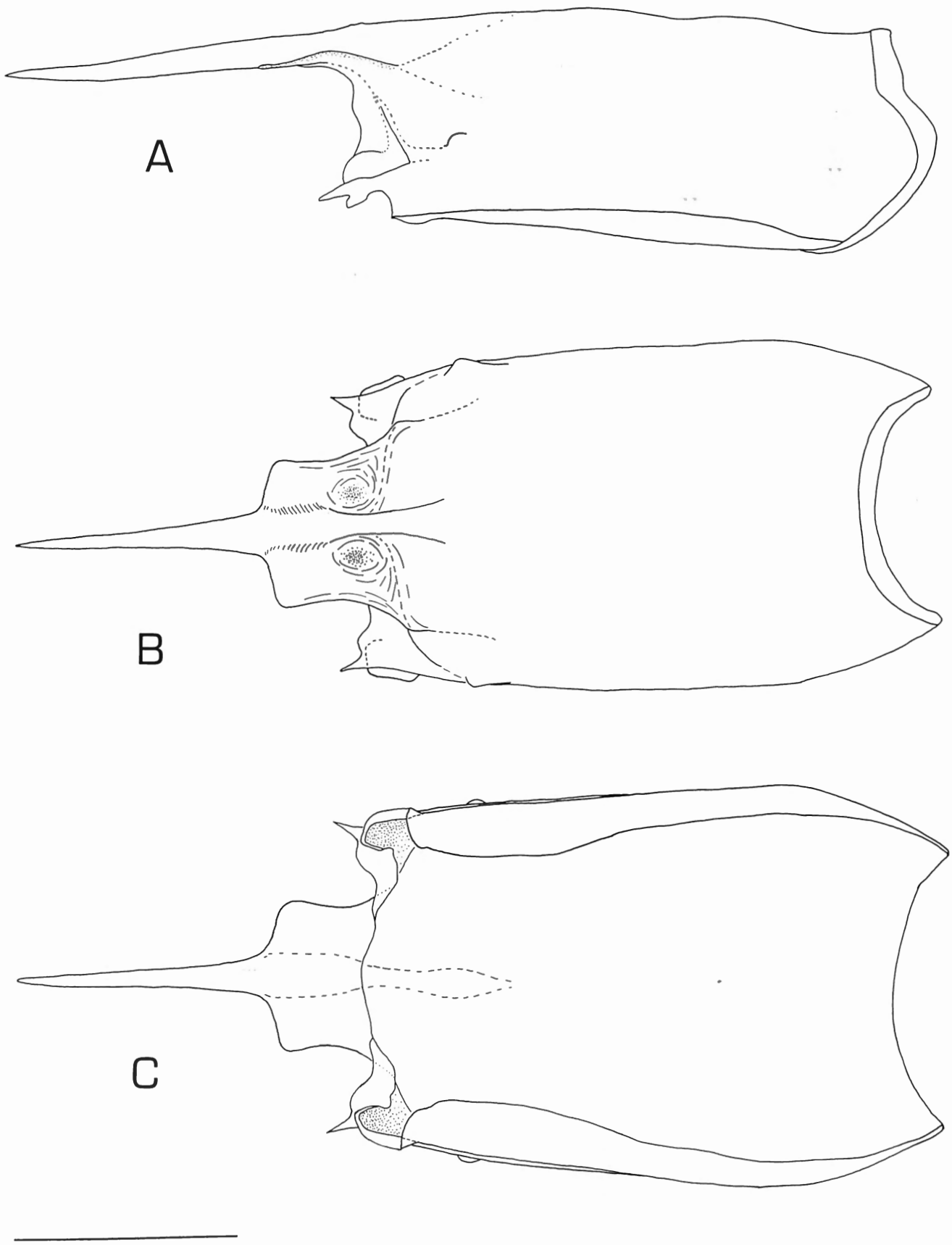

Fig. 4. - *Pseudocoutierea wirtzi* sp. nov. (female, Tarrafal, paratype). A: carapace in lateral view; B: carapace in dorsal view; C: carapace in ventral view. Scale bar = 1 mm.

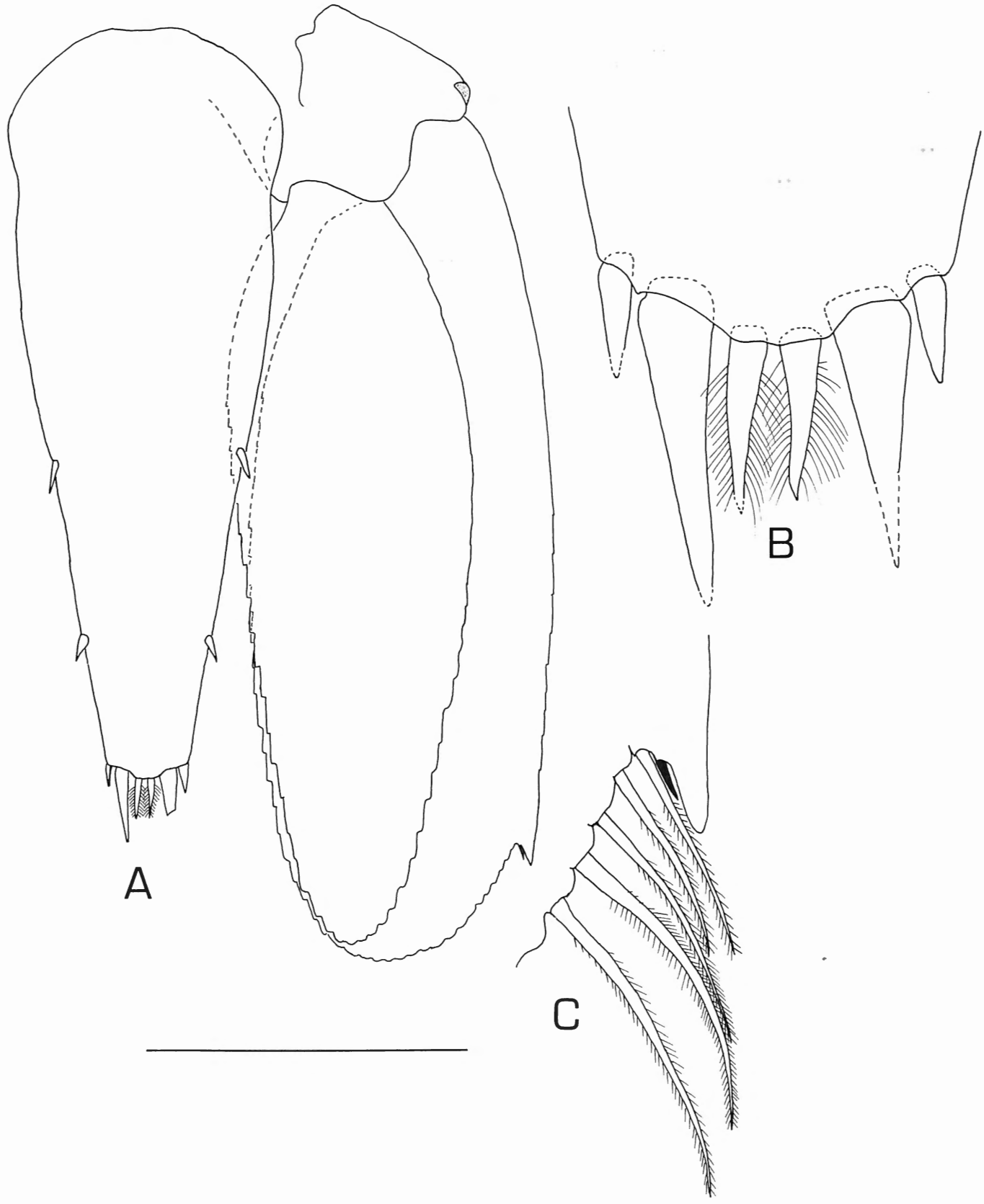

Fig. 5. – *Pseudocoutierea wirtzi* sp. nov. (female, Tarrafal, paratype). A: telson and right uropod; B: tip of telson; C: outer tooth and spine of exuropod. Scale bar: A = 0.50 mm; B, C = 0.12 mm.

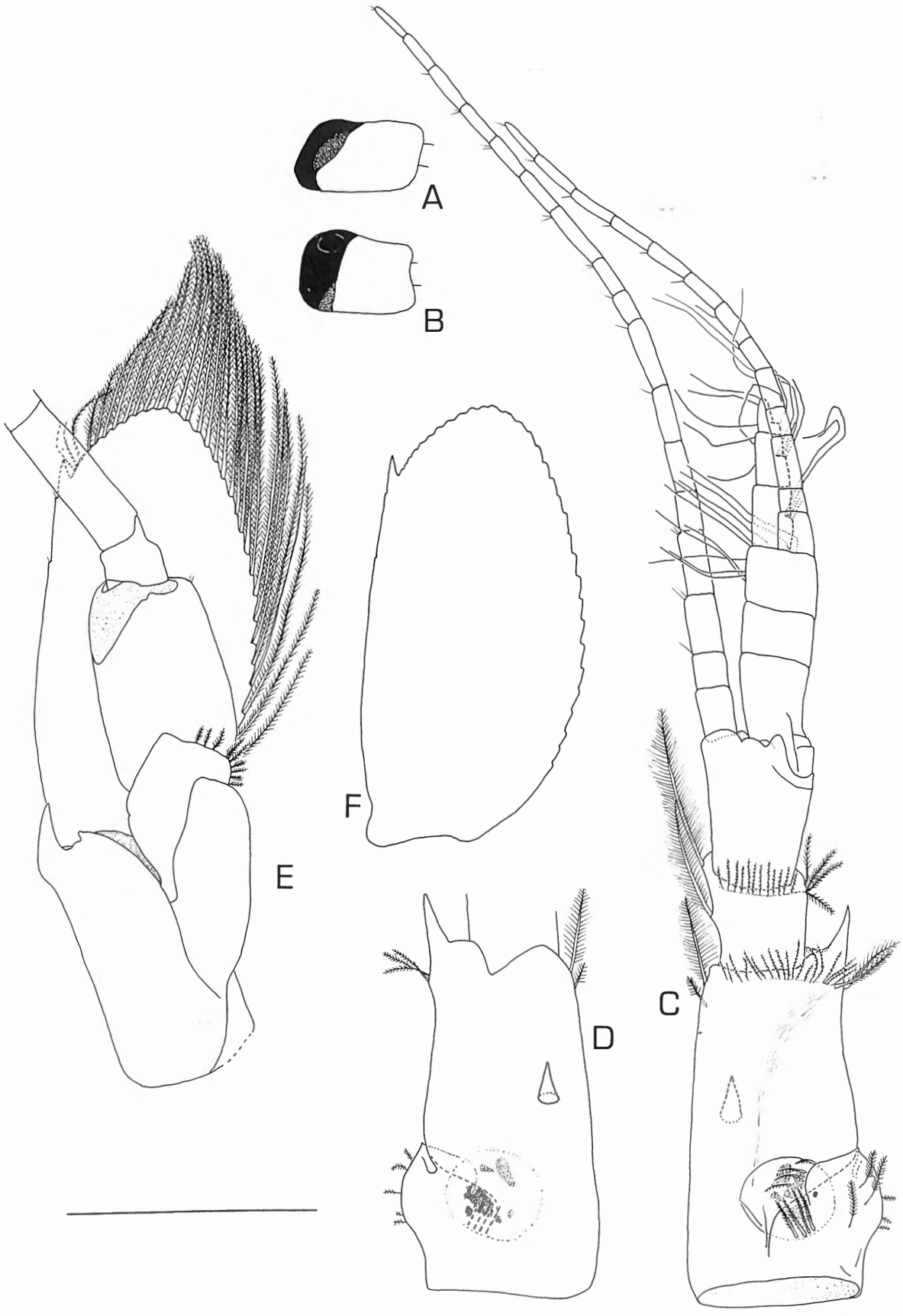

Fig. 6. – *Pseudocoutierea wirtzi* sp. nov. (female, Tarrafal, paratype). A: right eyestalk in frontal view; B: right eyestalk in dorsal view; C: right antennula in dorsal view; D: first segment of right antennula in ventral view; E: basal part of right antenna in ventral view; F: right scaphocerite in ventral view. Scale bar: A, B = 1.5 mm; C, D, E, F = 0.50 mm.

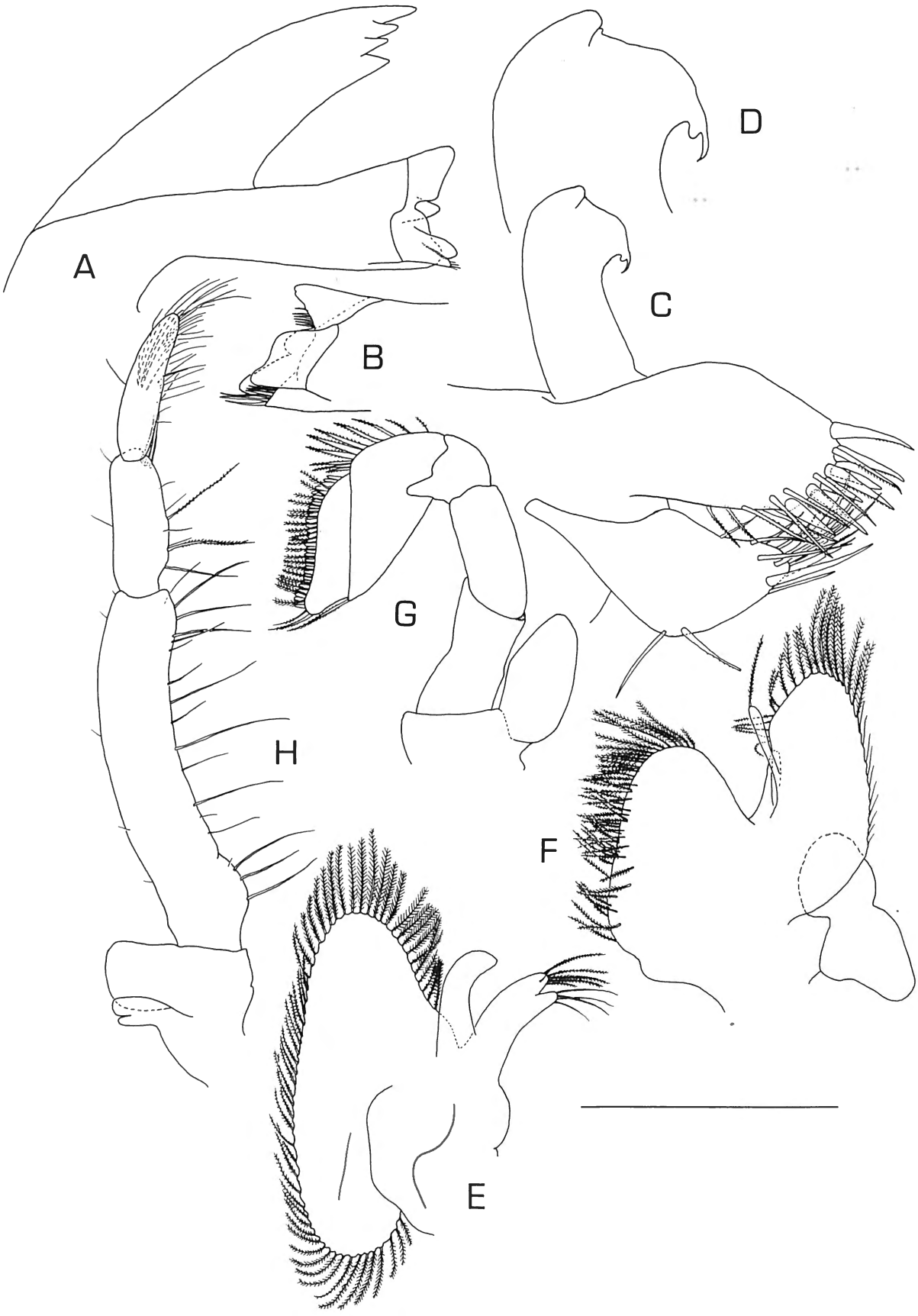

Fig. 7. – *Pseudocoutierea wirtzi* sp. nov. (female, Tarrafal, paratype). A: left Md; B: molar process of right Md; C: right Mx1; D: palp of right Mx1; E: right Mx2; F: left Mxp1; G: left Mxp2; H: right Mxp3. Scale bar: F, G, E, H = 0.50 mm; A, B, C = 0.25 mm; D = 0.12 mm

exopod, with lateral plate well developed and subquadrate, with small bilobed arthrobranch; antepenultimate segment consisting in fusion of basis with ischiomerus; ultimate and penultimate segments equal; ultimate + penultimate segments < antepenultimate segment.

P1 slightly overreaching scaphocerite. P1 chela slender with fingers 0.65 times as long as palm, with carpus 0.91 times as long as chela, 0.84 times as long as merus. P1 coxa with very strong protuberance which may be touched by its fingers (see fig. 9A).

Females with both P2 slightly unequal, without granules, with merus reaching only basal part of scaphocerites. Major P2 of adult female dissected with merus 0.9 times as long as ischium, and 2.5 times as long as carpus; with carpus 1.4 times as long as broad, 0.31 times as long as palm; fingers long (0.68 times as long as palm), fairly slender, not especially curved, each with proximal tooth. Minor P2 of adult female similar to major P2 but with chela toothless.

Adult male with major P2 covered with small granules; robust and very large; with merus overreaching scaphocerite; with merus 1.4 times as long as ischium, and 2.5 times as long as carpus; with carpus 1.2 times as long as broad, 0.22 times as long as palm; fingers short (0.30 times as long as palm), robust, strongly curved, each with proximal tooth.

Juvenile male major P2 less massive and with less granules.

Adult and juvenile male minor P2 much smaller than major P2, similar to the female minor P2, without granulations.

P3-P5 morphologically similar and very robust. P3 overreaching basicerite apex; P4 and P5 overreaching antennal spine. P3-P5 with merus slightly curved, with strong protuberance on distal part of flexor border; proximal part of this protuberance decalcified; carpus very short; propodus without spine, slightly curved and slightly longer than merus; dactylus very short, without longitudinal median carina on flexor border; terminal unguis partly fused to dactylus.

Endopod of first male pleopod short; borders parallel on proximal half, strongly broadened in distal part of mesial side; tip rounded; no setae; only one spine, on mesial border. Appendix masculina small and shorter than appendix interna; appendix masculina with 11 spines in lateral and apical position.

Exuropod with tiny movable spine between distolateral tooth and blade.

Colour pattern.- Specimens from gorgonians : transparent to semi-transparent with reddish dots scattered on body and appendages; each pleonite with a broad diffuse orange-coloured transverse stripe or a broad diffuse yellowish (sometimes mottled with dark brown) transverse stripe with reddish dots; ventral part of pleon usually with a longitudinal dark brown stripe; some specimens have more brown chromatophores scattered within the body and particularly in the cephalothorax (these specimens are therefore much less transparent than the others). Specimens from antipatharians : male transparent with irregular diffuse pale yellow mottles on body and appendages; female with body sides bright yellow, upper part of body orange-coloured with a diffuse transverse stripe on each pleonite, second pereiopod transparent and mottled with yellow, P3-P5 with proximal part of merus yellow and the remaining part of these appendages transparent.

Length.- In the 43 specimens from gorgonians, the maximal total length is about 10 mm (usually smaller) and the maximal carapace length about 3 mm. The two specimens from antipatharians are much larger : male total length = 12 mm, male carapace length = 3 mm; female total length = 15 mm, female carapace length = 4 mm.

Ecology

Pseudocoutierea wirtzi sp. nov. has been found in large numbers between 20 and 30 m depth, on the gorgonian *Leptogorgia gaini* STIASNY, 1940. Two very large specimens have also been found in the same depth range on the whip-shaped antipatharian *Stichopathes lutkeni* BROOK, 1889 but according to P. Wirtz (in litt.), it is obviously uncommon on this host. Colour slides of *P. wirtzi* sp. nov. on gorgonians and antipatharians show that the shrimp has a cryptic colour pattern. I observed in preserved specimens that the last three pairs of pereiopods follow a marked inwards curve with the dactyls pointing toward the sternum. This rather unusual flexion of the legs is easily explained by the normal position of the shrimp as seen on colour slides : it is flattened against its host with the last three pairs of pereiopods grasping the gorgonian or antipatharian stem.

It should be pointed out that CRIALES (1980) observed that the related species *Pseudocoutierea antillensis* CHACE, 1972 occasionnally occurs inside gorgonian polyps, but until now this behaviour has not been noticed for *P. wirtzi* sp. nov.

Finally, it should be pointed out that the males are much rarer than the females (or may be more difficult to catch), since the material examined comprises 39 females but only 6 males.

Special structures in pereiopods

In *Pseudocoutierea wirtzi* sp. nov., the merus of the last three pairs of pereiopods presents a swelling on the distal part of its flexor border (fig. 10A, 10D, 10E, 11: lower photographs, 12: lower left photograph) just like in the related American species *Coutierea agassizi* (COUTIÈRE, 1901), *Lipkebe holthuisi* CHACE, 1969, *Neopontonides beaufortensis* (BORRADAILE, 1920), *Neopontonides dentiger* HOLTHUIS, 1951, *Neopontonides henryvonprahli* RAMOS, 1995, *Pseudocoutierea antillensis* CHACE, 1972, *Pseudocoutierea conchae* CRIALES, 1981, *Pseudocoutierea edentata* CRIALES, 1981, *Pseudocoutierea elegans* HOLTHUIS, 1951; see the illustrations of BRUCE (1976), CHACE (1969, 1972), COUTIÈRE (1901), CRIALES (1981), HEARD (1986),

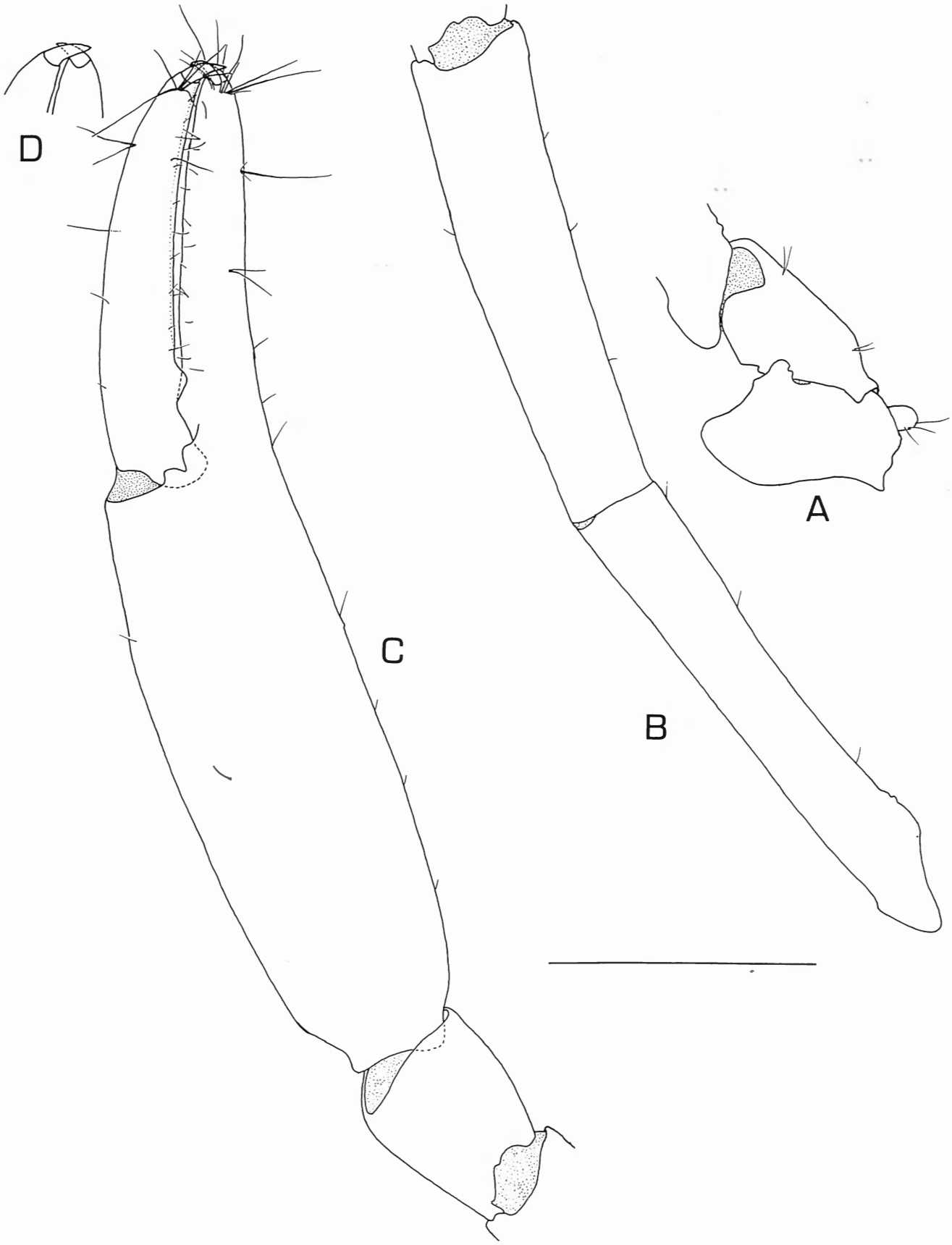

Fig. 8. – *Pseudocoutierea wirtzi* sp. nov. (female, Tarrafal, paratype). Right P2; A: coxa and basis; B: ischion and merus; C: carpus, propodus and dactylus; D: tip of the chela, setae not shown. Scale bar: A, B, C, D ≐ 0.50 mm.

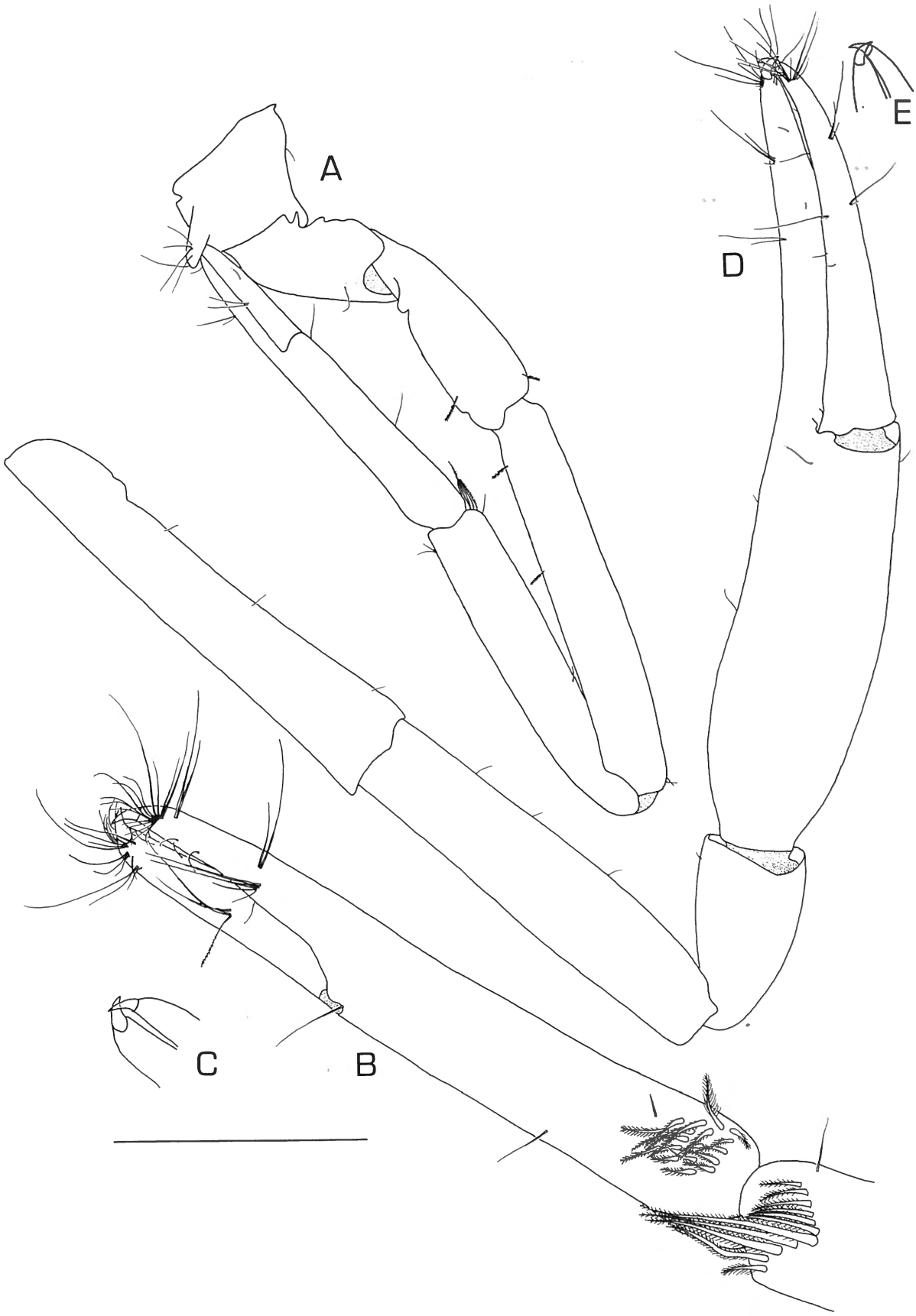

Fig. 9. – *Pseudocoutierea wirtzi* sp. nov. (female, Tarrafal, paratype). A: right P1; B: chela of right P1; C: tip of right P1 chela, setae not shown; D: left P2; E: tip of left P2 chela, setae not shown. Scale bar: A, D, E = 0.50 mm; B, C = 0.25 mm.

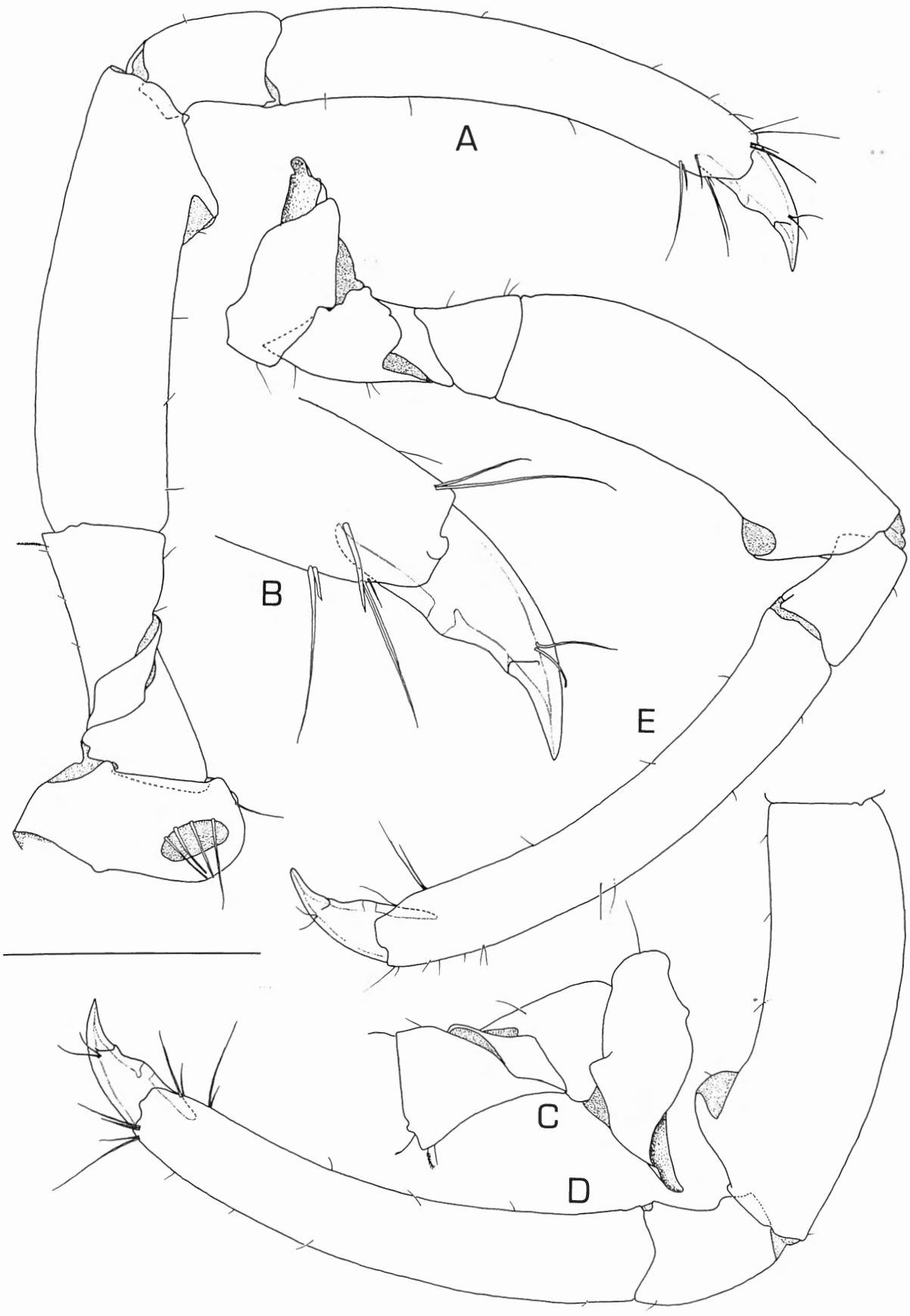

Fig. 10. – *Pseudocoutierea wirtzi* sp. nov. (female, Tarrafal, paratype). A: right P3; B: dactylus of right P3; C: proximal part of right P4; D: distal part of right P4; E: right P5. Scale bar: A, C, D, E = 0.50 mm; B = 0.25 mm.

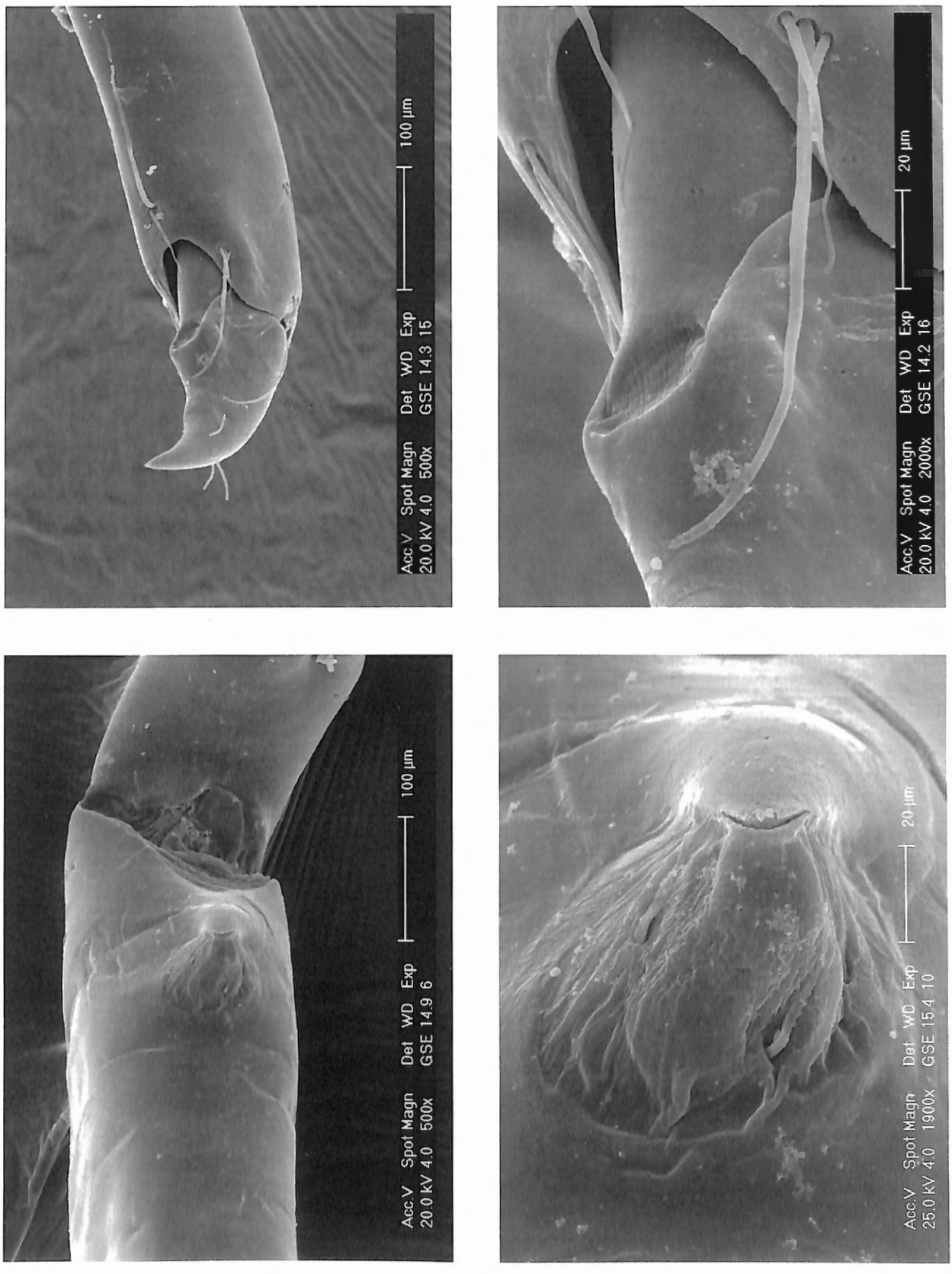

Fig. 11. – *Pseudocoutierea wirtzi* sp. nov. (female, Tarrafal, paratype), left P3. Upper photographs: dactylus showing its decalcified part in oblique view; lower photographs: meral protuberance seen from above.

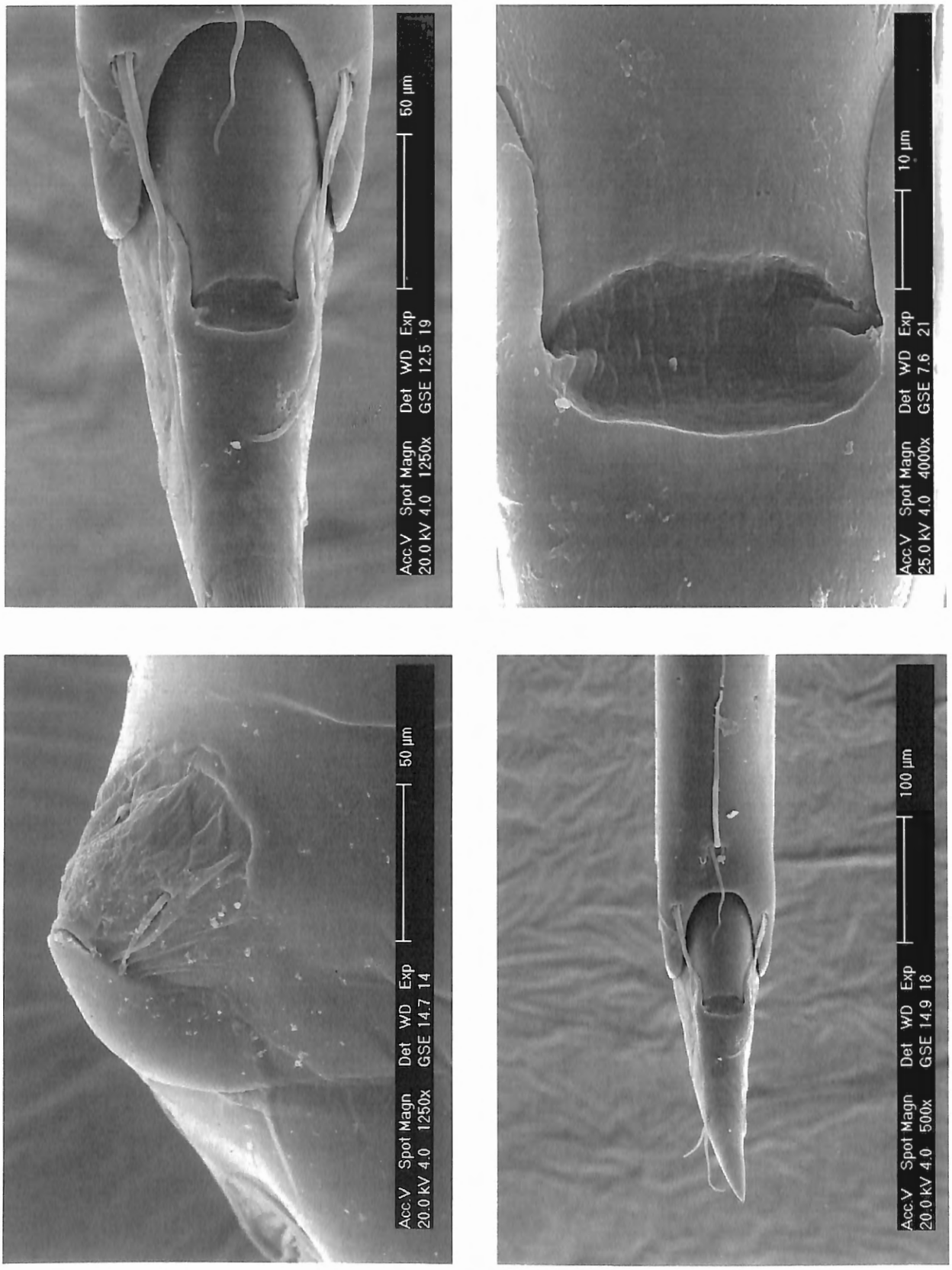

Fig. 12. – *Pseudocoutierea wirtzi* sp. nov. (female, Tarrafal, paratype), left P3. Upper photographs and right lower photograph: dactylus showing its decalcified part seen from above; left lower photograph: meral protuberance in lateral view.

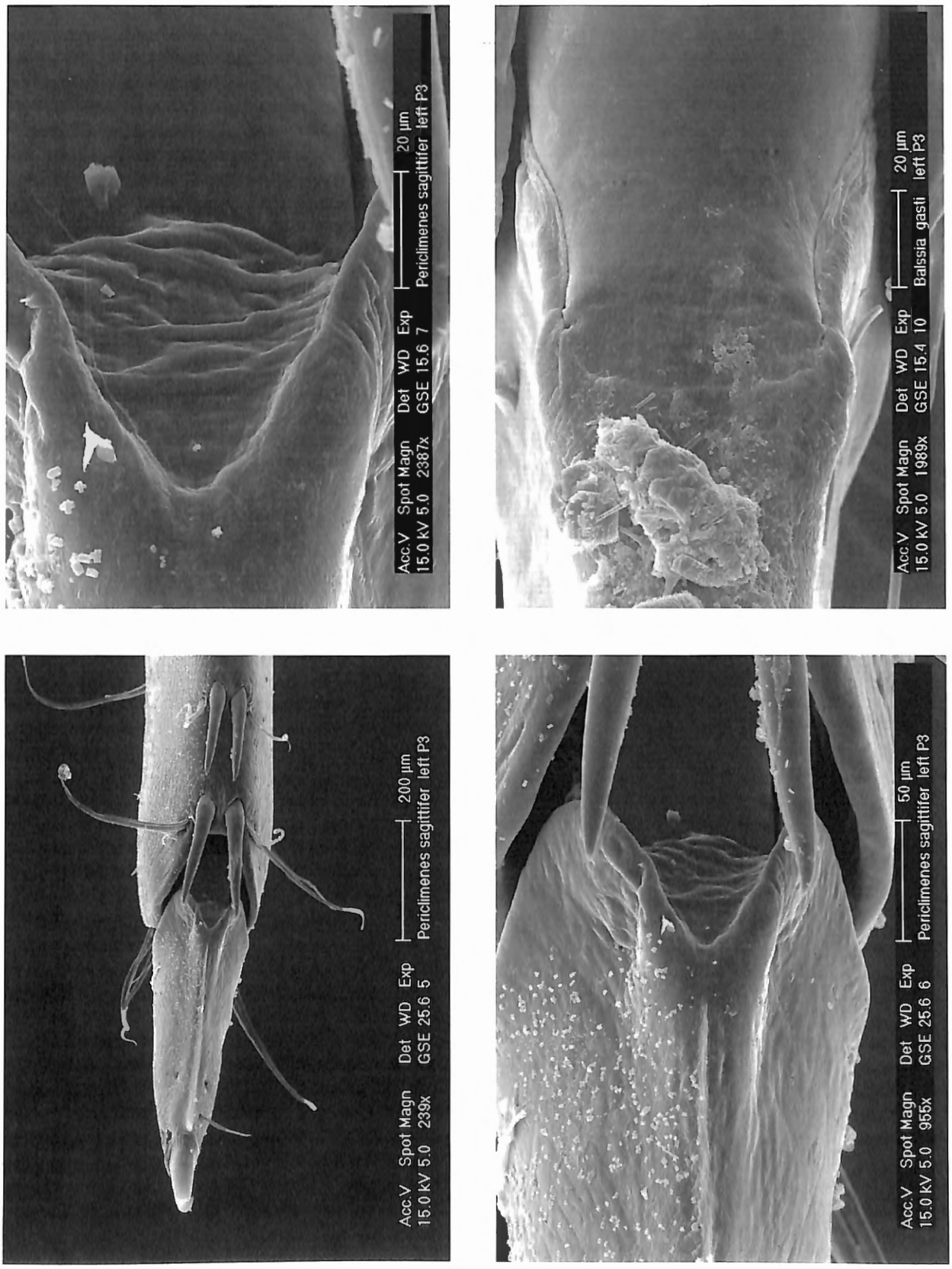

Fig. 13. – Species: left photographs and lower right photograph: *Periclimenes sagittifer* (NORMAN, 1861) (female, France, Chausey Islands); upper right photograph: *Balssia gasti* (BALSS, 1921) (female, the Azores, Faial Island, Monte da Guia). Subject of all photographs: dactylus of left P3 showing its decalcified part seen from above.

HOLTHUIS (1951, 1978); RAMOS (1995). Several very strong meral and one carpal protuberances have also been observed on the flexor border of the second pereiopod in the Indo-pacific species *Miopontonia yongei* BRUCE, 1985 (BRUCE, 1985; OKUNO, 1998). Apparently, these swellings have never previously been examined in detail.

Examination of the swellings of *P. wirtzi* sp. nov. under high magnification with an optic microscope and with a scanning electron microscope indicates that they are not simple protuberances. Their distal part is normally calcified, while their proximal part comprises a large and well delimited decalcified surface with a pair of small setae; the internal tissue of the swellings is granular and quite different from the muscular tissue that fills the largest part of the merus. In my opinion, it is not impossible that the inner tissue of the swellings is an exocrine gland or a cluster of exocrine glands (possibly modified tegumental glands) and that their secretions are secreted through the decalcified part of the swelling (or even by the pair of setae). Only a detailed histological study can confirm or invalidate this hypothesis. Although the function of these swellings is totally unknown, it seems likely that they play a role in the relation between the shrimp and its host.

In my opinion, there is little doubt that the swellings observed on the pereiopods of the related species cited hereabove are morphologically similar with those of *P. wirtzi* sp. nov., with a possible exception for those of *Miopontonia yongei* BRUCE, 1985 which looks at first glance very different.

In *P. wirtzi* sp. nov., the dactylus of the last three pairs of pereiopods also presents enigmatic structures. The walls of the dactylus are almost completely made of very thick calcified chitin. However, on optical microscopical preparations in lateral view, there is always an apparent interruption in hard chitin on its flexor border, near junction with propodus (fig. 10B).

Interruptions in hard chitin of dactylus have been illustrated without comments in several other species of shrimps, related or not to *P. wirtzi* sp. nov. However, to my knowledge, only KEMP (1922), BRUCE (1966) and MONOD (1979) have given brief comments on these structures.

KEMP (1922) made the following observations on *Dasycaris symbiotes* KEMP, 1922, a pontoniine shrimp which also has an apparent gap in the hard chitin of walking legs dactyli, on microscopical preparations : "The dactyli appears simple under low magnifications but when stained and mounted and viewed under a high power a pit or pore can be detected on the interior side near the base. In this pit a fleshy process is lodged and this process is continuous with striated muscle tissue at the base of the dactylus. From the structure of the parts it seems probable that the process can be protruded through the pit. Examination of living material is necessary before the function of the process can be determined accurately; it is possible that it acts as a pad and helps the prawn to retain a grip on the host."

BRUCE (1966) observed in the pontoniine shrimp *Platycaris latirostris* HOLTHUIS, 1952 that the dactylus comprises a hinge system in its proximal part : "An inconspicuous basal protuberance is present but is only visible when the dactyl is extended. It consists of an oval disc with a depressed centre and is mobile, being hinged distally. It possesses its own retractor mechanism in addition to the main flexor mechanism of the dactyl."

MONOD (1979) observed a hinge system in the Pontoniinae *Pontonides unciger* CALMAN, 1939, the Palaemoninae *Palaemon serratus* (PENNANT, 1777), and the Alpheidae *Synalpheus demani* BORRADAILE, 1900 and *Synalpheus streptodactylus* COUTIÈRE, 1905, and states : « il semble bien qu'il s'agisse d'une pièce chitineuse articulée sur l'extrémité proximale du bord dactylien ventral et unissant ce dernier au tendon du muscle fléchisseur du dactyle; cette pièce, qui se trouve logée, en position fléchie du dactyle, dans une poche à parois définies, représente-t-elle une portion spécialisée, épaissie, du tendon du fléchisseur ».

In order to have a better understanding of the proximal dactylar structure of *Pseudocoutierea wirtzi* sp. nov., I made some observations in scanning electron microscopy on this species (fig. 11: upper photographs, 12: upper photographs and lower right photographs). It appears that the new species has the same morphological organization as in the species studied by BRUCE (1966) and MONOD (1979), i.e. a structure which looks like a hinge system with a decalcified median articulation. Further examinations in two other Pontoniinae : *Balssia gasti* (BALSS, 1921) and *Periclimenes sagittifer* (NORMAN, 1861) indicated that this structure is also present in these species (fig. 13). So it is a widely distributed feature which has almost totally been overlooked in literature. The lack of data on this structure is probably due to the fact that the flexor border of dactylus is rarely examined under sufficiently high magnifications, or with the optimal orientation. The fact that an apparent discontinuity in lateral view has been seen in some species and not in others is probably related to shrimp size, size of hinge system and tegument thickness : indeed, the apparent discontinuity should be very evident by transparency on microscopical preparations in very small (very transparent) shrimps with a large hinge system, but not in large (less transparent) shrimps with a reduced hinge system.

Comparison with related genera and species

The reduction or lack of maxilliped exopods observed in the genus *Pseudocoutierea* HOLTHUIS, 1951 is a character shared with a fairly large number of pontoniine genera, which are probably not all related to each others : *Balssia* KEMP, 1922; *Chacella* BRUCE, 1986; *Coutierea* NOBILI, 1901; *Ctenopontonia* BRUCE, 1979; *Hamodactyloides* FUJINO, 1973; *Hamodactylus* HOLTHUIS, 1952; *Izucaris* OKUNO, 1999; *Lipkebe* CHACE, 1969; *Mesopontonia* BRUCE, 1967; *Miopontonia* BRUCE, 1985, *Neopericlimenes* HEARD, SPOTTE & BUBUCIS, 1993; *Neopontonides* HOLTHUIS, 1951; *Paratypton* BALSS, 1914, *Pontonides* BORRADAILE, 1917;

Propontonia BRUCE, 1969; *Pseudopontonides* HEARD, 1986; *Tectopontonia* BRUCE, 1973; *Veleronia* HOLTHUIS, 1951; *Veleroniopsis* GORE, 1981; *Waldola* HOLTHUIS, 1951 (CHACE & BRUCE, 1993; HOLTHUIS, 1993; HEARD *et al.*, 1993; BRUCE, 1994; OKUNO, 1999).

However, amongst these genera, several have other characteristic features in common with the different species of *Pseudocoutierea*, a fact which suggests a possible phyletic relationship in some cases.

The proximal part of rostrum is also transformed in a wing-like process (orbital eave) in all the species of the following genera : *Balssia* KEMP, 1922 (BALSS, 1921; BRUCE, 1998; this paper : Fig. 14B); *Chacella* BRUCE, 1986 (BRUCE, 1986; HENDRICKX, 1990; WICKSTEN, 1983 as *Dasycaris*); *Coutierea* NOBILI, 1901 (COUTIÈRE, 1901 as *Coralliocaris*; HOLTHUIS, 1978); *Izucaris* OKUNO, 1999 (OKUNO, 1999); *Lipkebe* CHACE, 1969 (CHACE, 1969; BRUCE, 1976; SHAW *et al.*, 1977), *Pontonides* BORRADAILE, 1917 (BORRADAILE, 1917; HOLTHUIS, 1952; MONOD, 1979; DE RIDDER & HOLTHUIS, 1979; BRUCE, 1998a); *Pseudopontonides* HEARD, 1986 (HEARD, 1986); *Veleronia* HOLTHUIS, 1951 (HOLTHUIS, 1951; CANTERA *et al.*, 1987); *Veleroniopsis* GORE, 1981 (GORE, 1981); and in one species of the genus *Neopontonides* HOLTHUIS, 1951 : *Neopontonides henryvonprahli* RAMOS, 1995 (RAMOS, 1995).

Some genera also have a well developed pterygostomian sinus : *Coutierea* NOBILI, 1901 (HOLTHUIS, 1978; COUTIÈRE, 1901 as *Coralliocaris*); *Miopontonia* BRUCE, 1985 (BRUCE, 1985; OKUNO, 1998); *Pseudopontonides* HEARD, 1986 (HEARD, 1986); *Veleroniopsis* GORE, 1981 (GORE, 1981). A previously overlooked reduced pterygostomian sinus also occurs in *Balssia* KEMP, 1922 (see Fig. 14A and 14C).

As already indicated above, the walking legs also have a more or less distinct swelling on the distal part of the meral flexor border in the following species : *Coutierea agassizi* (COUTIÈRE, 1901); *Lipkebe holthuisi* CHACE, 1969; *Neopontonides beaufortensis* (BORRADAILE, 1920), *Neopontonides dentiger* HOLTHUIS, 1951, *Neopontonides henryvonprahli* RAMOS, 1995. I have examined the walking legs of the distantly related species *Balssia gasti* (BALSS, 1921) with a scanning electron microscope but in that shrimp the ventrodistal part of the merus prooves to be normal (i.e.: smooth and strongly calcified).

The following genera have a cleft basal endite on maxilla, as in *Pseudocoutierea* HOLTHUIS, 1951 : *Balssia* KEMP, 1922 (BRUCE, 1998B; BALSS, 1921 as *Amphipalaemon*); *Coutierea* NOBILI, 1901 (HOLTHUIS, 1978); *Hamodactylus* HOLTHUIS, 1952 [not always] (BRUCE, 1994); *Lipkebe* CHACE, 1969 (CHACE, 1969); *Mesopontonia* BRUCE, 1967 (BRUCE, 1994); *Miopontonia* BRUCE, 1985 (BRUCE, 1985, 1994); *Propontonia* BRUCE, 1969 (BRUCE, 1994). The basal endite of maxilla has not been described in *Veleroniopsis* Gore, 1981. Other genera have the basal endite either entire or vestigial.

Finally, the genera *Coutierea* and *Veleroniopsis* share with *Pseudocoutiera* the possession of a strong lateral carina on each side of carapace, a character totally absent in most other genera (CHACE, 1972; COUTIÈRE, 1901; CRIALES, 1981; GORE, 1981; HOLTHUIS, 1951, 1978). However, a previously overlooked faint lateral carina is also present in *Balssia* KEMP, 1922 (see Fig. 14A and 14C).

Due to their close similarity, the genera *Coutierea, Veleroniopsis* and *Pseudocoutiera* as currently defined need a detailed comparison.

The antennal spine is present and extremely long in *Coutierea*, normally developed in *Pseudocoutierea*, absent in *Veleroniopsis*. The hepatic/postorbital area has a strong tooth in *Coutierea*, is smooth or with a blunt protuberance in *Pseudocoutierea*, has a blunt protuberance in *Veleroniopsis*. The anterior extremity of the lateral carina of carapace is prolonged by a tooth in *Coutierea*, not in *Pseudocoutierea* and *Veleroniopsis*. In *Coutierea*, the second to fifth pleura have a tooth. In *Pseudocoutierea*, only the third or fourth to fifth pleura have a tooth. In *Veleroniopsis*, all pleura are toothless. The posterolateral prolongation of the sixth pleonite is particularly long in *Coutierea* while it is fairly normal in *Pseudocoutierea* and *Veleroniopsis*. The telson tip has 3 fixed teeth (median = the shortest) in *Coutierea*, while there are 6 mobile spinules in *Pseudocoutierea* and *Veleroniopsis*. The fused part of outer antennular flagella has about 12 joints in *Coutierea*, about 3 joints in *Pseudocoutierea* and *Veleroniopsis*. The last three pairs of pereiopods have a meral swelling in *Coutierea* and *Pseudocoutierea*, but not in *Veleroniopsis*.

It is now necessary to compare the 5 currently described species of *Pseudocoutierea*. For this purpose, I give hereafter a short comparative diagnosis of each species. The accounts of the previously described species are based on literature only. The absence of a mobile spinule on exuropod in Western Atlantic species needs confirmation. Indeed, in *P. wirtzi* sp. nov., this spine is present but so minute that it is only distinct under very high magnifications. The shape of stylocerite apparently also varies depending on species but previously published drawings are insufficiently detailed to allow a precise comparison, and therefore this character is not considered hereafter.

Pseudocoutierea antillensis CHACE, 1972

Body dorsoventrally depressed. Wing-like part of rostrum quadrate with a well developed tooth on each anterolateral angle. Hepatic/postorbital area without protuberance. Third pleuron toothless, rounded; fourth and fifth pleura with a posterior tooth. Posterolateral prolongation of sixth pleonite forming a triangular tooth. Scaphocerite 3 times as long as broad, with outer border slightly concave. Mandibular incisor process with 3 teeth. Mx2 scaphognathite with outer border slightly concave. Mxp1 caridean lobe distinctly overreaching basal endite. Mxp1 with small flagellum on side of caridean lobe (overreaching extremity of caridean lobe).

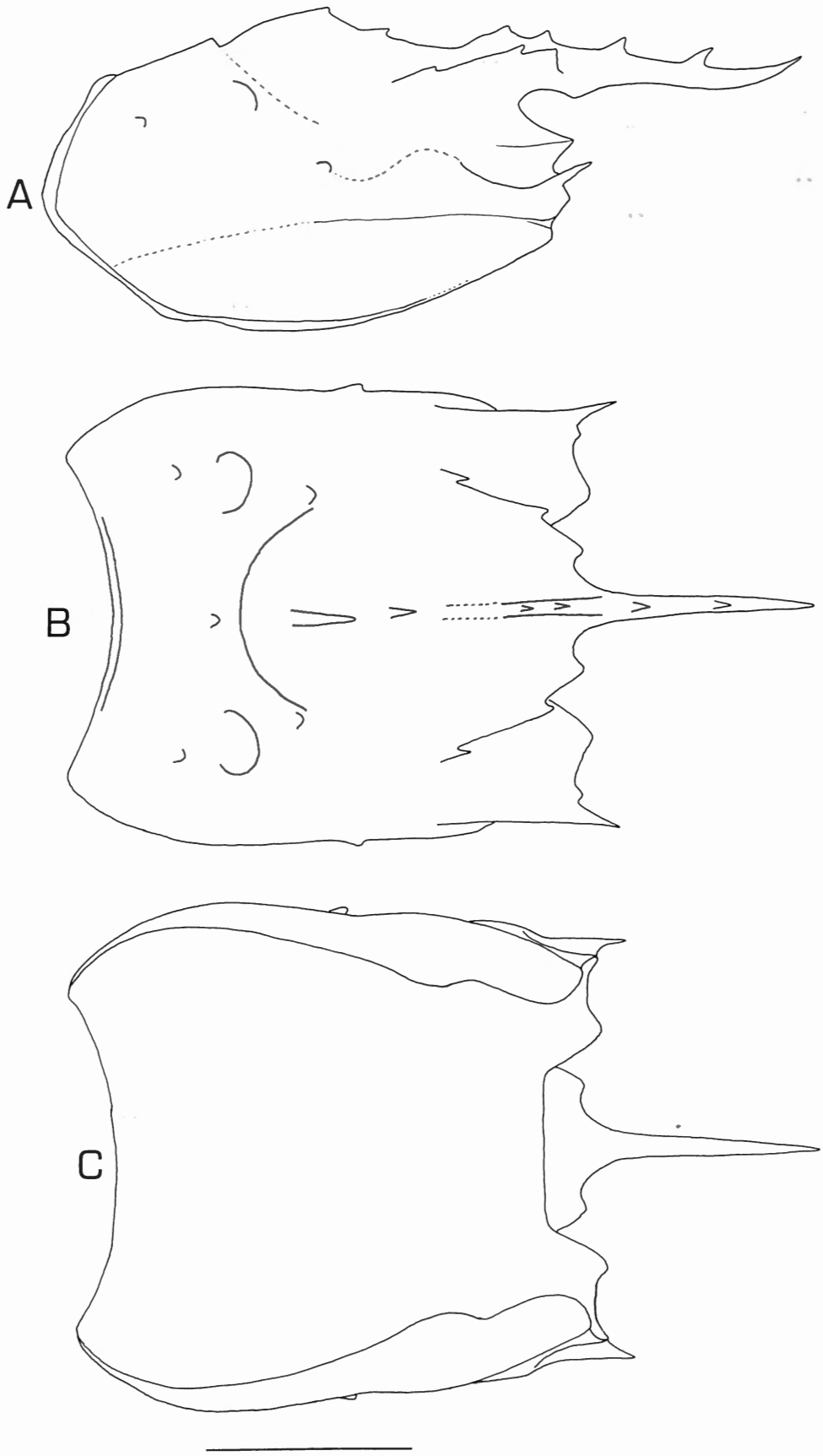

Fig. 14. – *Balssia gasti* (BALSS, 1921) (female, the Azores, Faial Island, Monte da Guia). A: carapace in lateral view; B: carapace in dorsal view; C: carapace in ventral view. Scale Bar = 1 mm.

Mxp1 basal endite with outer border convex and with inner upper border strongly convex. Inner border of caridean lobe and of basal endite in contact or overlapping each other. Mxp2 without exopod; with epipod reduced and bilobed, not overreaching basis. Mxp3 without arthrobranch. P3-P5 robust, with fairly well developed meral swelling, without spinule on propodus. Exuropod without mobile spinule. Western Atlantic. Hosts : the gorgonians *Eunicea tourneforti* (H. MILNE EDWARDS & HAIME), *Eunicea calyculata* (ELLIS & SOLANDER), *Eunicea fusca* (DUCHASSAING & MICHELOTTI), *Plexaura* sp. (CRIALES, 1980), *Pseudopterogorgia americana* GMELIN, 1791 (SPOTTE *et al.*, 1995; SPOTTE & BUBUCIS, 1996). Reference : CHACE (1972: 43, fig. 11).

Pseudocoutierea conchae CRIALES, 1981

Body not dorsoventrally depressed. Wing-like part of rostrum quadrate with a short tooth on each anterolateral angle. Hepatic/postorbital area without protuberance. Third, fourth and fifth pleura with a posterior tooth. Posterolateral prolongation of sixth pleonite forming a triangular tooth. Scaphocerite 2.5 times as long as broad, with outer border nearly straight. Mandibular incisor process with 4 teeth. Mx2 scaphognathite with outer border nearly straight but convex. Mxp1 caridean lobe almost reaching tip of basal endite. Mxp1 with large flagellum on side of caridean lobe (overreaching extremity of caridean lobe by most of its length). Mxp1 basal endite with outer border straight on a limited part of its length and with inner upper border distinctly convex. Inner border of caridean lobe and of basal endite divergent. Mxp2 with well developed exopod (overreaching merus); without epipod. Mxp3 without arthrobranch. P3-P5 very robust, with moderately developed meral swelling, without spinule on propodus. Exuropod without mobile spinule. Western Atlantic species. Host : the gorgonian *Leptogorgia virgulata* (LAMARCK). Reference : CRIALES (1981: 174, figs. 6-9).

Pseudocoutierea edentata CRIALES, 1981

Body not dorsoventrally depressed. Wing-like part of rostrum regularly rounded (not quadrate), without anterolateral teeth. Hepatic/postorbital area without protuberance. Third pleuron with or without a posterior tooth; fourth and fifth pleura with a posterior tooth. Posterolateral prolongation of sixth pleonite forming a triangular tooth. Scaphocerite 2.6 times as long as broad, with outer border nearly straight. Mandibular incisor process with 4 teeth. Mx2 scaphognathite with outer border nearly straight but convex. Mxp1 caridean lobe distinctly overreaching basal endite. Mxp1 with small flagellum on side of caridean lobe (overreaching extremity of caridean lobe). Mxp1 basal endite with outer border strongly convex and with inner upper border almost straight slightly convex. Inner border of caridean lobe and of basal endite strongly divergent. Mxp2 with well developed exopod (overreaching merus); with epipod reduced, consisting of one small rounded lobe directed upwards reaching only proximal part of basis. Mxp3 without arthrobranch. P3-P5 very robust, with moderately developed meral swelling, without spinule on propodus. Exuropod without mobile spinule. Western Atlantic species. Host : the gorgonian *Leptogorgia virgulata* (LAMARCK). Reference : CRIALES (1981: 168, fig. 2).

Pseudocoutierea elegans HOLTHUIS, 1951

Body dorsoventrally depressed. Wing-like part of rostrum with a well developed tooth on each anterolateral angle. Hepatic/postorbital area without protuberance. Third, fourth and fifth pleura with a posterior tooth. Posterolateral prolongation of sixth pleonite forming a triangular tooth. Scaphocerite 2.5 times as long as broad, with outer border slightly concave. Mandibular incisor process with 4 teeth. Mx2 scaphognathite with outer border slightly concave. Mxp1 caridean lobe distinctly overreaching basal endite. Mxp1 without flagellum on caridean lobe. Mxp1 basal endite with outer border slightly convex and with inner upper border strongly convex. Inner border of caridean lobe and of basal endite parallel and separated by a narrow space. Mxp2 without exopod; with epipod well developed consisting of one subquadrate lobe directed upwards and overreaching outer border of basis. Mxp3 with small arthrobranch. P3-P5 very robust, with well developed meral swelling, with small distal spinule on propodus flexor border. Exuropod with minute mobile spinule. Eastern Pacific. Host : according to MARTIN & ZIMMERMAN (1997), the species is associated with the gorgonian *Muricea californica* Aurivillius, and according to WICKSTEN (in litt.) also with another gorgonian: *Lophogorgia chilensis* Verrill. Reference : HOLTHUIS (1951: 182, pl. 55 and not pl. 57 as indicated in that work).

Pseudocoutierea wirtzi sp. nov.

Body dorsoventrally depressed. Wing-like part of rostrum quadrate with anterolateral angle broadly rounded, without anterolateral teeth. Hepatic/postorbital area with blunt protuberance. Third, fourth and fifth pleura with a posterior tooth (that of third pleuron is blunt). Posterolateral prolongation of sixth pleonite forming an elongated tooth. Scaphocerite 2 times as long as broad, with outer border slightly convex. Mandibular incisor process with 4 teeth. Mx2 scaphognathite with outer border nearly straight but convex. Mxp1 caridean lobe distinctly overreaching basal endite. Mxp1 with small flagellum on side of caridean lobe (not reaching extremity of caridean lobe). Mxp1 basal endite with outer border straight on a large part of its length and with inner upper border slightly convex. Inner border of caridean lobe and of basal endite strongly divergent. Mxp2 without exopod; with epipod well developed consisting of one elliptic lobe directed upwards and overreaching outer border of basis. Mxp3 with small arthrobranch. P3-P5 very robust, with well developed meral swelling, without spinule on propodus. Exuropod with minute mobile spinule. Eastern Atlantic species. Hosts : the gorgonian *Leptogorgia gaini* STIASNY and the anthipatharian *Stichopathes lutkeni* BROOK.

Conclusive remarks

The discovery of this very characteristic new species confirms my previous assumption (d'UDEKEM d'ACOZ, 1996) that the pontoniine fauna of the Atlanto-Mediterranean area is imperfectly known.

The unusual morphological features found in the walking legs of *Pseudocoutierea wirtzi* sp. nov. and related species would require more detailed studies.

The various character combinations and different evolutive grades found amongst the Pontoniinae with reduced maxilliped exopods make these shrimps a potentially interesting subject for cladistic analysis.

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