

## Taxonomic report on a collection of monstrilloids (Copepoda: Monstrilloida) from Banco Chinchorro, Mexico with description of a new species

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**Resumen.** Durante una serie de estudios del zooplancton realizados en 1996, 1999 y 2000 en Banco Chinchorro, Quintana Roo, México, se recolectaron varios copépodos monstrilloides. El análisis sistemático de este grupo de especímenes permitió la identificación de cuatro especies de *Monstrilla* y una de *Cymbasoma*. La primera es *M. careli*, recientemente descrita de Brasil; se presenta una descripción complementaria y comparativa de los especímenes mexicanos. La segunda es una especie nueva de este género; es muy similar a *M. careli* de la que difiere básicamente por la estructura de la quinta pata; esta especie está descrita siguiendo los estándares actuales. La tercera especie es *M. elongata*, de la que se reportan machos y hembras y se amplía su descripción. Se asignan a esta especie los machos antes reconocidos como pertenecientes a *M. mariaeugeniae* con base en caracteres morfológicos compartidos por ambos sexos. El macho de esta especie tiene un proceso espiniforme nunca antes descrito en el grupo. La cuarta especie es *M. mariaeugeniae*, conocida en la costa oriental de la Península de Yucatán y se registra por vez primera en Banco Chinchorro. La especie de *Cymbasoma* es *C. quintanarooense*, ya conocida en las costas de Quintana Roo, México. Este reporte taxonómico incrementa a ocho el número de especies de Monstrilloida reconocidas para Banco Chinchorro.

Palabras clave: arrecife, zooplancton, copépodos, taxonomía de crustáceos, mar Caribe.

**Abstract.** During a series of zooplankton surveys carried out in 1996, 1999, and 2000 in Banco Chinchorro, Quintana Roo, Mexico, several monstrilloid copepods were collected. Systematic analysis of this set of specimens allowed the identification of four species of *Monstrilla* and one of *Cymbasoma*. The first is *M. careli*, recently described from Brazil; an expanded and comparative description based on this new collection from the western Caribbean Sea is

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presented herein. The second is assignable to a new species, quite similar to *M. careli* but differing mainly in the structure of the fifth legs; a complete description of this species is made following current upgraded standards. The third species is *M. elongata*, of which males and females are reported and described from Banco Chinchorro. The male of *Monstrilla elongata* is recognized herein as that previously assigned to *M. mariaeugeniae* based on characters shared by both sexes. The male of this species has an inner basipodal spiniform process not previously known in the group. The fourth *Monstrilla* is *M. mariaeugeniae*, known from the eastern coast of the Yucatan Peninsula, and is reported here in Chinchorro. The species of *Cymbasoma* is *C. quintanarooense*, also known from the coast of Quintana Roo, Mexico. This report increases to eight the number of species known from Banco Chinchorro.

Key-words: reef zooplankton, copepods, crustacean taxonomy, Caribbean Sea.

## Introduction

Monstrilloid copepods are semiparasitic forms. They are parasites of benthic polychaetes and molluscs and their most conspicuous stage is the adult, which is planktonic and free-living (Davis 1984). Much is still unknown about their taxonomy and biology (Huys & Boxshall 1991; Grygier 1994). One of the main taxonomical problems in this order of the Copepoda is that males and females of a given species cannot be easily linked. This situation has led to taxonomical confusion (see McAlice 1985). Another problem is the fact that several species have been described very briefly; most have to be redescribed according to new, more detailed standards (Grygier 1994a; Grygier & Ohtsuka 1995). Therefore, accurate identification of this group is essential in order to advance in the understanding of their ecology and distributional patterns. Monstrilloids are particularly rich and abundant in coastal and reef-related areas. In this work I present the second taxonomic report (after Suárez-Morales, in press) of the monstrilloid copepods collected during three zooplankton surveys (September 1996 and 1999; March 2000) in several sites of the Banco Chinchorro atoll, in the westernmost part of the Caribbean Sea. The first survey yielded three species of Monstrilloida of which two are new. In this additional report on the monstrilloids from Banco Chinchorro, taxonomic considerations are made for the species recorded, emphasizing those needing full or complementary description and/or illustration.

## Methods

A zooplankton sampling program was carried out during September 1999 (sta. 1-13) and March, 2000 (sta. 14-19) in Banco Chinchorro, an oceanic atoll off the southern coast of the Mexican Caribbean. Stations were located in both the fore-reef (sta. 1, 3, 4, 6, 7, 13, 18) and the reef lagoon (sta. 2, 5, 8, 11, 15, 16, 17, 19). Most sampling was made during the nighttime; some reef-lagoon samples and one fore-reef sample were collected during the day. Zooplankton was collected by surface hauls (0-5 m) using a square-mouthed (0.45 m per side) standard plankton net (0.33 mm mesh-size). A digital flowmeter was attached to the net mouth to estimate the volume of water filtered. The mean amount of water filtered during each trawl was 160 m<sup>3</sup>. Zooplankton samples were fixed and preserved in buffered 4 % formaldehyde solution (Smith & Richardson 1979). Monstrilloids were sorted from the entire sample and then transferred to 70% ethanol for preservation. The taxonomic analysis was performed after preparing the specimens with a 50%-50% glycerine-water solution. The specimens were deposited in the collection of zooplankton (ECO-CHZ) of El Colegio de la Frontera Sur, Chetumal, Q. Roo, Mexico.

## Systematics

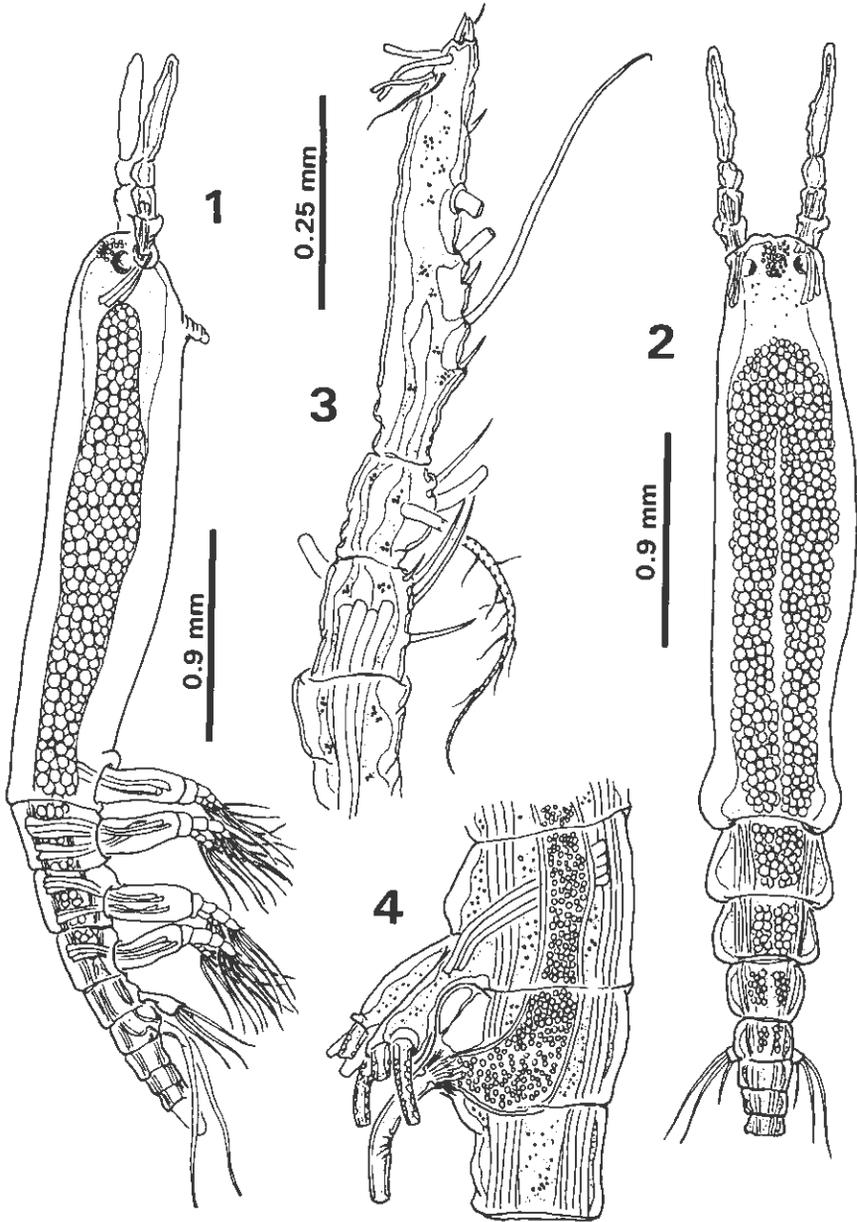
### Order MONSTRILLOIDA

#### *Monstrilla careli* Suárez-Morales & Dias

(Figs. 1-10)

*Material examined.* Two adult females, ethanol-preserved, undissected. Plankton sample, Banco Chinchorro. One specimen collected March 28, 2000, 18°43'51"N, 87°24'22"W. Catalogue number: ECO-CHZ-01134. Other specimens collected September 2, 1999, same site (21:45 h), ECO-CHZ-01140.

*Description of Mexican specimens;* adult female. Total body lengths of two female individuals 3.5 and 3.9 mm, measured in dorsal view from anterior end of cephalic somite to posterior margin of anal somite. Cephalothorax (incorporating first pedigerous somite) accounting for 63.7% of total body length. Forehead almost flat in dorsal view, with small protuberances, and with pair of short, slender sensilla (Fig. 10). Anteriormost part of cephalothorax not protuberant in ventral view (Fig. 1); with two pairs of nipple-like cuticular processes, one (1n in Fig. 8) surrounded by a field of short curved ridges. Other pair (2n in Fig. 8) near oral papilla, represented by single circular process with no surrounding structure (Fig. 8). Oral papilla protuberant, located near anteriormost part of body, lying midventrally 0.11 of distance posteriorly along cephalothorax (Fig. 1). Nauplius eye present, weakly developed, ocelli moderately pigmented on outer side, with rounded shape, eyes separated by distance equal to slightly less than two eye



Figs. 1-4. *Monstrilla careli* Suárez-Morales & Dias adult female from Banco Chinchorro, Mexico. 1, habitus, lateral; 2, habitus, dorsal; 3, left antennule, dorsal view; 4, fifth pedigerous and genital double somites showing fifth leg and base of ovigerous spines, lateral.

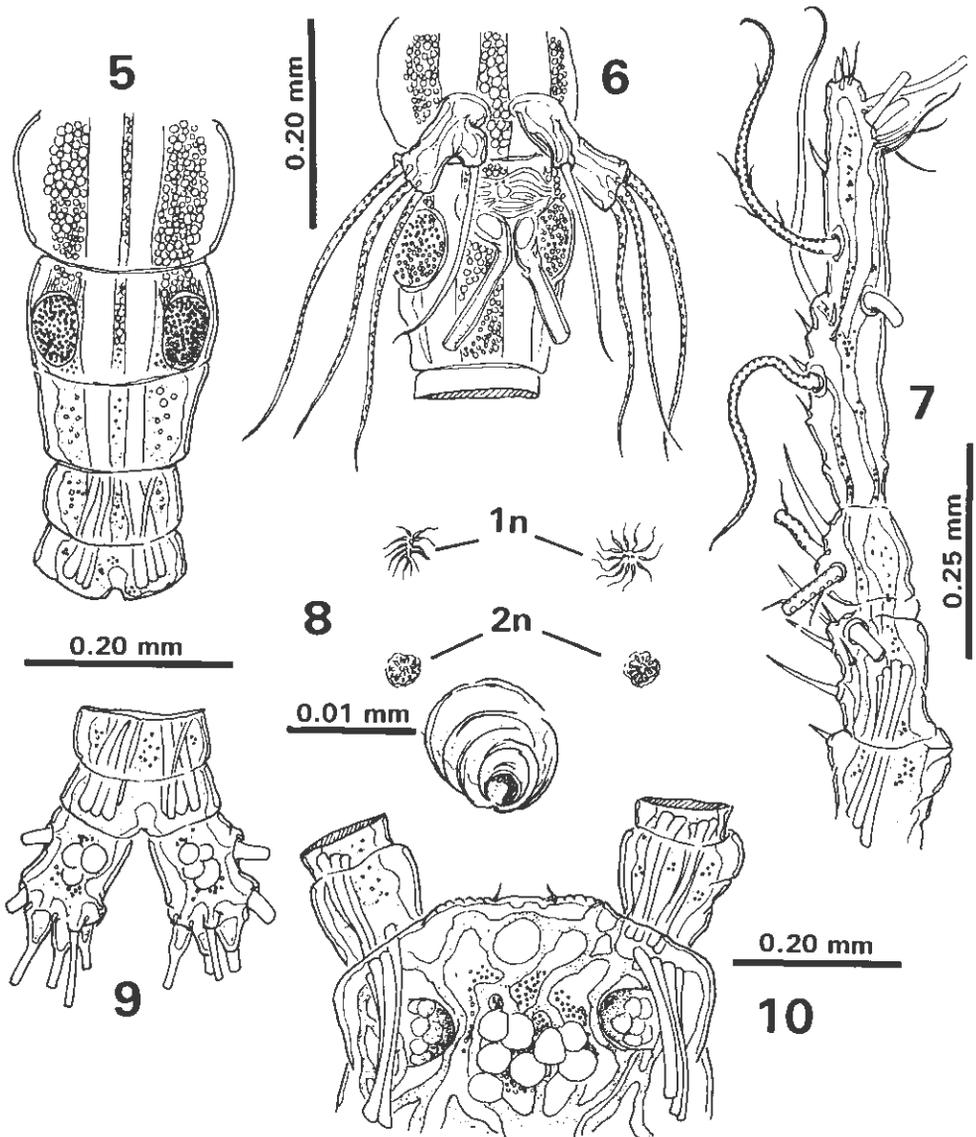
diameters. Cuticular ornamentation on cephalothorax represented by faint reticulation on proximal 1/3 of dorsal and ventral surfaces (not illustrated). Antennules four-segmented (Figs. 3, 7). Antennules relatively long, slender, slightly longer than 22% of total body length, and about 35% length of cephalothorax. In terms of setation pattern and nomenclature proposed by Grygier & Ohtsuka (1995) for monstrellid antennular armature, setae and spines on first (1), second (2d<sub>1,2</sub>, 2v<sub>1,3</sub>, IIId), and third (3, IIIv, IIId) segments, complete. Fourth segment with: 4v<sub>1,3</sub>, IVd, 4d<sub>1,2</sub>, Vm, Vd, Vv, 5, 6<sub>1,2</sub>, 6aes, b<sub>1,6</sub>; elements missing: 4aes. Setae b<sub>1,3</sub> unbranched. Ratios of length of antennule segments: 12.4: 18.4: 13.6: 55.4= 100. Antennule length between 0.8 and 0.9 mm.

Urosome consisting of fifth pedigerous somite, genital double somite, and two free abdominal somites (Fig. 5). Urosome, excluding furcal rami, accounting for 15.7% of total body length. Genital double somite with partial intersegmental division, visible in dorsal view and reaching around about midlength of somite. Double somite representing almost half length of urosome (Figs. 2, 5). Medial anterior ventral portion of genital double somite swollen (Fig. 4). Posterior section bearing ovigerous spines, these basally separated, not swollen but slender distally; length of ovigerous spines representing about 20.4% of total body length, extending beyond distal margin of anal somite. Caudal rami two times longer than wide, moderately divergent, bearing six setae including two outer, three terminal, and one dorsal seta (Fig. 9).

*Male.* Unknown.

*Remarks.* This species was described from specimens collected in the State of Rio de Janeiro, Brazil (Suárez-Morales & Dias in press). Hence, this is a complementary description emphasizing the morphological differences between both groups of specimens. The species is placed in the genus *Monstrilla* because of the presence of two postgenital somites (Isaac 1975) and more than four furcal setae. *Monstrilla careli* can be easily distinguished by a unique combination of characters. The main character is its body proportion, *i.e.*, it has a very long cephalothorax, representing about 64% of the entire body length. Other species of *Monstrilla* with relatively long cephalothorax (over 52% of total body length) are *M. longicornis* Thompson 1890 (53.8%), *M. longiremis* Giesbrecht 1892 (57.5%), *M. leucopsis* Sars, 1921 (57.4%), and *M. elongata* Suárez-Morales 1994a (71.4%). The cephalothorax/antennule proportion differs in these species: 1.18 (*M. longicornis*), 0.98-1.1 (*M. longiremis*), 1.5 (*M. leucopsis*), 2.4 (*M. elongata*), and 2.5-2.9 (*M. careli*) (Giesbrecht 1892; Sars 1921; Suárez-Morales & Dias in press).

The most important difference of this species with respect to other *Monstrilla* is the extremely long terminal segment of the antennule, which is more than half the length of this appendage. In other similar species, such as *M. longicornis*, *M. elongata*, *M. leucopsis*, *M. longiremis*, and even in *M. grandis* Giesbrecht 1891, all but



Figs. 5-10. *Monstrilla careli* Suárez-Morales & Dias adult female from Banco Chinchorro. 5, urosome, dorsal, caudal rami not shown; 6, fifth pedigerous and genital double somites showing fifth legs and base of ovigerous spines, ventral; 7, right antennule, dorsal; 8, cuticular ornamentation around the oral papilla, ventral; 9, caudal rami, dorsal; 10, head, dorsal.

the first or second segments are fused (see Giesbrecht 1892; Sars 1921; Isaac 1975). In females of *M. helgolandica* Claus 1863, *M. gracilicauda* Giesbrecht 1892, *M. rebis* (Suárez-Morales 1993), and *M. scotti* Isaac 1975, the distalmost segment is clearly longer than the others, representing 39.6%, 47.7%, 51%, and 48% of the antennule length, respectively. In *M. careli* the corresponding figure is between 55-56.6% in the type material (Brazil) and 54-54.5% in the Mexican (Banco Chinchorro) specimens. This feature alone seems to be strong enough to separate this species from its congeners. The armature of the antennules is much alike in both groups of specimens (Brazil and Mexico), and in both cases the antennular elements are complete, only aesthetasc 4aes is missing in both groups. Spiniform setae  $2v_1$ ,  $2v_2$ , and  $2v_3$  are relatively longer in the Brazilian specimens than in those collected in Banco Chinchorro.

The fifth leg of the Mexican material differs slightly from the pattern shown by the Brazilian specimens. In the former, the main lobe is slenderer than in the type specimens. The seta on the inner lobe is relatively longer in the Brazilian specimens, reaching well beyond the posterior margin of the genital somite. In the Mexican specimens this seta does not reach the posterior margin of the genital double somite. In the Mexican specimens the basal area at which the ovigerous spines are inserted shows an ornamentation pattern (see Fig. 6) not found in the Brazilian material, which has a semicircular structure at the base of the spines. However, the differences between the Mexican and the Brazilian specimens are slight; both groups share a similar morphology of the main taxonomic characters currently used in the taxonomy of these copepods. Hence, both groups of specimens are assignable to the same species.

This report represents a significant latitudinal expansion of the distribution of this species, from 22°S to the northwestern Atlantic (18°N). It is expected that the distribution of this species will include the western Caribbean, Central America, and northern South America.

*Monstrilla careloides* sp. nov.

(Figs. 11-16)

*Material examined.* Holotype adult female, undissected, ethanol-preserved. Banco Chinchorro, QUINTANA ROO, MEXICO, 18°34'07" N, 87°22'47" W (sta.5), March 29, 2000, ECO-CHZ -01131.

*Description, female holotype.* Body length 3.6 mm. Cephalothorax about 63.4 % of total body length (Figs. 11, 12). Oral papilla slightly protuberant, located at about 0.15 of distance posteriorly along ventral surface of cephalothorax (Fig. 12). Anteriormost cephalic region relatively broad near insertion of antennular bases. Middle part of cephalothorax slightly expanded, tapering posteriorly. Dorsal ocelli present, strongly pigmented only at inner margins. Pigment cups separated by distance of about 1.7 ocelli diameters, rounded in dorsal view. Cephalic region

flat in dorsal view, with low cuticular protuberances on forehead between antennule bases. Three pairs of strongly chitinized, nipple-like cuticular processes located ventrally anterior to oral papilla (Fig. 12).

Antennules moderately long, with four apparent segments, intersegmental division between putative segments 3-4 marked only by a constriction. Antennular length 0.61 mm, representing 15.8 % of total body length, and 25 % as long as cephalothorax. Length ratio of antennular segments, from proximalmost to distalmost: 23.6: 14.2: 10.5: 52.7 (includes fused third and fourth segments)(Figs. 13, 14). In terms of the basic setal nomenclature of Grygier & Ohtsuka (1995) for female monstrilloid copepod antennules, elements on second ( $2d_2$ ,  $2v_{1,3}$ , IIId) and third (3, IIIv, IIIId) segments present. In purported fourth and fifth fused segments, elements  $4v_{1,3}$ ,  $4d_2$ ,  $4aes$ , IVd, Vv,  $b_{1,3}$ ,  $6aes$ ,  $6_1$ , and  $6_2$  present. Elements IVv,  $4d_1$ ,  $b_{4,6}$ , and Vd missing.

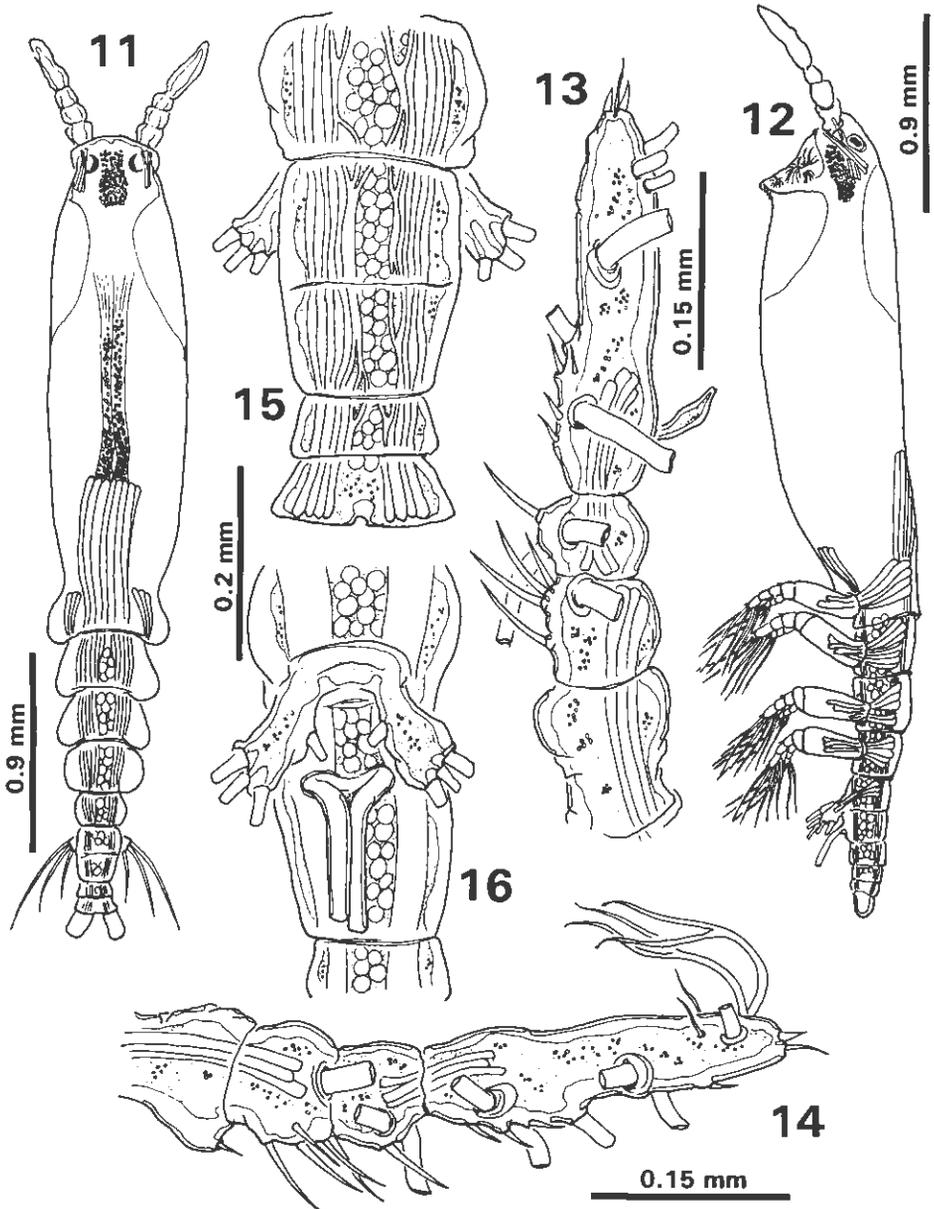
First pedigerous thoracic somite incorporated into cephalothorax. First pediger and three free succeeding pedigers each bearing pair of biramous swimming legs. Intercoxal sclerite on legs 1-4 rectangular. Basis with diagonal division articulating it with large, rectangular coxa. Basis with lateral hair-like seta on legs 1-4; on leg 3 seta at least 2.5 times longer and noticeably thicker than in other setae, not setulated. Natatory legs setae all sparsely and biserially plumose. Endopodites and exopodites of legs 1-4, triarticulate. Setae armed with small spines along outer margin; inner margin sparsely plumose. Armature of swimming legs:

	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 leg formed by single lobe. Lobe bearing three terminal setae, plus fourth seta on proximal 1/3 of inner margin (Fig. 16). Urosome comprised by fifth pedigerous, genital double somite plus two free somites. Genital double somite representing 46% of urosome, with incomplete dorsal suture (Fig. 15). Furcal rami subrectangular, with six setae.

*Etymology.* The name of this new species was formed using the specific name of the morphologically closest species (*M. careli*). The *oides* Greek terminal particle (derived from *eidōs*, form) meaning like, resembling, having the form of, was added to this name to mark the similarity of these two species.

*Remarks.* This female specimen was identified as a species of *Monstrilla* by the presence of two somites between the caudal rami and the genital double somite (Isaac 1975). It is considered to belong to a new species because of its unique combination of characters, mainly including the relatively long cephalothorax,



Figs. 11-16. *Monstrilla careloides* sp. nov. adult female from Banco Chinchorro. 11, habitus, dorsal; 12, habitus, lateral; 13, left antennule, dorsal; 14, right antennule, dorsal; 15, urosome, dorsal, caudal rami not shown; 16, fifth pedigerous and genital double somites, ventral.

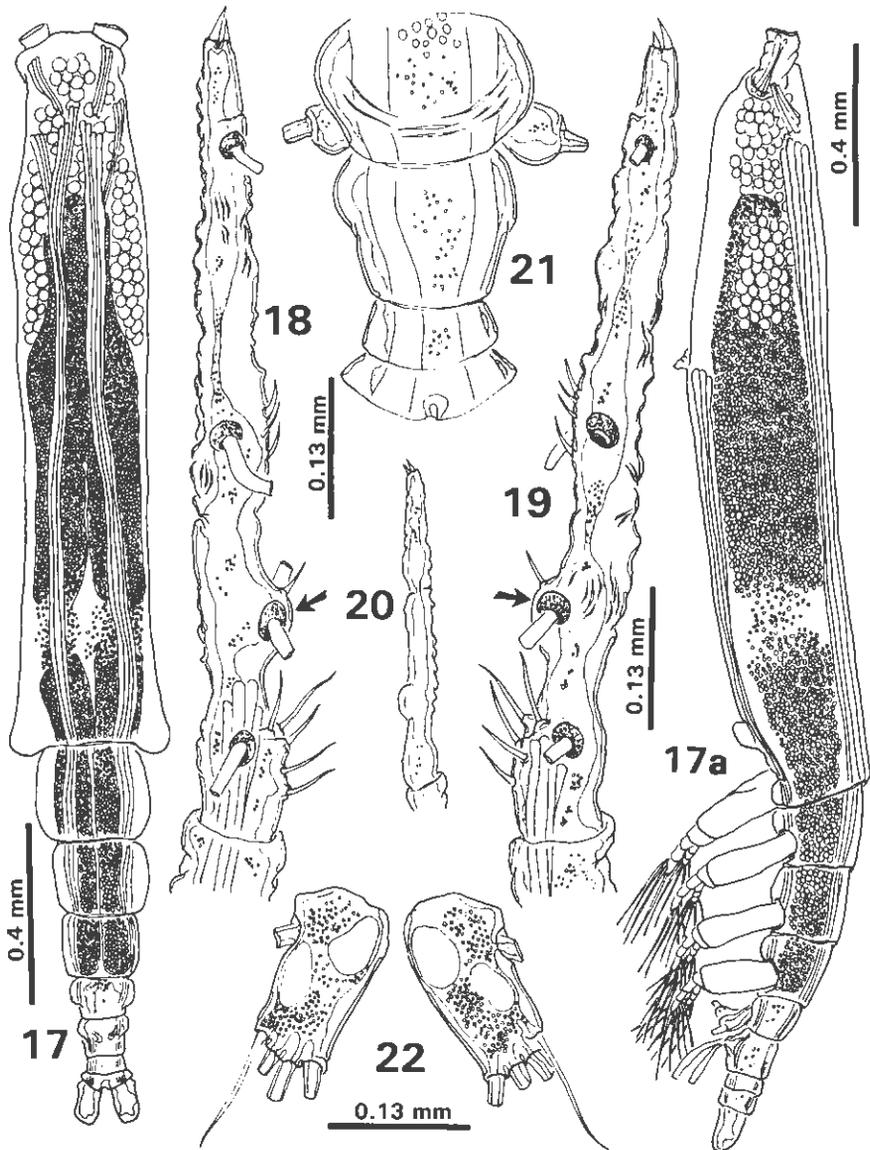
the relatively long terminal segment of the antennule, and the fifth leg with a single, unbranched lobe armed with four setae.

This species is very similar to *M. careli* from Mexico and from Brazil; in these two groups of specimens, the cephalothorax represents between 64 and 65% of the total body length. In this new species, the cephalothorax comprises up to 63%, that is, below the value assigned for *M. careli*. Furthermore, the antennules are clearly narrower in *M. careli* (see Figs. 3,7) than in the new species (see Fig. 13). The new species differs also in the antennular proportions; the antennules are relatively longer in both Mexico and Brazil specimens, representing 22% and 25.3% of the total body length, respectively, whereas this proportion is barely 15.8% in the new species. Moreover, the antennule relative length with respect to the cephalothorax is between 35 and 38% in the Mexican and Brazilian *M. careli* and is only 25% in *M. careloides*. Details of the antennular armature show some differences as well: in general, setae and spines are relatively longer in *M. careli* (mainly of elements  $2v_{1,3}$ ,  $2d_{1,2}$ ; IIIv, III d) than they are in the new species (see Figs. 3 and 13). Setae  $b_{4,6}$  are clearly present in *M. careli*, but absent in the new species. In *M. careloides* aesthetasc 4aes is present, but is absent in *M. careli*. The other character marked as relevant for both *M. careli* and *M. careloides* is the proportional length of the terminal segment of the antennules. The figures for the Brazilian (55-56%) and for the Mexican (54-54.5%) specimens of *M. careli*, both over 54%, differ from the proportion measured for this new species (52%). In another regional species with a relatively long terminal antennular segment, *M. rebis* Suárez-Morales 1993, this segment represents 48% of the antennule length. This value is slightly below that recorded for the new species; however, both species differ clearly in the structure of the fifth legs: *M. rebis* has two lobes with two terminal setae on each (Suárez-Morales 1993), thus differing from the pattern shown by the new species.

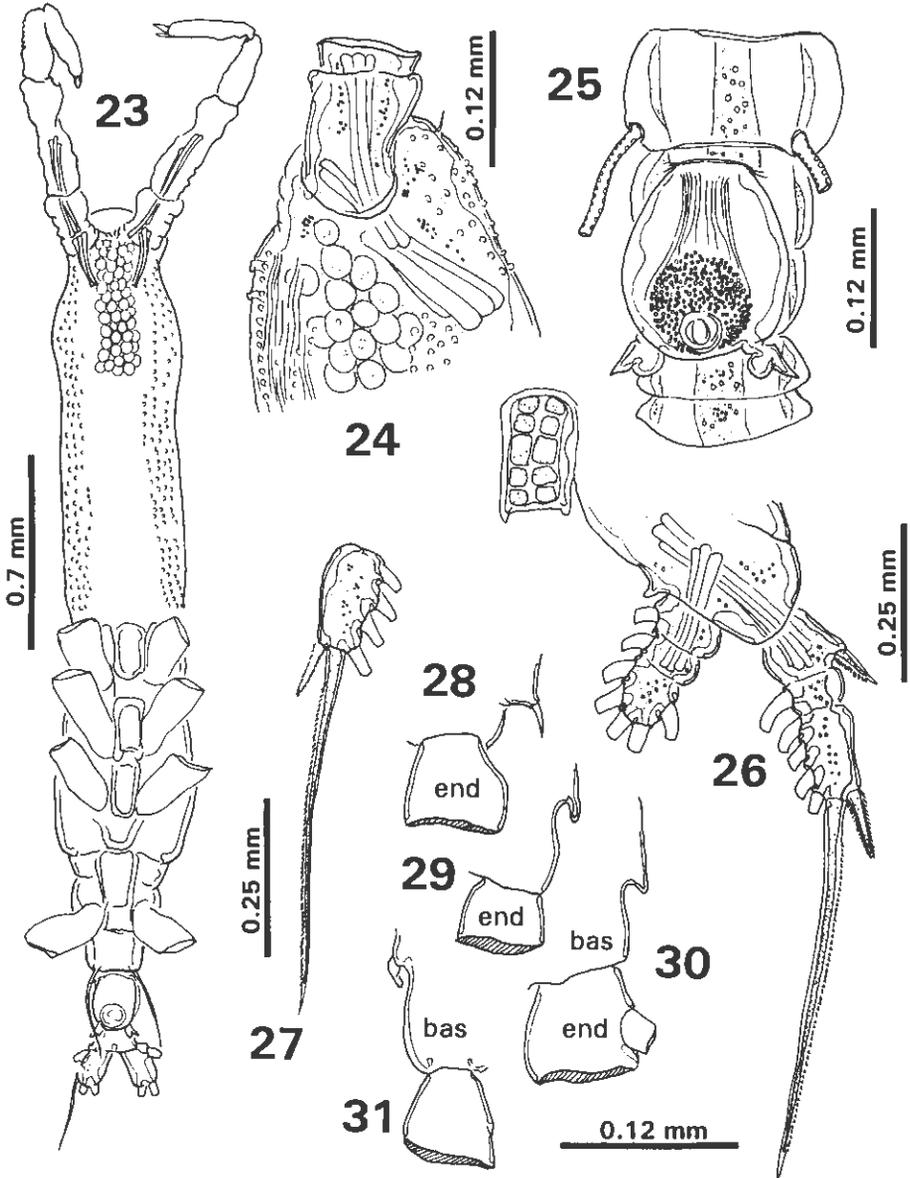
The structure of the fifth leg is one of the most relevant characters used to separate species of *Monstrilla* (Isaac 1975; Suárez-Morales 2000). The fifth leg structure, with a single lobe armed with three terminal and one (smaller) inner setae, differs sharply from the *M. careli* pattern, with a main lobe armed with three terminal setae, and an inner, smaller well-defined lobe armed with a single seta.

The two groups of *M. careli* and the new species show the same general type of ovigerous spines, but differ in the basal ornamentation, with striations and a wide base in the Mexican specimens, with a wide base in the type material from Brazil, and without a defined base in the new species. The three groups of specimens share the incomplete dorsal intersegmental division of the genital double somite (see Figs. 4,5,15), as described by Suárez-Morales & Dias (in press) for *M. careli*.

Some additional morphological differences between *M. careli* and the new species from Banco Chinchorro include the structure of the anteriormost part of



Figs. 17-22. *Monstrilla elongata* Suárez-Morales 1994. adult female from Banco Chinchorro. 17, habitus, dorsal, antennules cut short; 17a, habitus, lateral; 18, left antennule, dorsal, arrow showing middle "haired" basal plate; 19, right antennule, dorsal, arrow showing middle "haired" basal plate; 20, right antennule in proportion to figures 17 and 17a. anterior part of cephalothorax and head, ventral; 21, urosome, dorsal; 22, caudal rami, dorsal.



Figs. 23-31. *Monstrilla elongata* Suárez-Morales 1994, adult male from Banco Chinchorro. 23, habitus, ventral; 24, head and antennule bases, lateral; 25, genital complex, ventral; 26, right fourth swimming leg, anterior view, showing intercoxal sclerite and setation pattern; 27, terminal exopodal segment of second swimming leg; 28, first endopodal segment and basipodite of first swimming leg; 29, same of right second leg; 30, same of third leg; 31, same of left second leg.

the head; it is completely flat in *M. careloides*, but has low protuberances in *M. careli* from both Mexico and Brazil. The cephalothorax is formed differently in both species, being slenderer in *M. careli* (particularly in lateral view) (see Fig. 1) than it is in the new species, in which the cephalothorax appears robust and ventrally expanded (see Fig. 12). The anterior profile of the cephalothorax of *M. careloides*, with an anteriorly projected oral papilla area and three pairs of cuticular nipples, differs from the non-projected condition and the two nipple pairs in *M. careli* (Suárez-Morales & Dias in press).

There is no difference in the size of specimens of the three groups: 3.3-3.7 mm in *M. careli* from Brazil (type specimens) and 3.5-3.9 mm in the Mexican specimens, vs 3.6 mm in the new species. Moreover, the oral papilla is protuberant and located at about the same position in the three groups of specimens.

Even considering the general resemblance between *M. careli* and *M. careloides*, it is not difficult at this stage of our taxonomic knowledge of the local fauna and of the genus to assign this specimen to a new taxon based on the differences found in structures with high taxonomical value. There are examples of species which closely resemble other common forms and have turned out to be undescribed taxa (see Suárez-Morales 2000a). It is probable that when more material of this new species from Banco Chinchorro is available, these differences could be better evaluated.

*Monstrilla elongata* Suárez-Morales 1994  
(Figs. 17-36)

*Material examined.* Holotype female, Puerto Morelos, QUINTANA ROO, MEXICO, deposited in the National Museum of Natural History, Smithsonian Institution, USNM-259488. One adult male, Banco Chinchorro, 18°34'07" N, 87°22'47" W (sta. 5), March 29, 2000, ECO-CHZ-01146. One adult male, Banco Chinchorro, 18°42'54" N, 87°22'07" W (sta. 14) (23:10 h), March 28, 2000, ECO-CHZ-01139. One adult male, Banco Chinchorro, Cayo Centro, September 23, 1996, ECO-CHZ-01137. Four adult males, Banco Chinchorro, 18°38'00" N, 87°18'05" W (sta. 15) (20:45 h), March 28, 2000, ECO-CHZ-01133. Two adult males, Banco Chinchorro, 18°34'07" N, 87°22'47" W (sta. 5), March 29, 2000, ECO-CHZ-01145. Four adult males, Banco Chinchorro, 18°40'48" N, 87°19'03" W (sta. 2), March 28, 2000, ECO-CHZ-1130. Two adult females, Banco Chinchorro, sta. 15, March 28, 2000, ECO-CHZ-01143. Five adult females, Banco Chinchorro, sta. 14 (23:30 h), March 28, 2000, ECO-CHZ-01138.

*Description, female.* Total body length of seven adult females ranged between 1.6 and 3.3 mm (1.6, 1.8, 1.9, 2.2, 2.6, 2.5, 3.3 mm). Cephalothorax (incorporating first pedigerous somite) accounting for 67.7% of total body length (Fig. 17). Forehead flat in dorsal view. Anteriormost part of cephalothorax straight, without ventral protuberances or cuticular ornamentation. Oral papilla located 0.40-0.43

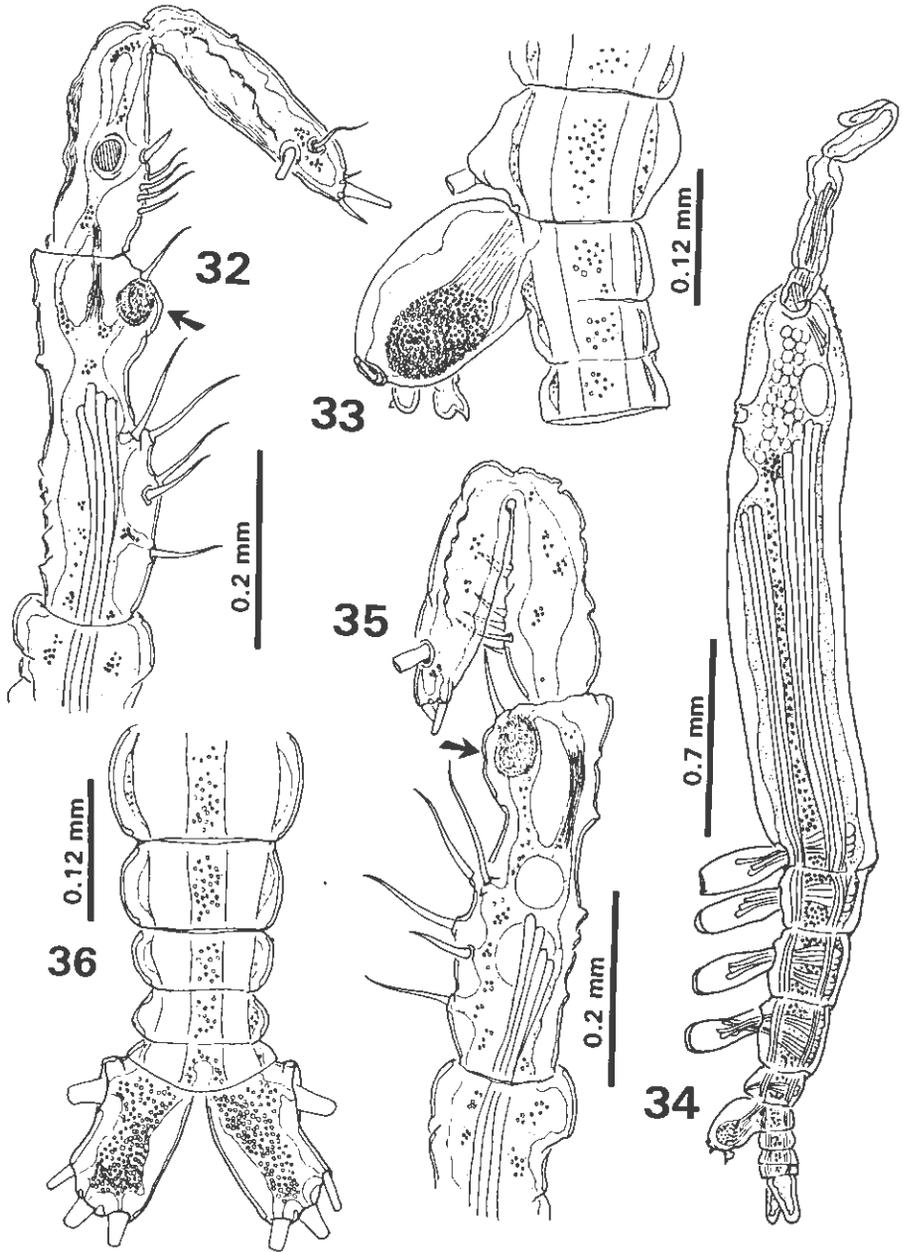
of distance posteriorly along ventral surface of cephalothorax (Fig. 17a). Nauplius eye and ocelli weakly developed, almost indistinguishable in studied specimens. Antennules relatively long, slender, 0.24% of total body length, and 48% length of cephalothorax. Antennule five-segmented, with segments 2-5 partially fused. Purported segments 1-5 armed with 0,0; 1,V; 2,I; 2,IV; 2,II setae (Roman numerals) and spines (Arabic numerals) (Figs. 18, 19). Two terminal spines forming pincer-like structure. Following pattern described by Grygier & Ohtsuka (1995) for female monstrolloid antennular armature, setae and spines on second ( $2d_{1,2}, 2v_{1,3}, II_d$ ) and third ( $3, III_v, III_d$ ) segments, complete. Fourth segment with:  $4v_{1,3}, IV_v, IV_d, 4d_1$ ; fifth with  $6_1, 6_2, V_m$ ; missing: most fifth segment elements, including  $V_d, V_m, 4a_{es}, b_{1,6}, 6_1$ . Antennule length between 0.7 and 1.2 mm in specimens analyzed (0.7, 0.8, 0.9, 1.1, 1.2, 1.2, 1.2 mm).

Incorporated first pedigerous somite and three free succeeding pedigerous somites each bearing pair of biramous swimming legs. Intercoxal sclerites on legs 1-4, rectangular. Basis with diagonal division articulating it with large, rectangular coxa. Basis with lateral hair-like seta on legs 1-4; on leg 3 seta at least 2.5 times longer and noticeably thicker than in other legs, not setulated. Natatory leg setae all sparsely and biserially plumose. Endopodites and exopodites of legs 1-4, triarticulate. Third exopodal segment with outermost terminal spiniform seta 4-4.5 times as long as bearing segment. Seta armed with small spines along outer margin; inner margin with row of setules. Outer spine 1.5 times smaller than bearing segment. Armature of swimming legs as:

	basis	endopodite	exopodite
leg 1	1-0	0-1;0-1;1,2,2	I-1;0-1;1,1,3
legs 2-4	1-0	0-1;0-1;1,2,2	I-1;0-1;1,1,2,2

Fifth legs short, with one lobe, basally separated, bearing two setae. Urosome consisting of fifth pedigerous somite, genital double somite, and two free abdominal somites (Fig. 21). Second to fourth pedigers accounting for 30.5% of total length in dorsal view. Urosome, excluding furcal rami, 15.4% of total body length. Genital double somite without intersegmental division; double somite representing 35.7% of the length of urosome (Fig. 21). Ratios of length of fifth pedigerous somite, genital double somite and free abdominal somite being: 35.7: 35.7: 15.1: 12.5 = 100. Medial portion of genital double somite moderately swollen, bearing short ovigerous spines which are basally separated, swollen medially but slender distally. Caudal rami about two times longer than wide, moderately divergent, bearing one outer, three terminal, and one dorsal setae (Fig. 22). Dorsal seta relatively short, about  $2/3$  length of ramus.

*Description, male.* Total body length of 11 individuals from 2.1-3.0 mm, mean: 2.5 mm. Cephalothorax (incorporating first pedigerous somite) accounting for 66% of total body length (Figs. 23, 34). Anteriormost part of cephalothorax slightly



Figs. 32-36. *Monstrilla elongata* Suárez-Morales 1994, adult male from Banco Chinchorro. 32, left antennule, dorsal; 33, genital complex, lateral; 34, habitus, lateral; 35, right antennule, dorsal; 36, urosome showing caudal rami, dorsal.

rounded in dorsal view, with pair of sensilla visible most easily in lateral view (Fig. 24). Ventral and dorsal surfaces of cephalothorax with vertical rows of small, blister-like processes reaching posterior margin of cephalothorax (see Figs. 23, 24).

Oral papilla lying midventrally 0.23-0.37 of distance posteriorly along cephalothorax, not protuberant (Fig. 34). Nauplius eye and ocelli present, weakly developed.

Antennule measuring between 0.86 and 1.0 mm, mean 0.92 mm, relatively long, slender, slightly longer than 53% of cephalothorax length, and about 35.5% of total body length (see Figs. 23, 34). Antennule five-segmented, with segments 3-4 fused (Figs. 32, 35). In terms of pattern described by Grygier and Ohtsuka (1995) for monstriloid antennular armature, setae and spines present on purported segments 1-5 are: element 1 absent from first segment, second segment with elements  $2d_{2,3}$ ,  $2v_1$ ,  $2v_2$ , element II<sub>d</sub> absent. On third segment only element 3 present, III<sub>d</sub> and II<sub>v</sub> absent. Base of element 3 with rounded patch covered by hair-like setae, visible in dorsal view (arrowed in Figs. 32, 35). Purported segment 4 bearing elements  $4d_{1,2}$ ,  $4v_{1,3}$ , and IV<sub>d</sub>; element IV<sub>v</sub> and aesthetasc 4<sub>aes</sub>, absent. Fifth segment with V<sub>d</sub>,  $b_6$ , 6<sub>aes</sub>, 6<sub>1</sub>, 6<sub>2</sub>; elements V<sub>v</sub>,  $b_{1,5}$ , and 5, absent.

Incorporated first pedigerous somite and three free succeeding pedigerous somites each bearing pair of biramous swimming legs. Pedigerous somites 2-4 free, together accounting for 24.3 % of total body length in dorsal view. Swimming legs 1-4 slightly decreasing in size posteriorly. Intercoxal sclerite of legs 1-4 with patches of tiny hair-like structures (Fig. 26). Basis of legs with diagonal division articulating with large, rectangular coxa along diagonal line (Fig. 26). Basis with lateral hair-like seta on legs 1-4; on leg 3, this seta about 2.5 times longer. Inner margin of basipodite, near insertion of first endopodal segment, with spiniform processes in legs 1-3 (Figs. 28-31), process absent in leg 4. Spiniform process more clearly defined in leg 1 (Fig. 28), weakening toward legs 2 and 3. Endopodites and exopodites of swimming legs 1-4, triarticulate. Ramus setae all biserially plumose except spiniform outer seta on exopod 1 and 3 of each leg. Outermost exopodal setae with outer margin with small spines along entire shaft, inner margin naked (Figs. 26, 27). Outermost exopodal spines relatively long, with biserially arranged spinules on the distal spiniform seta, and with outer margin of first exopodal spine naked (Fig. 26). Armature formula of swimming legs:

	basis	endopodite	exopodite
leg 1	1-I	0-1;I-1;1,2,2	I-0;0-1;1,1,3
legs 2-4	1-I	0-1;I-1;1,2,2	I-0;0-1;1,1,2,2

Fifth legs reduced, represented by pair of bud-like protuberances visible in lateral view, armed with one seta each (Fig. 25); seta reaching posterior margin of anal somite (see Fig. 23). Genital complex formed by long, narrow-based globose shaft with two terminal lappets (Figs. 25, 33). Terminal lappets formed as in Fig. 25, with a single distal pore located between them.

Urosome consisting of five somites: fifth pedigerous somite, genital somite with genital complex, and three free abdominal somites, last one being the anal somite. Urosome, excluding furcal rami, relatively short, accounting for 12% of total body length. Ratios of lengths of fifth pedigerous somite, genital double somite and free abdominal somite: 29.0:25.8:17.1:16.2:11.8 = 100. Caudal rami subrectangular, about 1.5 times as long as wide, moderately divergent. Caudal rami bearing four setae, three terminal and one outer lateral seta (Fig. 36).

*Remarks.* The female of this species was described based on specimens collected in the reef lagoon of Puerto Morelos, northern Quintana Roo, Mexico (Suárez-Morales 1994). Two females of the same species were recorded later on in the Philippines area (Suárez-Morales 2000), but it was not recorded again in the Mexican Caribbean. Hence, this record in Banco Chinchorro expands its local distributional range to the southern part of Quintana Roo.

The male of this species remained unknown since its original description. One of the main problems in the taxonomy of the Monstrilloida is that males and females are not easily linked. This is partly because both sexes are commonly captured in plankton samples, and their hosts usually remain unknown (Isaac 1975; Suárez-Morales & Escamilla 1997). The only way to confidently link both sexes is to find them parasitizing the same host. However, the presence of peculiar shared features could become also a linking criterion (Suárez-Morales & Escamilla 1997). The male of this species was originally described as *Monstrilla wandelli tropica* by Suárez-Morales (1996), based on collections from Puerto Morelos, Quintana Roo, Mexico. It was later on linked to *Monstrilla mariaeugeniae* Suárez-Morales & Islas-Landeros 1993 also from Puerto Morelos, based on their joint occurrence in the plankton samples and on certain morphological characters (Suárez-Morales 1998). However, after examining more male specimens of this species, it became clear that they could be more logically associated with the females of *M. elongata*. This conclusion is based on the following characters: 1) both share a peculiar cuticular patch on the base of some setae; in the female there are four patches, one of them on the third segment; in the male there is only one patch, on the third segment. This kind of structure is quite uncommon in monstrilloid copepods and by itself may be a reliable character to link both sexes; 2) the lack of element 1 (cf. Grygier & Ohtsuka 1995 nomenclature) on the first segment of the antennule is a character shared by both sexes, and this element is not commonly absent in the Monstrilloida; 3) the relatively long, slender antennule; 4) the body proportions, with a relatively long cephalothorax; 5) their occurrence in the same plankton sample. Therefore, the male assigned by Suárez-Morales (1998) to *M. mariaeugeniae*, should be recognized in the future as the male of *M. elongata*.

Monstrilloid copepods commonly have a single seta on the outer margin of the basipodite of swimming legs 1-4 (Huys & Boxshall 1991), and the inner margin is naked, without any seta or process. In the Copepoda as a group there is, in the primitive setation pattern, an inner basipodal seta. The spiniforin process found

in the males of *M. elongata* may represent the remains of this primitive setation in the Monstrilloida.

Banco Chinchorro females (1.6-3.3 mm) are shorter than the female holotype (4.2 mm). Males from Puerto Morelos measured 3.5-3.68 mm, which exceeds the greatest length of the Banco Chinchorro specimens (2.1-3.0 mm).

*Monstrilla mariaeugeniae* Suárez-Morales & Islas 1993

*Material examined.* One adult female, Banco Chinchorro, 18°34'07" N, 87°22'47" W (sta. 5), 29 March, 2000 (00:33 h), ECO-CHZ-01144; two adult females, Banco Chinchorro, 18°38'00" N, 87°18'07" W (sta. 15) (20:45 h), March 28, 2000, ECO-CHZ-01136.

*Remarks.* The original description of this species was based on female specimens (Suárez-Morales & Islas-Landeros 1993). Only females were recorded in Banco Chinchorro, their length (3.6-4.0 mm, mean of four specimens: 3.9 mm) is slightly below the figure reported for the type specimens (4.25 mm). The male remained unknown until Suárez-Morales (1996) assigned to this species the male specimens of *Monstrilla wandelli tropica* (Suárez-Morales 1998), known only from the Quintana Roo area. However, as discussed above, the male of this species is, again, unknown. This species has been recorded off the east coast of the Yucatan Peninsula (Suárez-Morales & Islas-Landeros 1993) and it is herein reported for the first time from Banco Chinchorro.

*Cymbasoma quintanarooense* (Suárez-Morales 1993)

*Material examined.* Seven females, 4 collected at Banco Chinchorro, 18°38'31" N, 87°27'07" W (sta. 4), March 23, 2000, catalogue number ECO-CHZ-01132; one adult female, Banco Chinchorro, 18°40'48" N, 87°19'03" W (sta. 2), 28 March, 2000, ECO-CHZ-01131; one adult female, Banco Chinchorro, 18°34'07" N, 87°22'47" W (sta. 5), 29 March, 2000, ECO-CHZ-01142; one adult female, Banco Chinchorro, 18°42'07" N, 87°22'05" W (sta. 14), March 28, 2000, ECO-CHZ-01135.

*Remarks.* This species was described from female specimens collected in Bahía de la Ascensión, central coast of the Mexican Caribbean (Suárez-Morales 1994a). Only females were collected in Banco Chinchorro; their length varied between 1.7 and 2.2 mm, with the mean for seven specimens being 1.9 mm. This figure is congruent with the known length range of the type material of this species (1.9-2.3 mm). The male of this species was described recently by Suárez-Morales (2000a) and was included in his identification key to the males of the known species of the genus. This is the first record of *C. quintanarooense* from Banco Chinchorro.

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