Belg. J. Zool. — Volume 122 (1992) — issue 2 — pages 211-222 — Brussels 1992

(Manuscript received on 14 May 1992)

A REDESCRIPTION OF *HEMILAOPHONTE JANINAE* JAKUBISIAK (COPEPODA, HARPACTICOIDA), A LAOPHONTID LIVING IN THE GILL CHAMBERS OF THE COMMON SPIDER CRAB

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SUMMARY

Hemilaophonte janinae Jakubisiak, living in the gill chambers of the common spider crab *Maja squinado* (Herbst), is redescribed in detail. Specimens of this harpacticoid were found on crabs collected along the Atlantic coasts of France and the Spanish Sahara. *H. clysmae* Por and Marcus, the second species assigned to the genus, is allocated to the closely related genus *Coullia* Hamond. Whereas the common spider crab shows a wide distribution throughout the Mediterranean, *H. janinae* has only been found on crabs from the Atlantic Ocean. Spider crabs from the Mediterranean Sea mainly host laophontids of the genus *Paralaophonte* Lang.

Key words : Hemilaophonte janinae, decapod associate, *Coullia clysmae* comb. nov.

INTRODUCTION

In 1932, Jakubisiak described the highly advanced laophontid, *Hemilaophonte janinae* he encountered in washings of several specimens of the common spider crab, *Maja squinado* (Herbst, 1788) (Decapoda, Brachyura, Majidae). So far the species has never been reported again, although Petkovski (1964) and Raibaut (1968) studied the associated fauna of Mediterranean spider crabs to some extent.

In the course of a revision of the family Laophontidae, washings of common spider crabs from the western Atlantic Ocean led to the redescovery of this interesting species. As the type-specimens of *H. janinae* could not be localized, the detailed redescription given herein, is based on the newly recovered material only.

Por and Marcus (1972) assigned a second species, *Hemilaophonte clysmae* to the genus, found in sediment samples from the Gulf of Suez. In addition, they broadened the generic diagnosis of *Hemilaophonte* Jakubisiak to accommodate *H. clysmae* properly. As will be discussed below, the latter should not be maintained in *Hemilaophonte*. Instead, *H. clysmae* should be assigned to the closely related genus *Coullia* HAMOND.

MATERIAL AND METHODS

Common spider crabs preserved in the collections of the Invertebrates Section of the Koninklijk Belgisch Instituut voor Natuurwetenschappen were treated as described in FIERS (1990). Dissected specimens are mounted in glycerine while preserved ones are stored in 75 % neutralized ethyl alcohol.

Drawings were made with the aid of a camera lucida attached to a light microscope equipped with phase contrast. Terminology and abbreviations used herein are according to LANG (1948, 1965).

Specimens of *Hemilaophonte janinae* were found on common spider crabs from the following localities :

- France, Dinard. Leg. K.B.I.N., 20 September 1950, IG : 17639. One female common spider crab containing 7 females and 4 males. 1 female and 1 male dissected, slides labeled COP 3664a, b and 3665 respectively. Other specimens preserved in alcohol, COP 2339.
- Spanish Sahara (Rio de Oro) : Port Etienne (Nouadhibou), Bay de Repos. Leg. MERCATOR, 11th cruise, 7/8 November 1935. One male common spider crab containing 7 females, 1 male and 1 female copepodid CV, preserved in alcohol, COP 2337.
- Spanish Sahara (Rio de Oro) : Port Etienne (Nouadhibou). Leg. MERCATOR, 14th cruise, 3 January 1938, IG. 11553. One female common spider crab containing 1 female and 1 female CV copepodid. Female dissected, slides labeled 3666a, b. Juvenile preserved in alcohol, COP 2338.

All the harpacticoid specimens are deposited in the collections of the Recent Invertebrates Section of the Koninklijk Belgisch Instituut voor Natuurwetenschappen.

SYSTEMATICS

Genus ***Hemilaophonte*** JAKUBISIAK, 1932

Diagnosis. — Small translucent laophontids with a strongly depressed body shape and divergent cylindrical furcal rami; antennule six-segmented without thorns or processes on the proximal segments; antenna with a well-developed exopodite bearing four sub-equal setae; P1 with prolonged protopodite and two-segmented exopodite; exopodites P2 and P3 three-segmented; exopodite P4 two-segmented; three outer spines on ultimate exopodal segments of P2 and P3, two outer spines on second exopodal segment of P4; endopodites P2-P4 two-segmented; endopodite P2 smaller than endopodites of P3 and P4; baseoendopodite P5 with two apical and two lateral setae; exopodite P5 short, with six setae.

Sexual dimorphism : antennule sub-chirocer ; P3 endopodite two-segmented possessing a long curved apophysis on second segment ; P5 with two baseoendopodal and five exopodal setae ; P6 with two setae.

Type-species. — *Hemilaophonte janinae* Jakubisiak, 1932, by monotypy.

Discussion. — Jakubisiak (1932) considered *Hemilaophonte* to be closely related to *Harrietella* T. Scott, a monospecific genus commonly found in association with the woodboring gribble (*Limnoria*, Hicks, 1989 and references therein). Although Lang (1948, p. 1449, 1450) consented to Jakubisiak's (1932) view, he expressed clearly his reservations because of the concise and probably erroneous description of the male. Obviously, as male features are of basic significance in revealing the phylogenetic relationships within the Laophontidae, the ignorance of the sexual characteristics strongly questions possible statements about relationships between the genera.

Clearly, relying on female characteristics only, *Hemilaophonte* and *Harrietella* resemble each other because of their shared reduced segmentation of the P4 exopodite, their remarkable depressed body shape and, although to a lesser degree, the reduced chaetotaxy of the legs. Apparently, Jakubisiak (1932) and Lang (1948) also based their conclusion on the comparable way of life of the species in association with other invertebrates.

As illustrated herein, Jakubisiak (1932) overlooked the sexually dimorphic morphology of the third leg as well as one of the setae on the P5 exopodite of the male. Males of *H. janinae* possess a large curved apophysis on a two-segmented P3 endopodite and exhibit in the P5 five exopodal and two endopodal setae. Other legs show no sexually dimorphic features. Clearly, P3 and P5 of the males of *Hemilaophonte* differ significantly from those of *Harrietella*. In the latter, the male P5 bears at the most four exopodal setae and has only a single endopodal seta while the P3 endopodite possesses a rather short and blunt outer subdistal process. Moreover, the endopodal setae of the male P3 of *Harrietella* exhibit marked differences in comparison with those of the female. The inner lateral and inner distal setae are shorter and more rigid while the outer distal one is spiniform and only as long as the apophysis (Hicks, 1989). In contrast, the P3 endopodite of the males in *Hemilaophonte* with its long curved sharp apophysis bears a seta which is markedly shorter and more slender than in the female. Apparently, the sexually dimorphic characteristics of *Hemilaophonte* have a different origin than those of the *Pseudonychocamptus* — *Harrietella* branch.

Two more recently erected laophontid genera, namely *Coullia* Hamond, 1973 and *Phycolaophonte* Pallares, 1975, share a particular characteristic with *Hemilaophonte*. In general, the endopodal lengths in laophontids decrease from P2 towards P4. Whereas the P2 endopodite reaches beyond the middle of the second exopodal segment, the P4 endopodite is only as large as the first exopodal segment and often even smaller. The three above-mentioned genera do not share this arrangement. Here, the P2 endopodite is distinctly smaller than the P3 and P4 endopodites because of the reduced size and shape of the segments. In the genus *Coullia* the endopodite P2 can either be absent or be represented as a single seta.

This particular pattern, in addition to the P5 chaetotaxy and the shape of the male P3 endopodite, unifies these three genera in a separate branch within the family. This branch is probably not directly related with the *Pseudonychocamptus* — *Harrietella* lineage.

At present two species are assigned to the genus *Coullia*, namely *C. heteropus* HAMOND, 1973 and *C. platychelipusioides* (NOODT, 1958) and only one, *P. insularis* PALLARES, 1975, to the genus *Phycolaophonte*. Unfortunately, the male is known only for the latter but after observations were made of several other species of the genus *Coullia*, at present unknown and which will be described in a forthcoming contribution, the morphology of the sexual dimorphic P3 and the chaetotaxy of the male P5 in *Coullia* was found to be exactly the same in *Phycolaophonte* and *Hemilaophonte*.

Having justified the relationships of *Hemilaophonte* to *Coullia* and *Phycolaophonte*, the question still remains whether *H. clysmae* POR and MARCUS, 1972 should be maintained in the genus. Firstly, it should be noted that the numerations in the illustrations given by POR and MARCUS (1972) of the P2 (Fig. 40) and P3 (Fig. 39) are interchanged as is evidenced in accompanying descriptions of both legs.

Hemilaophonte clysmae differs significantly from *H. janinae* by the presence of a three-segmented P4 exopodite, a long ovate exopodite in the P5 and by the distinct ventrolateral extensions on the genital double-segment and the second abdominal somite. These specific features of *H. clysmae* exclude this species from the genus *Hemilaophonte* as they are typical for the closely related genus *Coullia*. Consequently, *H. clysmae* should be allocated to the latter genus and indicated as *Coullia clysmae* (POR and MARCUS, 1972) comb. nov.

SYSTEMATICS

Hemilaophonte janinae JAKUBISIAK, 1932

Hemilaophonte Janinae nov. gen., nov. sp.- JAKUBISIAK, 1932 : p. 510-513, Fig. 2.
Hemilaophonte janinae JAKUBISIAK, 1932 - WILLEY, 1935 : p. 51 ; JAKUBISIAK, 1936 : p. 320 ; NICHOLLS, 1941 : p. 95 ; LANG, 1948 : p. 1427, fig. 584(1) ; VERVOORT, 1964 : p. 371 ; MEDIONI and SOYER, 1966 : p. 1062 ; POR and MARCUS, 1972 : p. 258 ; WELLS, 1976 : p. 172, 189. ; HUYS, 1988 : p. 1528.

Type-material. — Unknown.

Type-locality. — JAKUBISIAK (1932 : p. 506) examined several specimens of *Maja squinado* captured near Roscoff (France) and a single specimen of unknown origin bought at a market in Paris. Unfortunately he did not mention exactly from which specimens he collected *Hemilaophonte janinae*.

Redescription. — Female : body (Fig. 1a) strongly dorso-ventrally depressed; cephalothorax with smoothly curved lateral margins; largest width in the posterior half of the cephalothorax; thorax and abdomen tapering towards the anal somite; genital double somite about as long as wide, without posterolateral extensions of the edges (Fig. 1c); anal operculum rounded; body length, measured from rostral tip to distal margin of the furcal rami, 565 - 605 µm.

Integumental structures : dorsal surfaces of the thoracic and abdominal somites naked; pleural regions of the thoracic somites furnished with fragile hairs; genital double somite and abdominal somites with some short rows of spinules along the lateral margins and on the ventral surfaces.

Rostrum (Fig. 1d) broad at base, strongly tapering anteriad and fused with the cephalothorax; rostral tip not prominent.

Furcal rami two and a half times as long as wide, divergent; inner margin with a small spinulose elevation near the implantation of the dorsal seta; the latter implanted near the inner margin and articulating on two basal parts; three lateral setae arising in the distal third of the outer margin; inner apical seta small; principal setae not fused; outer principal one as long as the supporting ramus; outer distal edge showing a large tubular pore.

Genital field (Fig. 1h) with two setae on both halves; median field formed by a complex of internal structures, reaching almost towards the middle of the ventral surface of the segment.

Antennule (Fig. 2g) six-segmented; first segment rather small; surface of the segments smooth except for a short row of spinules on the distal anterior edge of the first segment; setal ornamentation : 1-8-5-2+Aesth-1-12.

Antenna (Fig. 2c) with allobasis bearing an inner seta and a well developed exopodite; exopodite with three sub-equal setae and one longer spinulose seta (Fig. 2b); endopodal segment with a few spinules in the proximal half and along the distal margin, ornamented laterally with two spines and a slender seta and apically with three spines, two geniculated setae and a slender seta.

Mandible (Fig. 1f) with four teeth and a seta on the gnathobasis; palp cylindrical, twice as long as wide, bearing four smooth setae and a feathered one; rami obsolete.

Arthrite of maxillule (Fig. 1e) slender, having five unarmed teeth and two setae; coxal extension with two setae and basal extension with three setae; exopodite distinct as a minute segment, bearing a single seta; endopodite obsolete, represented as a single seta.

Maxilla (Fig. 1g) with three endites; proximal one obsolete, represented as a seta; median and apical endites cylindrical, nearly five times as long as wide and bearing each two slender setae and one armed strong spine; basis furnished with teeth along the ultimate third of the extension and bearing one seta on the surface; rami obsolete, represented as three setae.

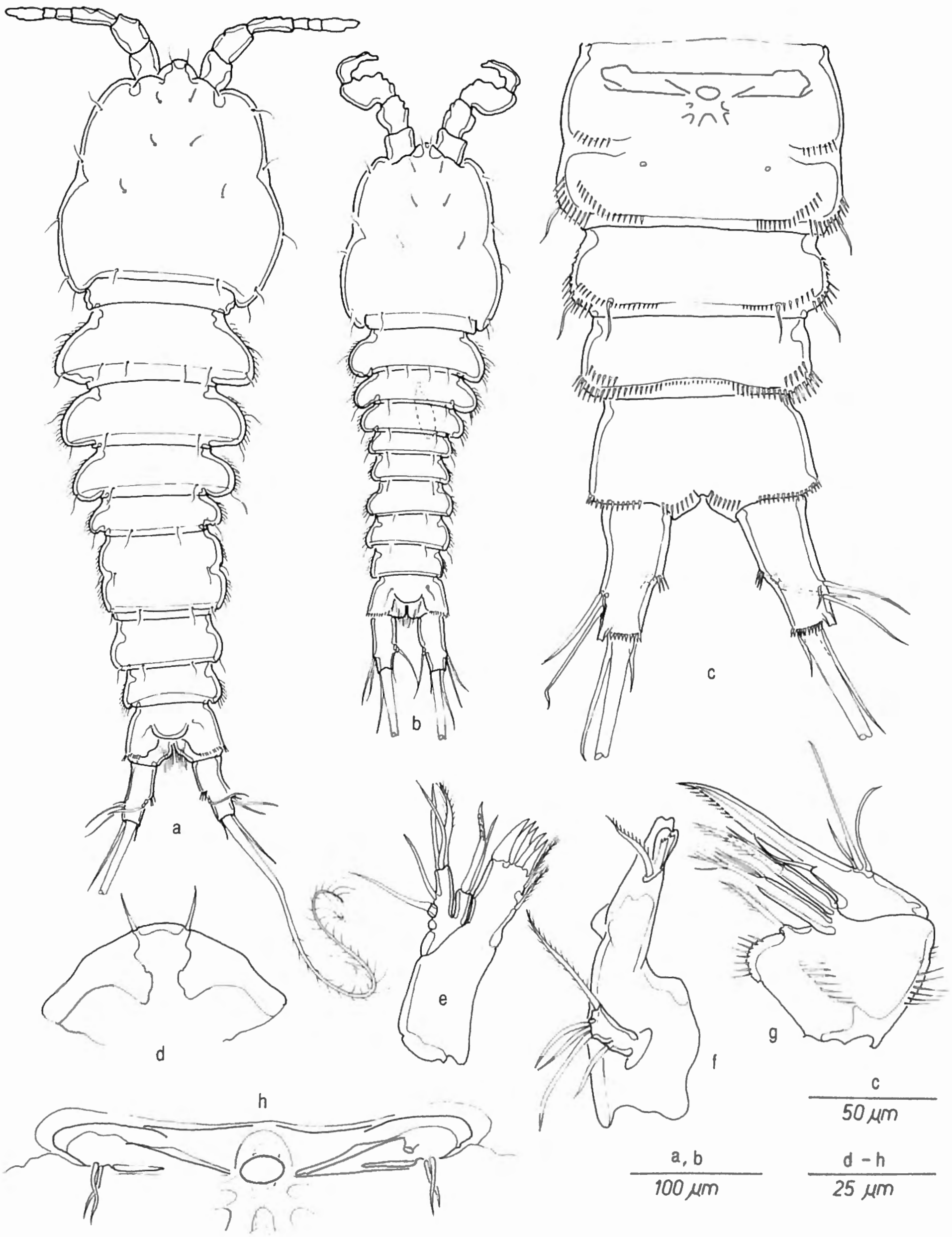

Fig. 1. — *Hemilaophonte janinae* : a, habitus of the female, dorsal view ; b, habitus of the male, dorsal view ; c, abdomen of the female, ventral view ; d, rostrum, dorsal view; e, maxillule ; f, mandible ; g, maxilla ; h, genital field.

Redescription. — Female : body (Fig. 1a) strongly dorso-ventrally depressed; cephalothorax with smoothly curved lateral margins; largest width in the posterior half of the cephalothorax; thorax and abdomen tapering towards the anal somite; genital double somite about as long as wide, without posterolateral extensions of the edges (Fig. 1c); anal operculum rounded; body length, measured from rostral tip to distal margin of the furcal rami, 565 - 605 µm.

Integumental structures : dorsal surfaces of the thoracic and abdominal somites naked; pleural regions of the thoracic somites furnished with fragile hairs; genital double somite and abdominal somites with some short rows of spinules along the lateral margins and on the ventral surfaces.

Rostrum (Fig. 1d) broad at base, strongly tapering anteriad and fused with the cephalothorax; rostral tip not prominent.

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Genital field (Fig. 1h) with two setae on both halves; median field formed by a complex of internal structures, reaching almost towards the middle of the ventral surface of the segment.

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Mandible (Fig. 1f) with four teeth and a seta on the gnathobasis; palp cylindrical, twice as long as wide, bearing four smooth setae and a feathered one; rami obsolete.

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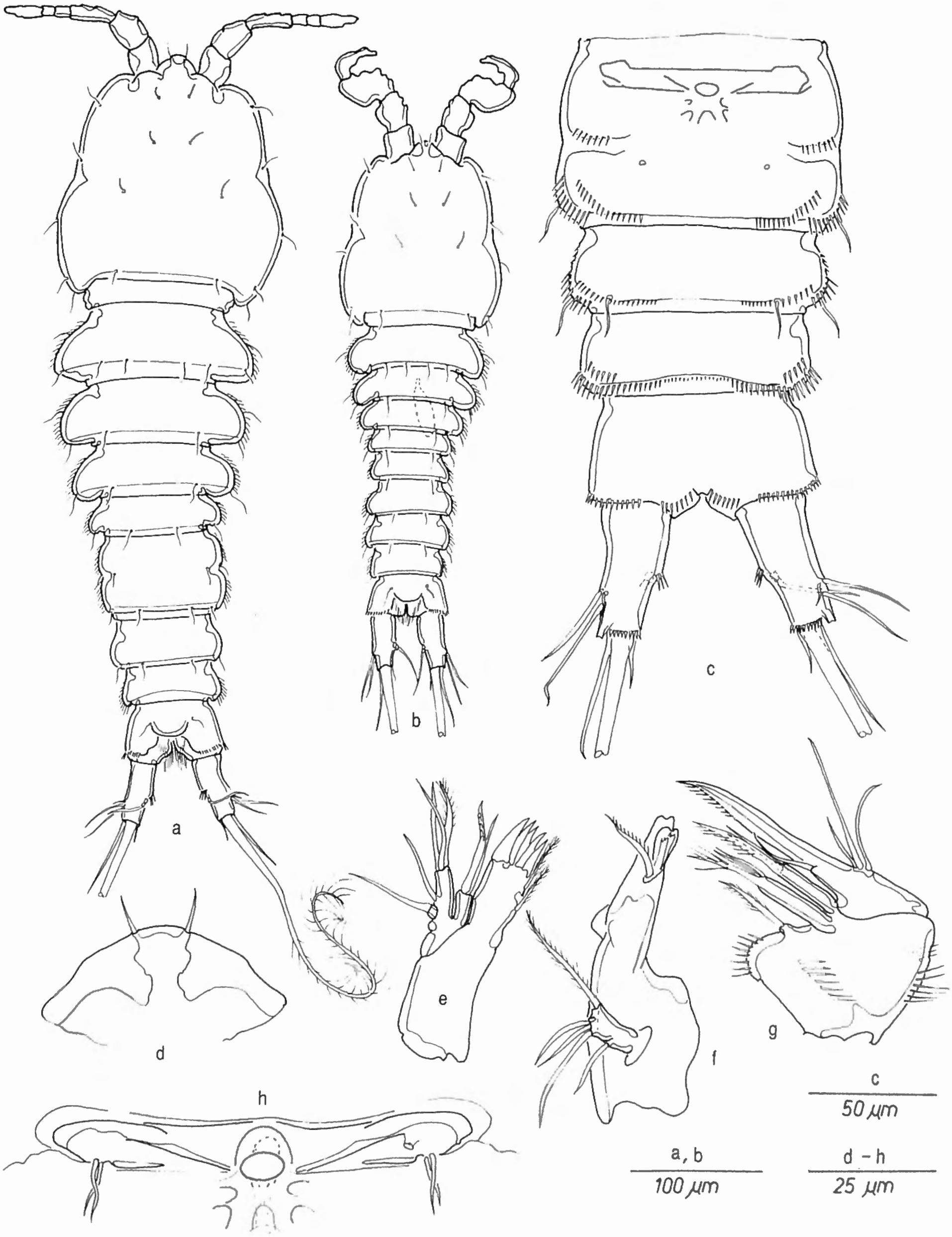

Fig. 1. — *Hemilaophonte janinae* : a, habitus of the female, dorsal view ; b, habitus of the male, dorsal view ; c, abdomen of the female, ventral view ; d, rostrum, dorsal view; e, maxillule ; f, mandible ; g, maxilla ; h, genital field.

Fig. 2. — *Hemilaophonte janinae* : a, male antennule ; b, exopodite of antenna ; c, antenna ; d, maxilliped ; e, male P5 ; f, female antennule ; g, male P6.

Maxilliped (Fig. 2d) with a short syncoxa, bearing two setae ; endopodal claw longer than basis furnished with strong teeth in the distal third ; tiny seta at basis of the claw.

P1 (Fig. 3a) : prae-coxa triangular and smooth ; coxa twice as long as wide, spinulose along the inner margin ; basis up to four times as long as wide with outer seta implanted proximally ; exopodite two-segmented ; second segment two and a half times as long as the first one and bearing two outer minute spines and two api-

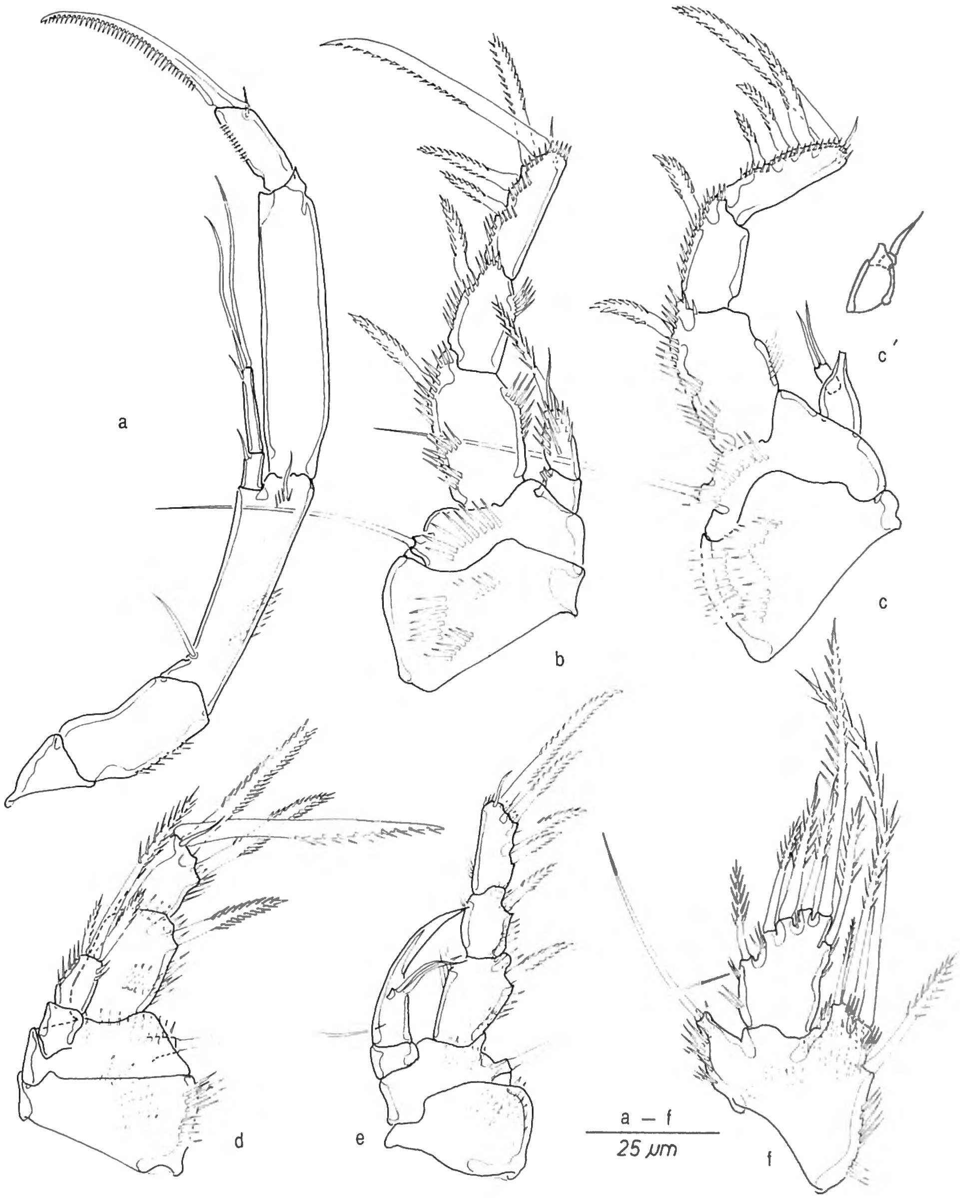

Fig. 3. — *Hemilaophonte janinae* : a, P1 ; b, P2 ; c, P3 ; c′, endopodite P3 of another specimen ; d, P4 ; e, male P3 ; f, female P5.

cal smooth setae ; first endopodal segment four times as long as wide ; endopodal claw strongly armed.

P2-P4 (Fig. 3c, b and d, respectively) with large spinules on protopodal segments ; exopodites of P2 and P3 three-segmented, of P4 two-segmented ;

endopodites P2-P4 two-segmented; inner distal edge of proximal endopodal segment of P3 with a large hyaline tubular pore; chaetotaxy of the legs in table I.

TABLE I

Chaetotaxy of Hemilaophonte janinae

	P2	P3	P4
Exopodite	0-0-023	0-0-023	0-022
Endopodite	0-020	0-020	0-021

Baseoendopodite of P5 with a small endopodal lobe, bearing four spinulose setae (two apical and two lateral ones, Fig. 3f); exopodite one and a half times as long as wide, having six spinulose setae; integument ornamented with spinules on the surface of the baseoendopodite and along the margins of the exopodite.

Male : habitus (Fig. 1b) resembling closely that of the female but differing in length (390 - 435 µm) and in the more parallel-sided abdomen.

Antennule (Fig. 2a) six-segmented, sub-chirocer with aesthetasc on segment four; ultimate segment prolonged with a sharp distal edge.

Mouthparts, P1-P4 as in the female, except for the P3 endopodite; the latter (Fig. 3e) with a long and curved sharp apophysis arising from the inner distal edge of the second segment.

P5 (Fig. 2e) with a small but distinct baseoendopodite, showing an inner expansion with two setae; opposite legs not fused together; exopodite as long as wide, bearing four spinulose setae and one smooth seta.

Right P6 (Fig. 2f) somewhat larger than left one; both legs with two smooth setae.

Variability. — One specimen (France, Dinard) was found bearing a single seta on the second endopodal segment of P2 (Fig. 3c′).

Discussion. — The herein studied specimens agree in many respects with the original description of *H. janinae*. However, comparing the illustrations in JAKUBISIAK's (1932) description with the present ones, some differences in the chaetotaxy of the legs are worth stating.

The ultimate exopodal segments bear a short and slender inner seta on the inner distalmost edge. Those setae often hidden beyond the outer exopodal spine and the fringe of spinules arising along the apical margin are rather difficult to observe. Moreover, regarding the chaetotaxy of the endopodites, including the endopodal lobe of the female P5 and the exopodite of the male P5 in the original description, the situation is equivocal. In all these legs JAKUBISIAK (1932) illustrated and described one seta less than observed in the herein studied specimens. Although we encountered one specimen with a single endopodal seta in P2, it is noticeable that each leg in the original description lacks the shortest and slendermost seta. Obviously, these setae were overlooked because of their small dimensions.

Bionomics. — Superficial rinsing of the body and body parts of the common spider crabs never revealed the presence of *H. janinae*. The harpacticoid fauna obtained in this way shows a high diversity comprising representatives of several different families (JAKUBISIAK, 1932 ; see also INGLE, 1983 for a list of associates found on *Maja squinado*). *H. janinae*, as well as *Paralaophonte royi* JAKUBISIAK, 1932 n. comb., *P. majae* PETKOVSKI, 1964, *P. ormieresi* RAIBAUT, 1968 were only found in the residues when the gill chambers of the crabs were thoroughly rinsed using a strong water current (FIERS, 1990).

Apparently, *Hemilaophonte janinae* and *Paralaophonte royi* n. comb., the two species JAKUBISIAK (1932) found on *Maja squinado* are typical associates of this decapod, living exclusively on the gills of their host.

Distribution. — The distribution of the common spider crab is fairly well-documented. This large, regionally economically important decapod crustacean is known in the Atlantic Ocean from the west coast of Scotland towards the coasts of Guinea, including the Canary Islands. In the Mediterranean its range extends eastwards up to the Bosporus (ZARIQUIEY ALVAREZ, 1968 ; CHRISTIANSEN, 1969 ; ADEMA, 1991). A single male specimen in the collections of the Recent Invertebrate Section was trawled off Ghana, extending the known distribution somewhat more southwards along the west African coast.

Regarding the distribution area of *Maja squinado* one could expect to encounter *Hemilaophonte janinae* throughout its range. Surprisingly, this harpacticoid associate has only been found on spider crabs collected in the Atlantic Ocean. Several specimens of spider crabs from Mediterranean localities were rinsed in search of harpacticoid copepods but *H. janinae* was never found. Instead, the examined Mediterranean spider crabs hosted *Paralaophonte ormieresi* and some new species of the genera *Coullia* and *Laophonte*, amongst others which are not considered as typical associates (*Laophonte cornuta*, *L. elongata*, *Pseudonychocamptus proximus*, etc.).

Of particular interest is the presence of *Paralaophonte royi* n. comb., described from Roscoff by JAKUBISIAK (1932) and found on a specimen of *Maja squinado* collected off Ghana and as such extending the known range of this harpacticoid species far southwards.

There are several indications suggesting that the three *Paralaophonte*-species known as associates of the common spider crab, have a common origin within *Paralaophonte*. This particular lineage occurs in most of the host's range with the most plesiomorph representative (*P. majae*) in the eastern part of the Mediterranean. A comparable east-westwards distribution has been previously suggested for the genus *Laophontina* (FIERS, 1991) and for the *monodi*-species group of the genus *Afrolaophonte* (FIERS, 1990b).

In contrast, *Hemilaophonte janinae* seems to occur only in the eastern Atlantic while its sistergroup, the genus *Coullia*, shows a circum-tropical distribution pattern. As, however, the relationships within *Coullia* are not fully understood yet, it would be premature to state fargoing conclusions about the zoogeographical origin of *Hemilaophonte*. But, it seems possible that this genus branched off from a West-African stock as part of the eastern Pacific-western Atlantic track.

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