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Taxonomic report on some monstrilloids (Copepoda, Monstrilloida) from Toulon Bay, France

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Summary

During a zooplankton survey carried out off the coasts of the bay of Toulon, France, several monstrilloid copepods were collected. The systematic analysis of this group allowed the identification of males and females of *Monstrilla grandis* GIESBRECHT, a male of *Cymbasoma tenue* (ISAAC), and a male of a new species of *Monstrilla. Monstrilla grandis* is a cosmopolitan species which has been recorded previously in the Mediterranean but has not been adequately described, this is particularly true for the male, which is fully described herein. The specimen of *C. tenue*, a species redescribed recently, has some interesting morphological variations and its description is amended. The new species of *Monstrilla, M. pygmaea*_n.sp., is very closely related to *M. helgolandica* CLAUS and to *M. serricornis* SARS. The new species can be distinguished mainly by its extremely small size, by details of the ornamentation of the terminal antennular segment, the structure of the genital lappets, and by its body proportions.
Key-words: Zooplankton, copepods, Mediterranean.

Introduction

Monstrilloid copepods have a peculiar life cycle, they are parasites of polychaetes and molluscs during most of their preadult stages, and adults are free-living, exclusively reproductive individuals (DAVIS, 1984; ISAAC, 1975; SUÁREZ-MORALES & GASCA, 1998). This is why only adults can be found in the plankton collections, their occurrence is unfrequent and random (ISAAC, 1974a,b). Their taxonomy is still in need of development (GRYGIER, 1994a). One of the main problems is that males and females are known for only a reduced number of species and it is difficult to link both sexes (SUÁREZ-MORALES & ESCAMILLA, 1997; SUÁREZ-MORALES, 1999). Several species are being currently redescribed or amended (GRYGIER, 1994b; SUÁREZ-MORALES & RICCARDI, 1997; SUÁREZ-MORALES, 1999) according to new, upgraded standards (GRYGIER & OHTSUKA, 1995).

A zooplankton survey was carried out off the coasts of Toulon Bay, northwestern Mediterranean Sea. A previous survey of the monstrilloid copepod fauna in this zone yielded a new record and a redescription of *Cymbasoma tenue* (ISAAC, 1974b) (SUÁREZ-MORALES & RICCARDI, 1997). Additional material from this area was sent to me for identification. The present study deals with the systematics of the species found in the surveyed area.

Toulon Bay (43°5'N, 6°0'E) is located on the French coast of the Mediterranean Sea (northwestern portion) (Fig. 1). The continental shelf of the area is narrow, with a mean slope of 2.4% (POIDENOT, 1993). The salinity varied between 33.7 and 33.9 PSU, while the mean water temperature was 22.8°C.

Material and methods

Zooplankton was collected at two sites located along the coasts of Toulon on 4 July 1996 by vertical hauls (0-22 m) with a standard conical plankton net (0.09 mm mesh size). This gear allowed collection of a wide size range of zooplankton organisms. The biological material was preserved in a buffered 5% seawater formalin solution. Monstrilloid copepods were sorted out from the entire sample and preserved in 70% ethanol. These specimens were deposited in the Collection of Zooplankton of El Colegio de la Frontera Sur, in Chetumal, Mexico (ECO-CHZ), and in the Museum National d' Histoire Naturelle, in Paris.

Systematics

Order Monstrilloida

Monstrilla grandis GIESBRECHT, 1891

Material: Three adult females, ethanol-preserved, undissected. Toulon Bay (43°5'N, 6°0'E), July 4, 1996. Two adult males, same locality and date. Catalogue number: ECO-CHZ-00511.

Descriptions.- Female. Total body length of 3 individuals 0.8, 1.1, and 1.5 mm measured from anterior end of cephalic somite to posterior margin of anal somite. Cephalothorax (incorporating first pedigerous somite) accounting for 61% of total body length. Forehead medially depressed in dorsal view. Anteriormost part of cephalothorax with ventral, rounded convex protuberance; another cuticular process, formed by a row of 8-11 rounded denticles is located adjacent to the first one forming a lineal polip-like structure (Fig. 2C). Oral papilla lying midventrally 0.52 of way back along cephalothorax (Fig. 2A). Nauplius eye present, weakly developed, ocelli slightly pigmented with rounded shape. No cuticular ornamentation was observed on the surface of cephalothorax.

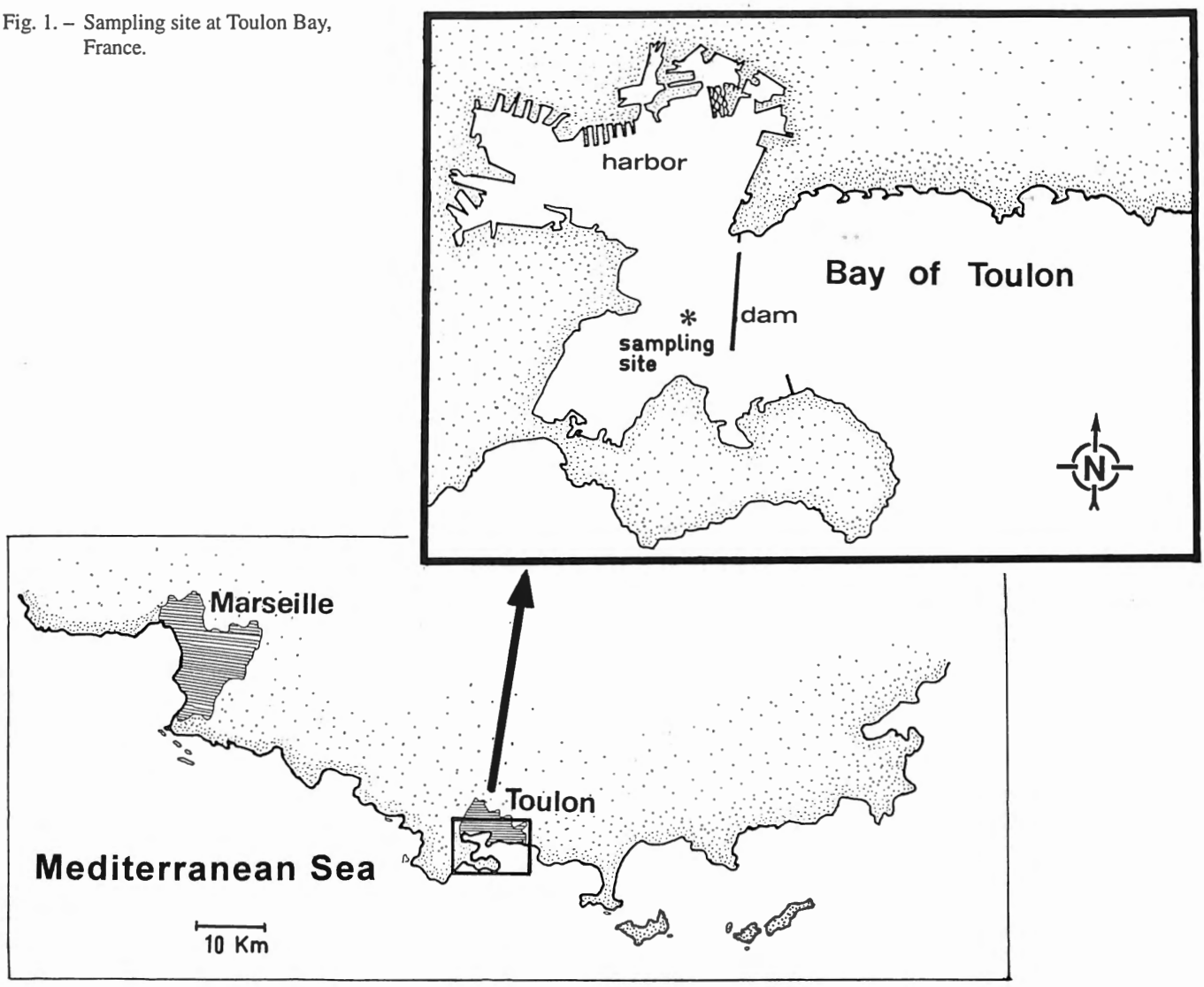

Fig. 1. – Sampling site at Toulon Bay, France.

Antennule three-segmented, purported segments 3-5 fused; armed with 0,I; 1,V; 12, VIII setae (Roman numerals) and spines (Arabic numerals) (Fig. 2B). Two of these spines terminal, forming a pincer-like structure. In terms of the pattern described by Grygier & Ohtsuka (1995) for monstrilloid antennular armature, setae and spines on second segment (2d1-3,2v1, 2v2, IId) on purported third (3,IIIv,d) and fourth (4aes, 4v1-3, 4d1,4d2, IVd,v) segments, all complete. Setae b5,b6 missing on last segment of right and left antennules; setae b1-3 dichotomously branched from distal half. Spines 4d1 and 4d2 missing in both antennules. Ratio of length of antennule segments: 12.5: 16.9: 70.6= 100. Antennule relatively long, slightly longer than 53% of total body length.

Incorporated first pedigerous somite and three free succeeding pedigerous somites each bearing a pair of biramous swimming legs. Pedigerous somites 2-4 accounting for 23.4% of total length in dorsal view. Legs 1-4 slightly decreasing in size posteriorly. Basis with diagonal division articulating with large, rectangular coxa along diagonal line. Basis with lateral hair-like seta on legs 1-4; on leg 3, this seta at least 2.5 times longer and noticeably thicker than on the others, lightly setulated. Endopodites and exopodites of legs 1-4, triarticulated. Ramus setae all biserially plumose except spiniform outer seta on exopod 1 and 3 of each leg. Armature of swimming legs as:

	Basis	Endopodite	Exopodite
Leg 1	1-0	0-1;0-1;1,2,2	I-1;0-1;I,1,3
Legs 2-4	1-0	0-1;0-1;1,2,2	I-1;0-1;I,1,2,2

Fifth legs bilobed, fused medially, arising from common plate. Basal portion relatively long, starting from ventral anterior end of bearing somite. Outer lobe about 1.3 times thicker than inner one, armed with three long, plumose seta, two inner subequal in length and width, outermost slightly longer; all setae biserially setulated. Specimens examined show single finger-like process on distal part of inner margin of outer lobe (Figs. 2D,E).

Urosome consisting of fifth pedigerous somite, genital double somite, and two free abdominal somites. Urosome, excluding furcal rami, accounting for 21.2% of total body

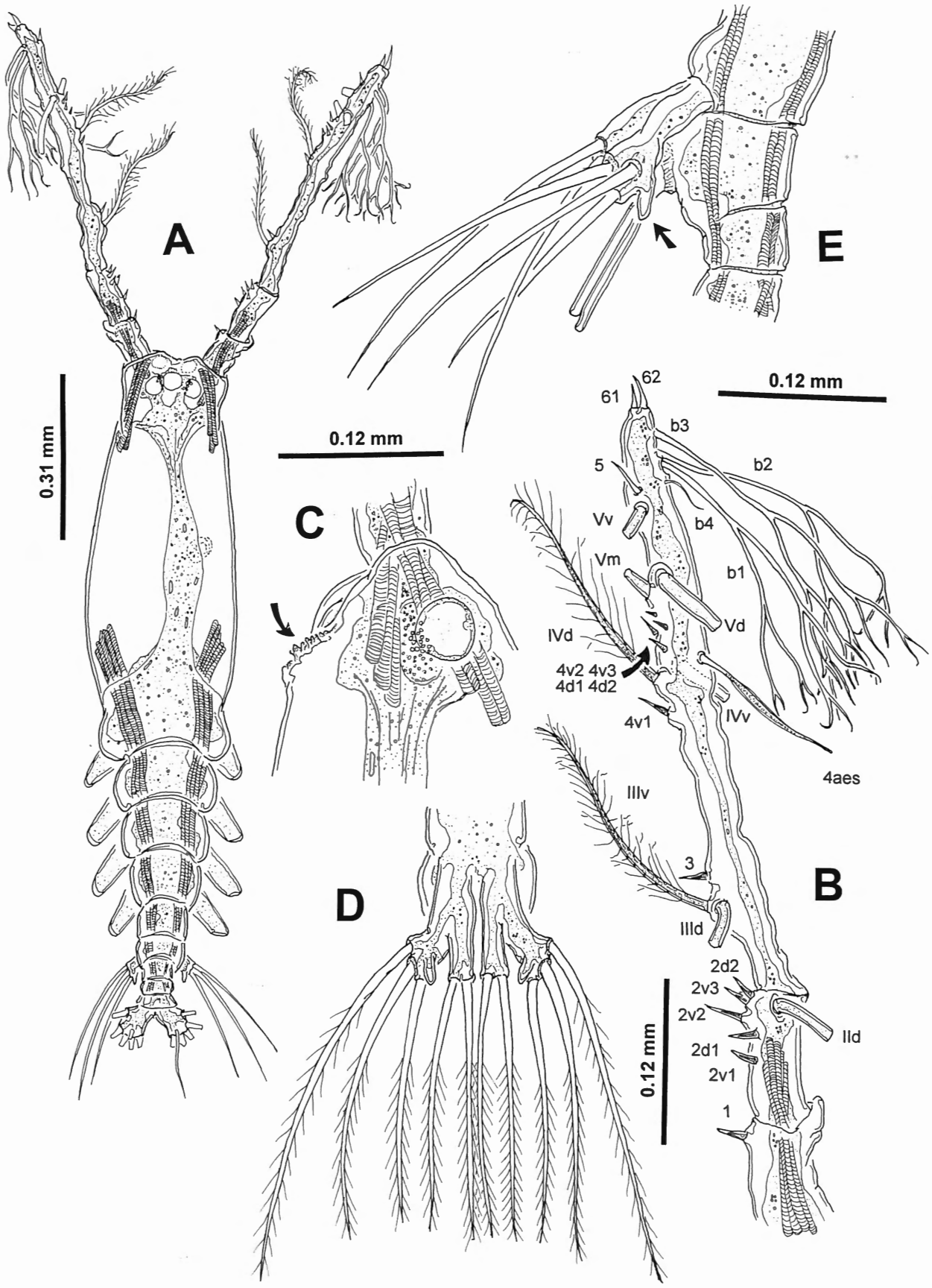

Fig. 2. – *Monstrilla grandis* GIESBRECHT. Toulon Bay. Adult female. A. Habitus, dorsal view; B. Right antennule, dorsal view, showing setation pattern following nomenclature of GRYGIER & OHTSUKA (1995); C. head, lateral view, ventral cuticular process arrowed; D. fifth legs, anterior view; E. fifth legs and genital somite, lateral view, digitiform process arrowed.

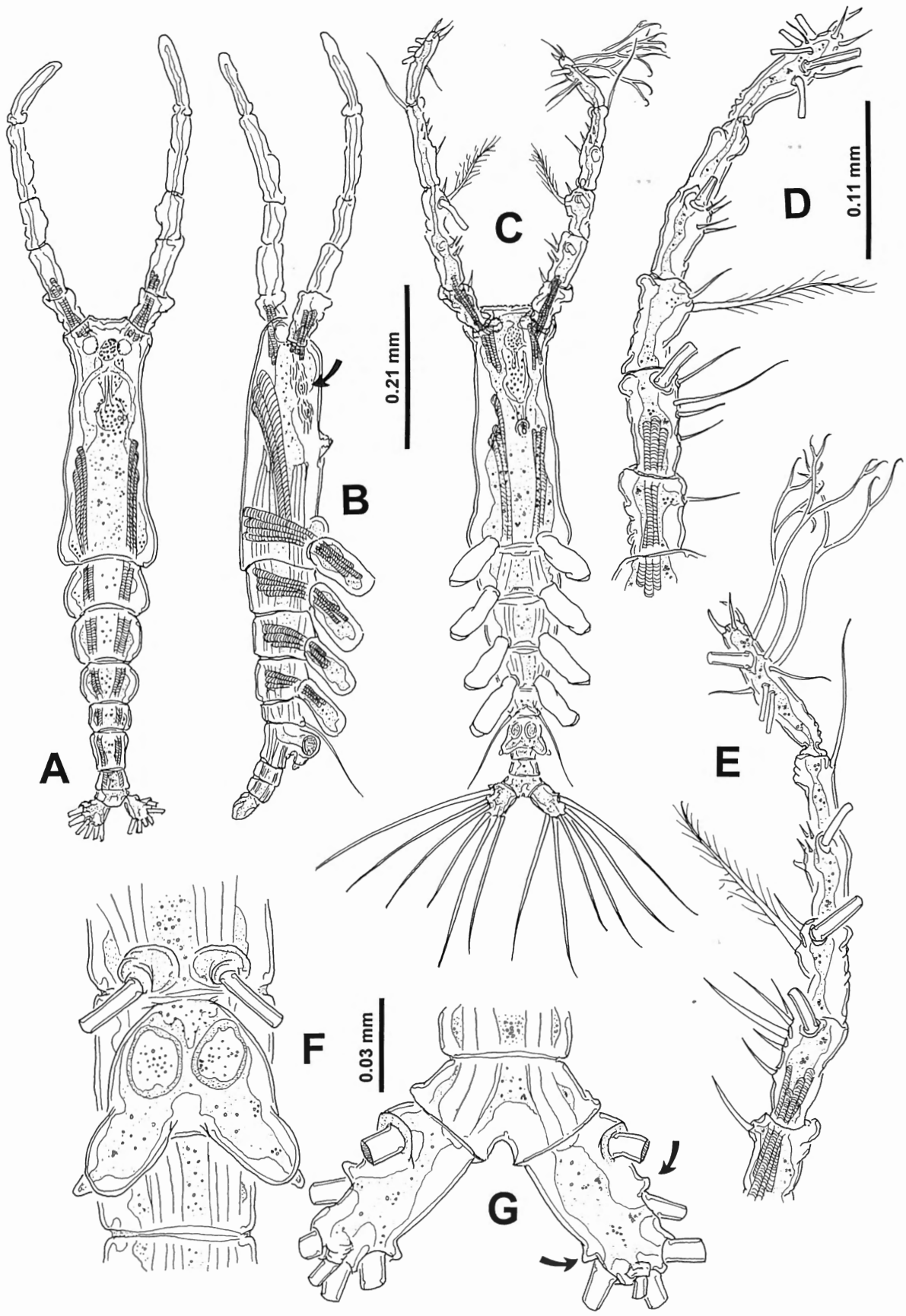

Fig. 3 – *Monstrilla grandis* GIESBRECHT. Toulon Bay. Adult male A. Habitus, dorsal view; B. same, lateral view, showing cuticular nipple-like process(arrowed); C. same, ventral view; D. right antennule, dorsal view; E. left antennule, dorsal view; F. genital complex, anterior view; G. furcal rami, dorsal view, cuticular processes arrowed.

length. Genital double somite with partial intersegmental division, visible in dorsal view; double somite representing less than half the length of urosome (42.5%)(Figs. 2A,E). Ratio of length of fifth pedigerous somite, genital double somite and free abdominal somite being: 31.4:38.5:19.1:11.1= 100. Medial portion of genital double somite moderately swollen, bearing long, basally-separated ovigerous spines which are not swollen but slender distally. Spines about 42% of total body length, extending slightly beyond setae of caudal rami. Caudal rami 1.8 times longer than wide, moderately divergent, bearing three terminal, one dorsal, and two inner setae. Seta on distal inner margin slightly thicker than the others.

Male. Body length of two analyzed specimens 0.61 and 0.65 mm, measured in dorsal view from anterior end of cephalothorax to posterior edge of anal somite. Cephalothorax 0.29 mm long, representing about 47% of total body length (Figs. 3A,B). Oral papilla located at about midway (0.53) of way back along ventral surface of cephalothorax (Fig. 3B). Cephalic region abruptly broadening on anterior third, posterior part of cephalothorax gradually broadening to same width. Dorsal ocelli present, pigment cups relatively large, separated by the distance of two ecelli diameters, poorly developed, almost unpigmented, rounded in dorsal view. Cephalic region flat in dorsal view, with low cuticular protuberances on forehead between antennule bases. Two strongly chitinized, nipple-like cuticular processes located ventrally anterior to oral papilla (arrowed in Fig. 3B).
Antennules relatively long, with five segments, segment 4 longest. Mean antennular length of two specimens 0.43 and 0.44 mm, representing close to 66% of total body length, and *ca.* 132% as long as cephalothorax. Segments armed with 0-I; 1-V; 2-I; 3-IV; 2-VIII+aes setae (in Arabic numbers), spines (in Roman numbers), and aesthetascs (aes), respectively. Distal antennular segment with three subequal, dichotomously branched setae aligned near outer distal end. In terms of the basic setal nomenclature of Grygier & Ohtsuka (1995) for female monstrilloid copepod antennules, two aesthetascs (4aes) and three setae (IVv, b5,b6,Vd) absent in the studied specimens. Length ratio of antennular segments: 11.2: 20.2: 16.3: 27.1: 25=100 (Figs. 3D,E). First pedigerous thoracic somite incorporated into cephalothorax. This and succeeding three pedigers each bearing well developed swimming legs, all with 3-segmented rami and with same armament pattern, except for leg 1 exopod. Legs 2 and 3 slightly larger than 1 and 4; exopods longer than endopods in all cases. Coxae of each pair unarmed, joined by intercoxal sclerite wider than long. Basis separated from coxa posteriorly by diagonal articulation. Outer margin of basis of swimming legs 1, 2 and 4 with a small, thin seta; seta on leg 3 about 2.5 times larger and thicker than in the other legs, lightly plumose. Outer distal corner of first and third exopodal segments of legs 1-4 each with short, spinelike seta, about one-third as long as bearing segment. All natatory setae lightly and biserially plumose except for seta on outer distal corner of third exopodal segments of legs 1-4, this being plumose along inner side, but bearing sparse row of small denticles along outer margin.

Armament formula of swimming legs as:

	Basis	Exopod	Endopod
Leg 1	0-1	I-0;0-1;I,2,2	0-1;0-1;1,2,2
Legs 2-4	0-1	I-0;0-1;I,2,3	0-1;0-1;1,2,2

Fifth leg represented by a pair of long seta each inserted on a basal lobe located on posterior end of bearing pedigerous somite (Fig. 3F). Fifth legs setae reach to the posterior end of anal somite (Fig. 3B,C). Succeeding somite with genital lappets, both moderately divergent, with broad main arms medially conjoined; inner margins smooth, naked. Both lappets with small, subterminal rounded process posteriorly directed (Figs. 3B,F).
Urosome consisting of four segments: fifth pedigerous somite (with fifth legs), genital somite (with genital complex) and two free somites. From dorsal view, genital somite about as long as preanal and anal somites together, anterior half expanded ventrally. Ratio of lengths of genital somite and two free posterior somites being: 51.6: 25.8: 23.1= 100. Furcal rami about 1.8 times longer than wide, with terminal margin 1.3 times wider than proximal. Rami with two protuberant processes, one on outer margin, near insertion of distal lateral seta; second on inner margin, near insertion of innermost terminal seta (both arrowed in Fig. 3G). Furcae with three well developed terminal setae of which the outermost is slightly thicker than other two, these being subequal in length and breadth. Two additional setae are inserted on the outer margin, dorsal seta relatively short.
Remarks: This species was originally and briefly described from material collected in the Red Sea (GIESBRECHT, 1891). A more detailed diagnosis, including illustrations were provided later on by GIESBRECHT (1892). ISAAC (1975) included it in his unvalid genus *Strilloma*, which was created as an interpretation of the partial separation of the genital double somite present in some species of *Monstrilla*. This very variable feature has been considered to have a questionable taxonomical value (HUYS & BOXSHALL, 1991; RAZOULS, 1996). Hence, having three or two somites between the genital and the furcal rami in the male and the female, the species is correctly placed in the genus *Monstrilla*. The female of this species has been illustrated partially by HUYS & BOXSHALL (1991), and little can be added to their excellent figures for most structures. All the details and body proportions found in the Toulon females of this species agree with the drawings of HUYS & BOXSHALL (1991). However, in this work the setation pattern is analyzed for the first time according to the nomenclature of monstrilloid setation pattern proposed by GRYGIER & OHTSUKA (1995) (see Fig. 2B). The three Toulon specimens analyzed have the digitiform process on the outer lobe of the fifth legs; it is depicted also by HUYS & BOXSHALL (1991). GIESBRECHT (1891) original drawings of this species show an outer lobe lacking this process. ISAAC (1974a) discussed this and concluded that the absence of this process GIESBRECHT's drawings resulted from a mistake.
Although it has been fairly well illustrated by the author of the species (GIESBRECHT, 1892), the male of *M. grandis* has not been described following the upgraded standards, particularly with reference to the setation of the antennules.

Therefore, the male was fully redescribed herein. The general features of the body, and the body and antennular proportions are similar to the drawings presented by GIESBRECHT (1892), with some minor differences which are briefly accounted here. The relative length of the antennules shown in GIESBRECHT's drawings (93.3%) is slightly below the figure reported here for the Toulon specimens (96%). The oral papilla is located on slightly different positions in each case, at 44% of the way back of the cephalothorax (GIESBRECHT, 1892), and at 53% in the Toulon material (see Fig. 3B). The presence of the nipple-like cuticular processes on the ventral surface of the cephalic somite has not been reported before. The relative lengths of the five antennular segments differ but only slightly (25: 27.1: 16.3: 20.2: 11.2=100 in GIESBRECHT's vs 24.6: 26.6: 19.3: 15.3: 14=100 in the Toulon specimens) mainly in the two proximal segments. Dichotomous branching of three subterminal setae b1-3 (Fig. 3E), and most of the armature of the distal segment of the antennule were not mentioned in previous descriptions or illustrations. The single fifth leg seta is longer in GIESBRECHT's illustrations, reaching the distal margin of the furcal rami; the same seta reaches to about midlength of furcal rami or by the posterior end of the anal somite in the Toulon specimens (see Fig. 3C). The two processes on the furcal rami are also new characters for this species, but its taxonomical value is yet to be determined. ISAAC (1974a, 1975) stated that the number of furcal setae in males of *M. grandis* is usually six, but one is often missing in the smaller males. This agrees with what has been found for the Toulon males, they are clearly on the low extreme of the size range reported for males of this species (0.65-1.9 mm) (ISAAC, 1975), and have five furcal setae only.

The purported distribution of this species is very wide, and has been reported from different parts of the world (ISAAC, 1975; GRYGIER, 1995). It has been found in the Mediterranean (RAZOULS & DURAND, 1991; RAZOULS, 1996); in France, it has been recorded from Roscoff (ROSE, 1926), Marseilles (GAUDY, 1962), and now in Toulon Bay.

Monstrilla pygmaea n.sp.

Type material:

Holotype: one adult male, undissected, ethanol preserved. Toulon Bay, July 4, 1996. Deposited in the Museum National d' Histoire Naturelle, Paris, catalogue number MNHN-Cp1868.

Type locality:

Toulon Bay (43°05'N, 06°00'E), French coast of the Mediterranean Sea.

Etymology.- The specific name is derivated from the Latin term *pygmaeus* meaning dwarf, using the feminine adjective *pygmaea*. It refers to the extremely small size of this species.

Description. Male. Total body length of analyzed specimen 0.43 mm measured from anterior end of head to posterior margin of anal somite. Cephalothorax 0.17 mm long, representing slightly over 40% of total body length (Figs. 4A,B). Oral papilla not prominent, located medially at about 41% of way back along ventral surface of cephalothorax (Fig. 4B). Cephalic region wide in dorsal view, slightly narrower than posterior part of cephalothorax, moderately constricted at the level of oral papilla. Dorsal ocelli present, pigment cups relatively large, poorly developed, relatively close from each other, separated by gap equal to only about half the diameter ofocellus; ocelli pigmented on inner parts only, rounded in dorsal view. Low, rounded protuberance located between the antennular bases and the oral papilla, visible in lateral view (Fig. 4B).

Antennules robust, in dorsal view distance between the bases is about 0.9 times the width of second antennular segment. Mean antennular length of specimen ca. 0.19 mm, representing close to 41% of total body length, and *ca.* 96% as long as cephalothorax. Antennules five-segmented, distal one geniculated as usual in male monstrilloids. Each segment armed with 0-I; 1-V; 2-I; 1-5; VIII+aes setae (in Arabic numbers), spines (in Roman numbers), and aesthetascs (aes), respectively. Following basic setal nomenclature of Grygier & Ohtsuka (1995), one aesthetasc (4aes) two setae (b4,b5), and a spine (5) are absent in the studied specimens. Distal antennular segment with five short rows of minute spinules reaching only about 1/3 of dorsal surface around segment. Distalmost process with only 2-3 spines, the number of spines and the length of the row increases proximally. Distal row much more solid than proximalmost, which bears about 8-9 spinules arranged in very tight pattern. Each row of spinules decreasing in size towards the outer margin (Figs. 5A,B). Terminal segment with three subequal, unbranched setae aligned near outer distal end. Length ratio of antennular segments, from proximal to distal one: 17.6: 26.5: 11.8: 23.5: 25 = 100 (Figs. 5A,B). First pedigerous thoracic somite incorporated into cephalothorax. This and succeeding three pedigers each bearing well developed swimming legs, all with 3-segmented rami and with same armament pattern, except for leg 1 exopod (Figs. 4C-E, 5D). Legs 3 and 4 slightly larger than 1 and 2; exopods longer than endopods in all cases. Coxae of each pair unarmed, joined by intercoxal sclerite as long as wide. Basis separated from coxa posteriorly by diagonal articulation. Outer margin of basis of swimming legs 1, 2 and 4 with a small, thin seta; seta on leg 3 *ca.* 2.3 times larger than in the other legs, lightly setulated (Fig. 4E). Outer distal corner of first and third exopodal segments of legs 1-4 each with short spine about 60% the length of bearing segment. All natatory setae lightly and biserially plumose except for seta on outer distal corner of third exopodal segments of legs 1-4, being plumose along inner side, but bearing row of small denticles along outer margin. Armament formula of swimming legs as:

	Basis	Exopod	Endopod
Leg 1	0-1	I-0;0-1;I,2,2	0-1;0-1;1,2,2
Legs 2-4	0-1	I-0;0-1;I,2,3	0-1;0-1;1,2,2

Fifth leg absent. Genital complex robust, with a wide cilindrical base. Terminal portion with two branches, both with denticulated posterior margin, moderately divergent, with moderately swollen outer margins. Lappets conjoined at base, with medial notch (Fig. 5E). Lappets almost reaching distal end of succeeding somite (Fig. 4B).

Urosome consisting of five somites: fifth pedigerous (with

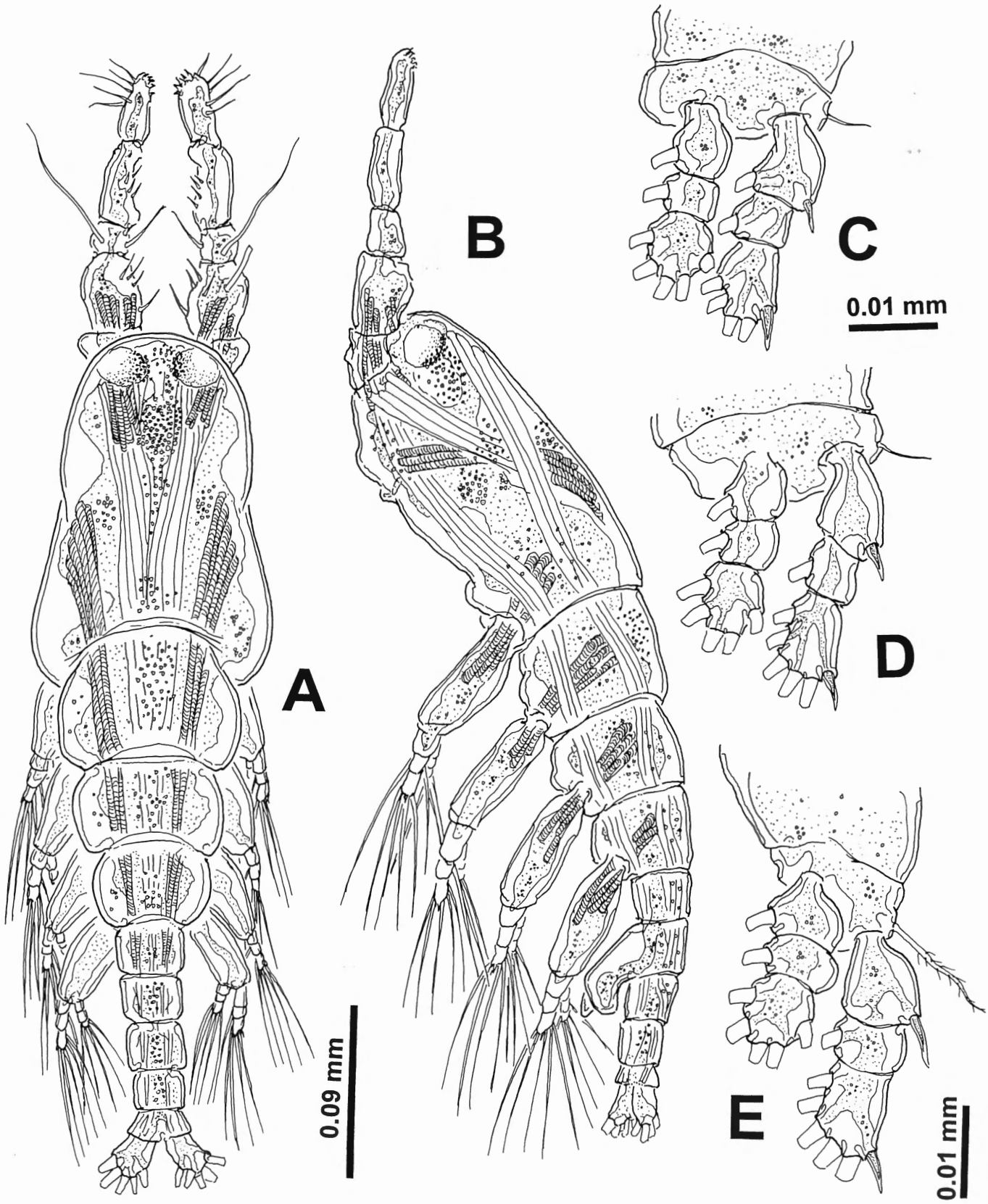

Fig. 4. – *Monstrilla pygmaea* n.sp. Toulon Bay. Adult male holotype. A. Habitus, dorsal view; B. same, lateral view; C. leg 1; D. leg 2; E. leg 3.

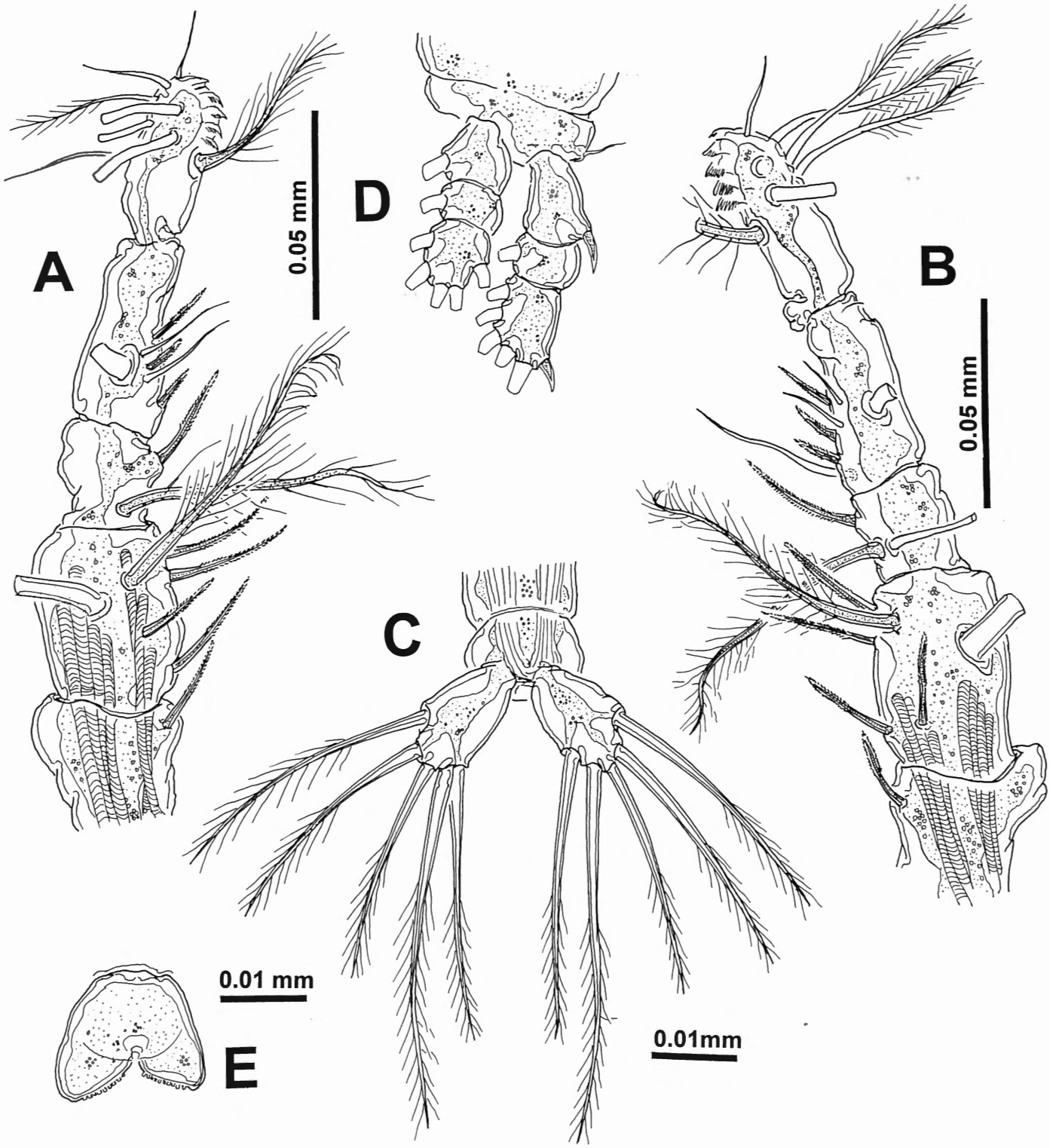

Fig. 5. – *Monstrilla pygmaea* n.sp. Toulon Bay. Adult male holotype. A. Left antennule, dorsal view; B. right antennule, dorsal view; C. furcal rami, dorsal view; D. leg 4; E. terminal portion of genital lappets, anterior view.

no appendages), genital (with genital complex) and three free somites. From dorsal view, genital somite about as long as each preanal urosomites. Anal somite being shortest of urosome. Ratio of lengths of genital somite and three free posterior somites being: 31.8: 27.4: 27.5: 12.3 = 100 (Figs. 4A,B).

Furcal rami nearly subtriangular, with terminal margin almost 60% wider than proximal. Approximately 1.3 times longer than wide, with three well developed terminal setae, plus an additional one on distal inner margin, and another on outer margin. Innermost terminal setae about 30% longer than the others; inner subterminal seta shortest (Fig. 5C).

Female unknown.

Remarks: This new species is very closely related to *M.*

helgolandica CLAUS, 1863, and to *M. serricornis* SARS, 1921. The main resemblance among these three species is the presence of a peculiar cuticular process on the inner part of the terminal antennular segment. This process is represented by several rows of minute spines or setules. The general structure of the genital lappets is also similar in the three species considered. However, a close analysis of these characters allows recognition of different species; the taxonomical relevance of the genital lappets on male monstrilloids has been stressed by MCALICE (1985), and has been recognized in several studies (SUÁREZ-MORALES, 1993, 1999; SUÁREZ-MORALES & RICCARDI, 1997). Males of *M. serricornis* show genital lappets with a smooth, medially protruding, rounded posterior margin (SARS, 1921; MCALICE, 1985), whereas this structure is always denticulated in *M. helgolandica* (MCALICE, 1985) and with a deep medial notch between the arms, as it is in the new species. However, in *M. pygmaea* the outer edge of the genital lappets is continuous, swollen, slightly rounded all along, without medial constrictions as those depicted for *M. helgolandica* by MCALICE (1985). Another difference of *M. pygmaea* with respect to the other two species is the structure and arrangement of the antennular process. It is formed by 5 tranverse rows of tightly arranged minute spines decreasing in size towards the external margin (Fig. 5A). The distalmost group is more consolidated and short, with only 2-3 spinules, the number growing progressively in the more posterior processes, up to 8-9 spinules. The ornamentation extends less than half the way around the segment, the distalmost row being the shortest. The arrangement of this process is quite different in *M. helgolandica*, in which it is a long row of setules of the same size surrounding all the distal portion of the antennular segment (see MCALICE, 1985, Fig. 1,2A). When compared with *M. helgolandica, Monstrilla* spec. depicted by HUYS & BOXSHALL (1991, Fig. 2.5.6A-C) has a similar pattern, which is also different from that described for *M. pygmaea*. For *M. serricornis*, the antennular processes were described by SARS (1921) as knife-shaped with 5 small recurved denticles, without further details. SARS' illustrations show a group of solid spines. Specimens upon which this description was made were reviewed later on by MCALICE (1985) who stated that the antennule denticles are in fact composed of short rows of very fine spines, which was evident at high magnification only. He recognized the differences of the arrangement and structure of this process as a key character to separate *M. helgolandica* from *M. serricornis*. The new species shows the same type of process as described for *M. serricornis* although MCALICE (1985) did not mention how extended these rows are around the segment. Hence, the new species shows a unique combination of features, genital lappets with a denticulated distal end, resembling *M. helgolandica*, and antennular ornamentation as in *M. serricornis*. There are some other differences among the three species, the antennules are relatively longer in *M. pygmaea* (40.6% of total body length) than they are in *M. helgolandica* (25-33%) (MCALICE, 1985), and in *M. serricornis* (30%)(Sars, 1921). The proportions of the antennular segments show some differences mainly between *M. pygmaea* and *M. serricornis* (see Table 1). The dorsal width of the antennules is different in the three species. In *M. helgolandica*, the distance between the antennule bases is equal to 2.3 times the width of the second segment, whereas this figure is 1.3 in *M. serricornis*, and barely 0.9 in *M. pygmaea*, whose antennules are clearly more robust than in the other two species. The antennular setation pattern has not been described in detail previously for *M. helgolandica* or *M. serricornis*; the setation pattern of *Monstrilla* spec. (HUYS & BOXSHALL, 1991) is quite similar to that found in the new species and has probably the same basic structure than that present in the other two species. However, the most striking difference of *M. pygmaea* is its size (0.43 mm), which is more than 3.7 times smaller than the average size reported for the males of *M. helgolandica* from various localities (GALLIEN, 1934; MCALICE, 1985), and more than 4 times smaller than the specimens of *M. serricornis* described by SARS (1921) (1.75 mm) from Norway. The size of the antennule of *M. pygmaea* was compared with that of *Monstrilla* spec. illustrated by HUYS & BOXSHALL (1991), the former measured 0.19 mm, while the latter is about 0.54 mm long, that is, almost 3 times larger than in the new species. The new species is the smallest monstrilloid copepod ever recorded, followed by *M. minuta* ISAAC, 1975 with a length of 0.49 mm (ISAAC, 1974a, 1975). Collection of this small forms is probably related to the use of finer meshes during zooplankton sampling as was used in Toulon Bay (0.09 mm).

Table 1.

Morphometric comparison of antennules of males of *M. helgolandica* (data from McAlice, 1985), *M. serricornis* (data from Sars, 1921 and McAlice, 1985), and *M. pygmaea*.
Segments 2-4 as percentage of terminal (Term.) segment length

	Term.	4	3	2
M. helgolandica	100	89-143	52-91	85-143
M. serricornis	100	134	54	87
M. pygmaea	100	112	62	106

The female of *M. pygmaea* remains unknown. The female is probably also closely related to *M. helgolandica*, but it might be long before the two sexes of this species can be found or linked. For instance, the male of *M. helgolandica* remained unknown for more than a century. There was an attempt of ISAAC (1974, 1975) to designate the male of *M. serricornis* as the male of *M. helgolandica*, but without sound bases. Later on, MCALICE (1985), based on the analysis of the males of the males of the two species, assigned the males of *M. canadensis* MCMURRICH, 1917, not *M. serricornis*, to *M. helgolandica*.

Cymbasoma tenue (ISAAC, 1975)

Material: one adult male, undissected, ethanol preserved. Toulon Bay, July 4, 1996. ECO-CHZ-00513.
Comments:
This species was redescribed recently by SUÁREZ-MORALES & RICCARDI (1997) from material collected in the bay of

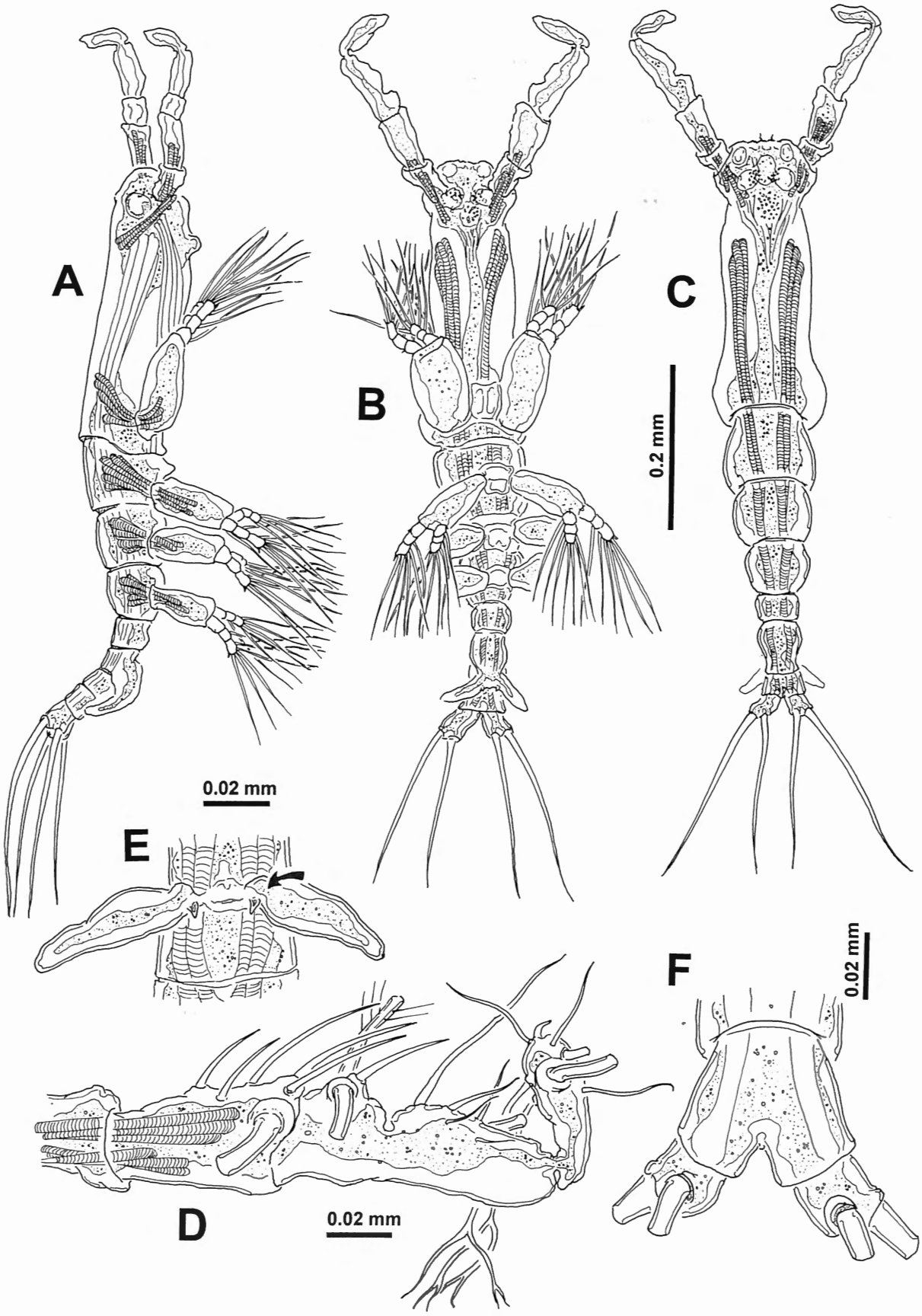

Fig. 6. – *Cymbasoma tenue* (ISAAC). Toulon Bay. Adult male. A. Habitus, lateral view; B. same, ventral view; C. same, dorsal view; D. right antennule, dorsal view; E. genital lappets, ventral view, showing basal denticles (arrowed).

Toulon. However, the specimen analyzed herein shows some differences which show additional variation in this species. The general body proportions and shape are as described by SUÁREZ-MORALES & RICCARDI (1997); however, the forehead in this specimen (Figs. 6B,C) is noticeably lower than in the redescription, but it has the same type of cuticular corrugation. In both cases, the head abruptly broadens anterior to the oral papilla (Figs. 6B,C), although this is more evident in the specimens upon which this species was redescribed. The cuticular protuberances on the cephalothorax, the location of the oral papilla, the armature of the antennules (Fig. 6D) are the same in both cases. Most importantly, the species is recognized by the structure of its genital lappets, one of the most relevant characters to identify male monstrilloids (MCALICE, 1985; SUÁREZ-MORALES, 1999). *Cymbasoma tenuis* has a characteristic pair of sharp denticles on the bases of the genital lappets. These denticles are clearly present in the studied specimen (Fig. 6E). One of the main differences between this individual and those redescribed from the same locality, is the presence of only two furcal setae (Fig. 6F) instead of three, as is commonly found in this genus. The presence of only two setae has not been recorded previously in monstrilloid copepods. The number of setae has been used as a secondary characters to identify monstrilloid species (ISAAC, 1975; SUÁREZ-MORALES, 1999). There is variation of this character in *Monstrilla*, but the only genus with three furcal setae is *Cymbasoma*; hence, this should then be modified to three or two.

Finally, the length range described for this species (1.1-1.15) is widened to 0.66-1.15 mm. Size variation within a species may result from the size of the host and the number of individuals within the host, as was suggested by GALLIEN (1934).

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