

Comparative morphology of *Cymothoa* spp. (Isopoda, Cymothoidae) from Brazilian fishes, with the description of *Cymothoa catarinensis* sp. nov. and redescriptions of *C. excisa* Perty and *C. oestrum* (Linnaeus)¹

Vernon E. Thatcher², Jayme de Loyola e Silva², Glauco F. Jost³ & José M. Souza-Conceição³

¹ Contribution number 1444 of the Departamento de Zoologia, Universidade Federal do Paraná.

² Departamento de Zoologia, Universidade Federal do Paraná. Caixa Postal 19020, 81531-980 Curitiba, Paraná, Brasil. Research Fellows of the CNPq.

³ Centro de Ciências Tecnológicas da Terra e do Mar (CTTMar), Universidade do Vale do Itajaí. 88302-202 Itajaí, Santa Catarina, Brasil.

ABSTRACT. *Cymothoa catarinensis* sp. nov. collected at Camboriú, Santa Catarina State, Brazil is described. The new species is of small size, has a cephalon that is little immersed in pereonite 1, anterolateral angles of pereonite 1 that reach or surpass the eyes and a pleon that is deeply immersed in pereonite 7. The pleopods of the new species have small, lobular accessory gills projecting from the bases. *Cymothoa excisa* Perty, 1830, and *Cymothoa oestrum* (Linnaeus, 1758) are redescribed. Both are of large size (25-35 mm in length). *C. excisa* has pointed anterolateral margins of pereonite 1 that reach or surpass the eyes. This species also has trilaminar pleopods in the female and bilaminar pleopods in the male. *C. oestrum* has rounded anterolateral margins of pereonite 1 and no visible eyes. This is the first time the latter species has been reported from Brazil. These three species are compared to four others that have been reported from Brazilian waters, namely: *C. liannae* Sartor & Pires, 1988; *C. brasiliensis*, *C. gerris* and *C. ianuarii*, all described by Schiödte & Meinert, 1884. A key is provided to aid in the separation of the Brazilian species of *Cymothoa*.

KEY WORDS. Atlantic Ocean, Brazil, fish parasites, marine isopods.

Species of the genus *Cymothoa* Fabricius, 1793, are widely distributed, but they are found only in marine fishes. Only a few studies concerning this genus in South America have been published. The first account of species belonging to this genus found on the Brazilian coast is that of SCHIÖDTE & MEINERT (1884). SARTOR (1986) published a report concerning the distribution of fishes and cymothoids along the Brazilian coast. Later, SARTOR & PIRES (1988) described a new species from Southern Brazil. THATCHER (2000) reported four species of *Cymothoa* from South America. According to TRILLES (1991), 32 named species of *Cymothoa* occur world-wide and five of these are from Brazilian waters. These are: *C. brasiliensis* Schiödte & Meinert, 1884; *C. excisa* Perty, 1830; *C. gerris* Schiödte & Meinert, 1884; *C. ianuarii* Schiödte & Meinert, 1884 and *C. liannae* Sartor & Pires, 1988. Additionally, *C. oestrum* (Linnaeus, 1793) has been reported from Venezuela and Africa and is reported here for the first time in Brazil. The three species described in 1884 have not been collected since but TRILLES (1979, 1981) reported finding five specimens in a museum in Holland. The species *C. excisa* and *C. oestrum* have been reported occasionally but have never been adequately described. For that reason, redescriptions of these species are presented herein. Also, a new species of *Cymothoa* is proposed and described. The morphology of

these species is compared and a key for their separation is presented.

MATERIAL AND METHODS

Marine fishes were netted on the coasts of Paraná and Santa Catarina States, Brazil. The Cymothoidae Leach, 1818 were removed from the mouths of their hosts and preserved in 70% ethanol. Appendages were removed with the aid of dissecting needles and cleared in either glycerine or pure phenol for study in temporary preparations. Photographs were taken with a digital camera at five megapixels and drawings were made with the aid of a camera lucida. Measurements are in micrometers (µm) unless designated as millimeters (mm).

Cymothoa Fabricius, 1793

Generic diagnosis: Body symmetrical. Anterolateral corners of pereonite 1 produced to embrace cephalon. Bases of antennae not expanded, well separated. Pereonites 5-6 usually wider than others. Coxal plates small. Pleon narrower than and immersed in pereonite 7. High carinae on bases of pereopods 4-7 and low ones on 1-3. Parasites of the mouths of fishes.



Figures 1-2. *Cymothoa catarinensis* sp. nov. female: (1) dorsal view; (2) ventral view. Scale = 2000 μ m.

***Cymothoa catarinensis* sp. nov.**

Figs 1-26

Host: *Menticirrhus litoralis* (Holbrook, 1860).

Site: Mouth, over tongue.

Localities: Florianópolis, Camboriú and Piçarras, Santa Catarina State, Brazil. Colector: Glauco Fernando Jost: April to December 2000.

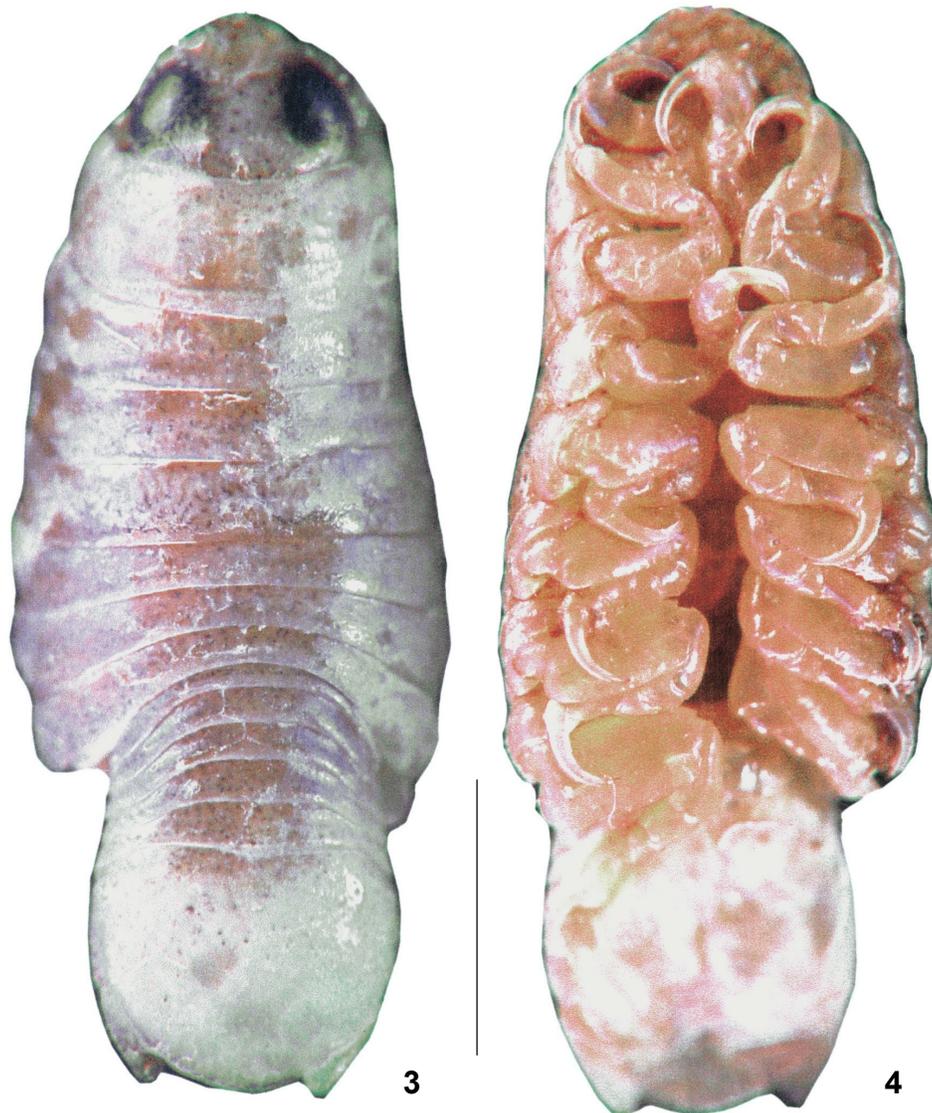
Intensity: 1-2/fish.

Prevalence: 20%.

Type material: Holotype female and 10 Paratype females deposited in the Crustacean Collection of the Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, AM, Brazil.

Etymology: The species name is in reference to the Brazilian State in which the species was first collected.

Species description (based on studies of 16 females and 8 males; measurements in table I): Female (Figs 1-2): body small convex dorsally; widest at level of pereonite 5. Cephalon moderately immersed in pleonite 1; frons rounded; eyes present. Antennule (Fig. 5) shorter and stouter than antenna consisting of 8 articles; antenna (Fig. 6) slender, of 8 articles. Mouthparts (Figs 7-9 and 11): Mandible with acute, chitinous incisor and rounded molar process; palp tapered, of three articles, the first being longer and wider than the second and the third being about a third as long as the first; maxillule with four terminal recurved spines; maxilla terminally bilobed with one stout spine on inner lobe and three on outer lobe; maxilliped with numerous setae on distal margin, palp of two articles, situated on midline, with three terminal spines. Pereon: pereonite 1 longest, with acute anterolateral angles that extend midway on eyes; pereonite 4 longer than 2 and 3, which



Figures 3-4. *Cymothoa catarinensis* sp. nov. male: (3) dorsal view; (4) ventral view. Scale = 2000 μ m.

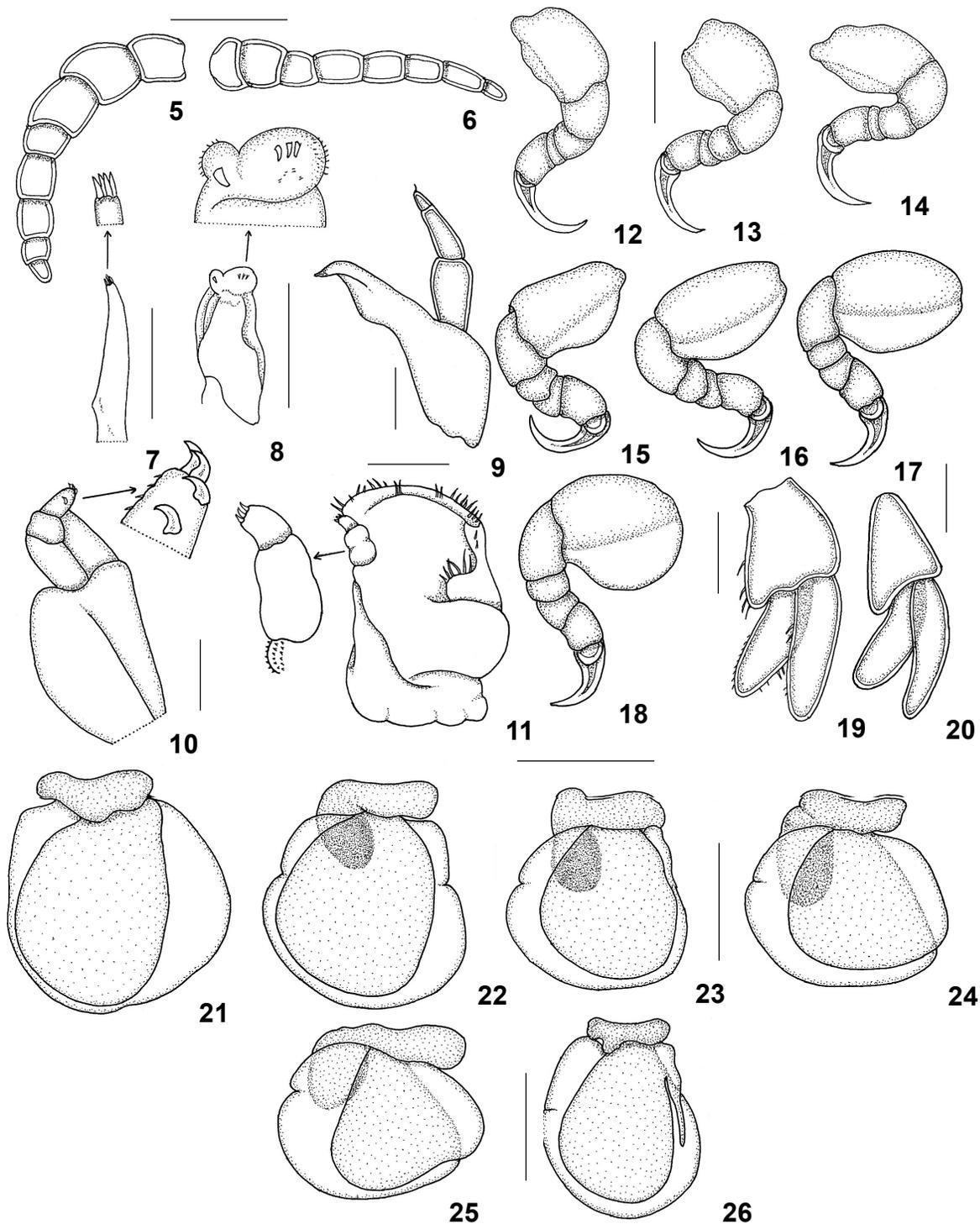
are subequal in length; pereonites 5-7 decrease in length; pereonite 7 reaches to or near pleotelson laterally. Pereopods (Figs 12-18) short, with low carinae on 1-3 and high carinae on 4-7. Pleon deeply immersed in pereonite 7; pleotelson two to three times wider than long. Pleopods (Figs 21-25) bilaminate, rounded, with small accessory gill extending from bases of 2-5. Uropod (Fig. 19) with short, slender rami, exopod only slightly longer than endopod, both provided with few setae; not reaching posterior margin of pleotelson.

Male (Figs 3-4): Body smaller, more slender and less convex dorsally than female. Cephalon not immersed in pereonite 1; frons rounded; eyes large. Maxilliped (Fig. 10) narrower than that of female; palp of 3 articles, with 4 stout recurved spines

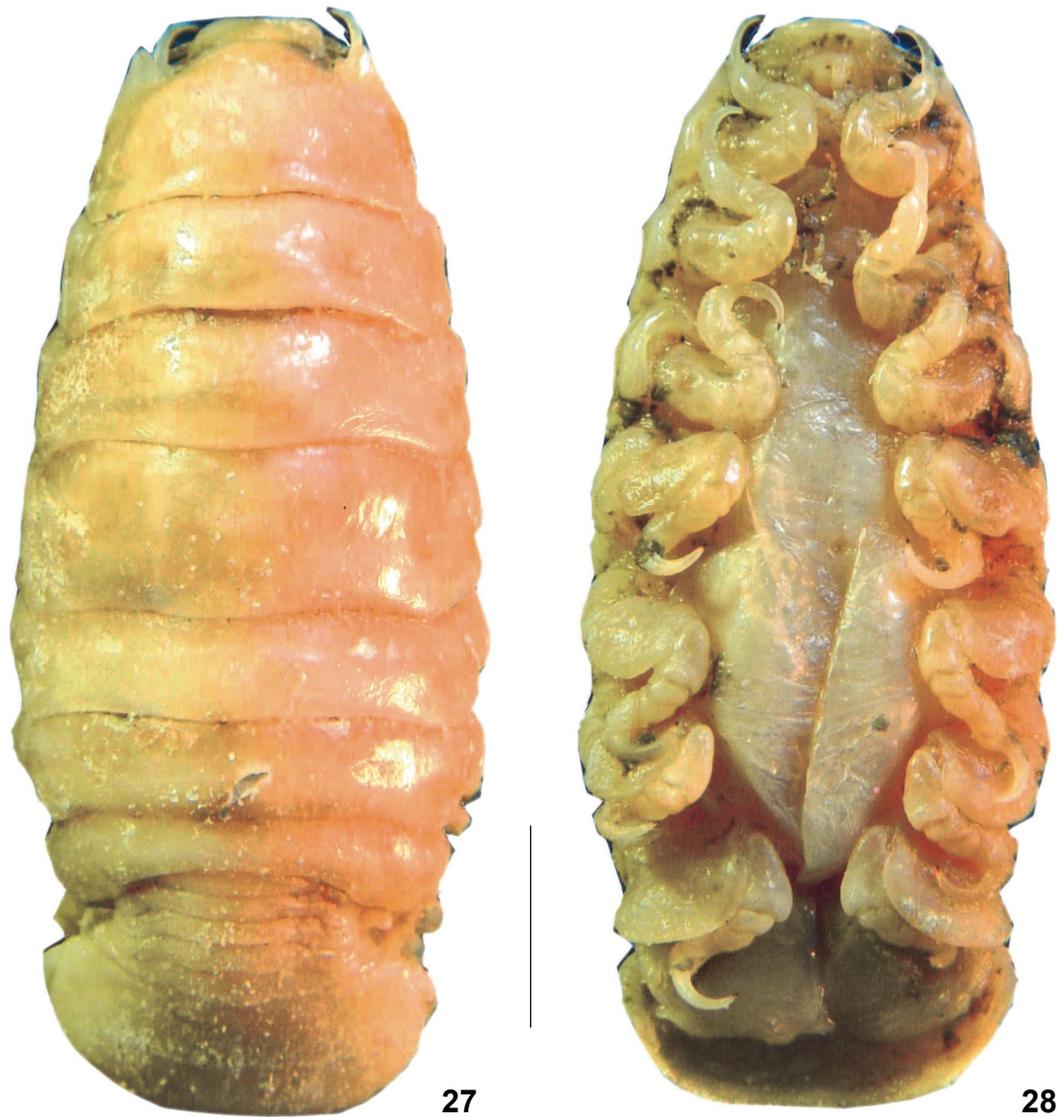
on terminal article. Pleopod 2 (Fig. 26) with slender appendix masculinum on endopod. Uropod (Fig. 20) similar to that of female but reaches or surpasses posterior margin of pleotelson. Penis not observed.

Manca (= Pullus II): More than 160 fully formed mancas (Figs 54, 55) were found in the marsupium of a single female. Body about 2600 μ m long and 1000 μ m wide. Cephalon truncate, 485 μ m long and 675 μ m wide; eyes large, ovoid, black; antennae longer than antennules, reach to middle of pereonite 1; both of 8 articles. Uropods extending well beyond posterior margin of pleotelson; endopod shorter than exopod.

Discussion. Distinguishing characters of the female of *Cymothoa catarinensis* sp. nov. are its small size, free cephalon,



Figures 5-26. (5-11) *Cymothoa catarinensis* sp. nov.: (5-9 and 11) female, 10 male: (5) antennule; (6) antenna; (7) maxillule; (8) maxilla; (9) mandible and palp; (10) male maxilliped; (11) female maxilliped. (12-20) Pereopods and uropods: (12-18) female pereopods 1-7; (19) female uropod; (20) male uropod. (21-26) Pleopods: (21-25) female pleopods 1-5; (26) male pleopod 2. Scales: 5-8 and 11 = 500 μ m; 9-10 = 200 μ m, 12-19 = 1000 μ m, 20 = 500 μ m, 21-26 = 1000 μ m.



Figures 27-28. *Cymothoa excisa* female: (27) dorsal view; (28) ventral view. Scale = 5000 μ m.

deeply immersed pleon, prominent and acute anterolateral angles of pereonite 1, bilaminate pleopods with small accessory gills on the bases and a pleotelson two to three times wider than long.

***Cymothoa excisa* Perty, 1830**

Figs 27-51

Host: *Micropogonias furnieri* (Demarest, 1823); Sciaenidae.

Site: Mouth, over tongue.

Locality: Saco dos Limões, Baía Sul, Ilha de Florianópolis, Santa Catarina, Brazil. Colector: Glauco Fernando Jost: April to December, 2000.

Prevalence: 13%.

Intensity: 1/infected fish.

Voucher specimens: Three females and one male deposited in the Crustacean Collection of the Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, Amazonas, Brazil.

Description (based on three females and one male; measurements in table II): Female (Figs 27-28): Body large, 2.3 times longer than wide; widest at level of pereonite 5. Cephalon immersed in pereonite 1; frons broadly truncate; eyes present but not prominent. Antennule (Fig. 29) of 8 articles the first three being stouter; distal article with 7 small apical spines. Antenna (Fig. 30) more slender than antennule, composed of 9 articles, the first 5 being longer and wider than others. Mouth-

Table I. Measurements (mm) of 16 females and 8 males of *Cymothoa catarinensis* sp. nov. Means in parentheses.

Gender	Body		Pleotelson	
	Length	Width	Length	Width
Females	16.5	9.0	2.0	7.0
	16.0	8.0	3.0	6.0
	15.2	7.0	2.0	5.5
	15.0	8.0	2.5	6.0
	14.0	6.0	2.0	5.0
	14.0	5.5	3.0	5.0
	14.0	6.0	2.5	4.5
	14.0	8.0	2.0	6.0
	13.0	6.0	2.0	5.5
	12.0	6.0	2.0	4.5
	12.5	6.2	2.0	5.0
	11.9	6.8	1.8	4.4
	11.5	5.0	1.8	4.0
	11.0	5.0	1.5	4.0
	10.2	6.2	1.8	4.4
	9.6	5.8	1.4	3.4
	(13.2)	(6.5)	(2.1)	(5.0)
Males	12.0	6.0	2.0	4.0
	10.5	5.0	1.5	4.0
	9.2	3.8	1.5	3.0
	8.5	4.0	1.0	3.0
	8.0	4.0	1.5	2.5
	8.0	4.0	1.0	3.0
	7.8	4.5	1.0	2.2
	7.5	4.4	1.4	2.8
	(8.9)	(4.5)	(1.4)	(3.0)

Table II. Measurements (mm) of three ovigerous females and one male of *Cymothoa excisa*, and of 1 ovigerous female of *Cymothoa oestrum*.

Species	Measurements				
	Body		Pleotelson		
	Length	Width	Length	Width	
<i>Cymothoa excisa</i>					
	Females				
		26.0	11.4	3.3	9.0
		26.0	12.5	3.1	9.2
	22.0	10.8	3.4	8.6	
Male	14.3	6.1	2.5	5.1	
<i>Cymothoa oestrum</i>					
	Female	28.0	13.0	4.0	8.4

parts (Figs 31-34): Mandible with chitinous, acute incisor and rounded molar process; palp of 3 articles, shorter than mandible. Maxillule with 4 stout, recurved apical spines. Maxilla bilobed with 3 stout recurved spines on external lobe

and 7 small spines and numerous spinules on internal lobe. Maxilliped with setae on distal margin; palp of 2 articles with few spines and spinules. Pereon only moderately convex; pereonites 1 and 4 subequal in length, pereonites 2 and 3 subequal in length, 5-7 decreasing in length. Pereopods (Figs 35-41) with large claw-like dactyls; low carinae on bases of pereopods 1-3, high carinae on 4-7. Pleon immersed in pereonite 7; pleotelson 2.6 times wider than long; pleopods (Figs 42-46) trilaminate, gradually decreasing in size from 1-5. Uropods (Fig. 47) with short rami; exopod only slightly longer than endopod; not reaching posterior margin of pleotelson.

Male: similar to female but smaller. Maxilliped (Fig. 50) more slender than that of female; palp distal rather than on the internal margin as in female. Pleopods (Figs 48-49)

bilaminate; pleopod 2 without appendix masculinum. Uropod (Fig. 51) with slender rami; exopod longer than endopod.

Discussion. Distinguishing characters of *Cymothoa excisa* are its large size; deeply immersed, truncate cephalon; acute anterolateral angles of pereonite 1 which reach or surpass the eyes; deeply immersed pleon; trilaminate pleopods in the female with bilaminate pleopods in the male and a pleopod 2 in the male that lacks an appendix masculinum.

Cymothoa oestrum (Linnaeus, 1793)

Figs 52-76

Hosts: According to TRILLES (1991), this species has been found on a number of different hosts, including: *Caranx latus*, *C. ruber*, *Priacanthus arenatus*, *Trachurops crumenophthalmus* and *Tarpon atlanticus*. The host of the present specimen is unknown but was probably a species of *Caranx*.

Site: Mouth, over tongue.

Localities: Camboriú, Santa Catarina State, Brazil. This species has been found from Key West, Florida, to Venezuela but has not been reported previously from Brazil.

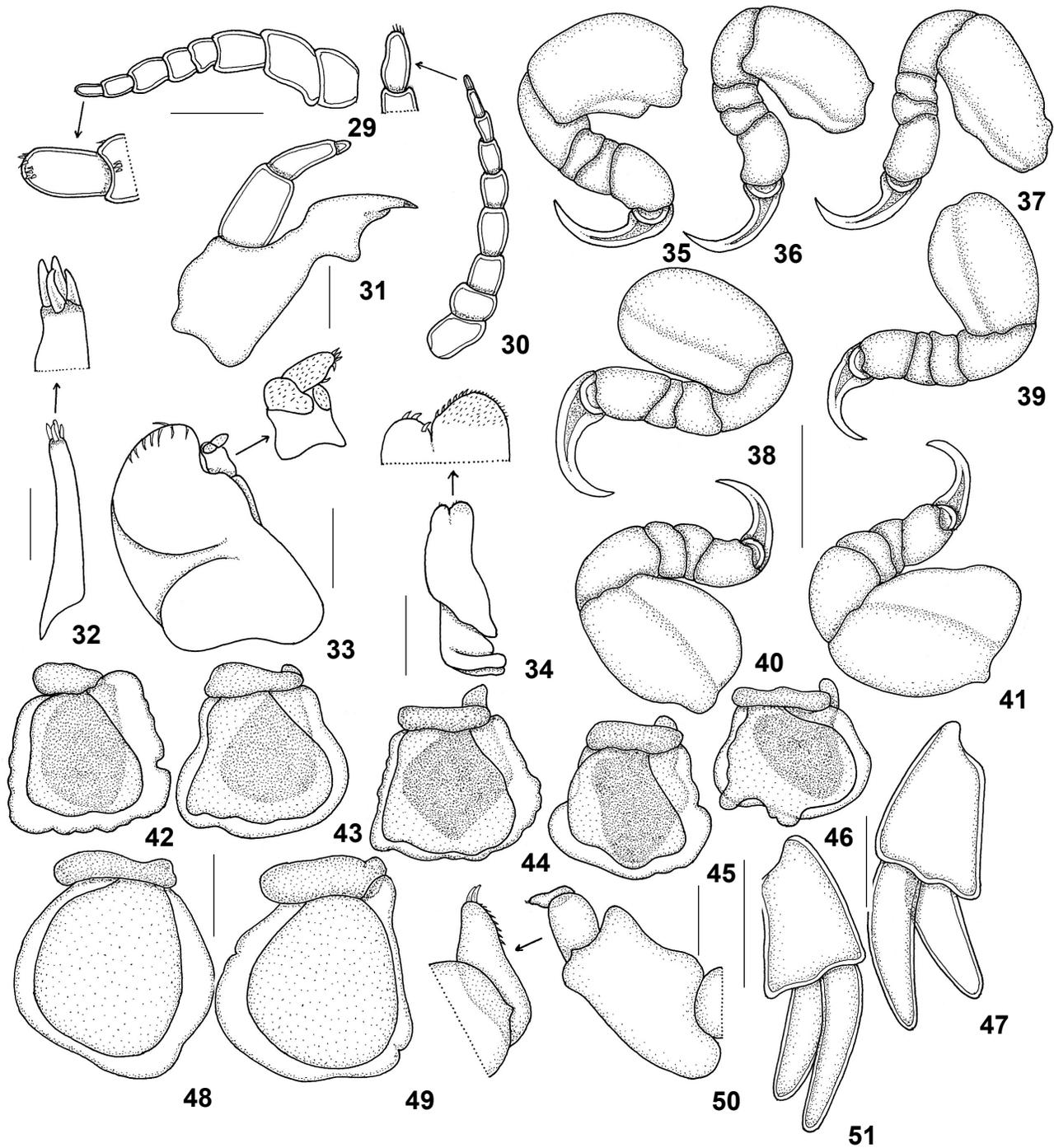
Intensity: 1/infected fish.

Male: Unknown.

Voucher specimen: One female deposited in the collections of the Zoology Department, UFPR, Curitiba, Paraná, Brazil.

Species description (based on single female containing 770 mancas in the marsupium): Female (Figs 52-53): Body large, 2.2 times longer than wide; widest at level of pereonites 5 and 6. Cephalon deeply immersed in pereonite 1; frons truncate; eyes absent; anterolateral margins of pereonite 1 large, rounded.

Antennule (Fig. 58) of 8 articles, the first 3 being stouter than others, terminal 3 with small spinules. Antenna (Fig. 59) composed of 9 articles, the first 3 being stouter than others. Mouthparts (Figs 60-63): Mandible with sharp incisor and rounded molar process; palp of 3 articles, longer than mandible. Maxillule with 4 terminal recurved spines. Maxilla bilobed, with 3 stout spines on external lobe and numerous spinules on outer lobe. Maxilliped with few small setae on distal margin; palp of 2 articles subequal in length but basal article 3 times wider than terminal one; palp situated medially and subapically, terminal segment with 3 stout spines. Pereon



Figures 29-51. (29-47) *Cymothoa excisa* female: (29) antennule; (30) antenna; (31) mandible and palp; (32) maxillule; (33) maxilliped; (34) maxilla; (35-41) *Cymothoa excisa* female pereopods 1-7; (42-46) pleopods 1-5; (47) uropod. (48-51) male: (48-49) pleopods 1-2; (50) maxilliped; (51) uropod. Scales: 33, 47 and 51 = 1000 μ m, 29-32, 34 and 50 = 500 μ m, 35-41 = 2000 μ m, 42-46 = 1000 μ m, 48-49 = 1 mm.



Figures 52-53. *Cymothoa oestrum* female: (52) dorsal view; (53) lateral view. Scale = 5000 μm .

moderately convex; pereonite 1 longest and 7 shortest. Pereopods (Figs 64-70) 4-7 manifestly larger than 1-3; basal carinae increasing in size from 5-7. Pleon little immersed in pereonite 7; pleotelson 2.8 times wider than long; pleopods (Figs 71-75) bilaminate, with small basal accessory gills; 5 with folds on endopod. Uropod (Fig. 76) with rami subequal in size and few spinules on basis.

Male: unknown.

Manca (Figs 54 and 56): Body about 2800 μm long and 1000 μm wide. Cephalon 350 μm long and 550 μm wide; eyes small, ovoid, red. Antennule of 8 articles, reaches to pereonite 2; antenna of 12 articles, reaches pereonite 6. Uropods long, bases extend to or beyond posterior margin of pleotelson; rami subequal in length. The manca of this species was figured, but not described, in RICHARDSON (1905).

Discussion. Distinguishing characters of *Cymothoa oestrum* are its large size; deeply immersed truncate cephalon, without eyes; anterolateral margins of pereonite 1 blunt and bilaminate pleopods with folding on the fifth endopod.

Other species of *Cymothoa* reported from Brazil

Cymothoa liannae Sartor & Pires, 1988

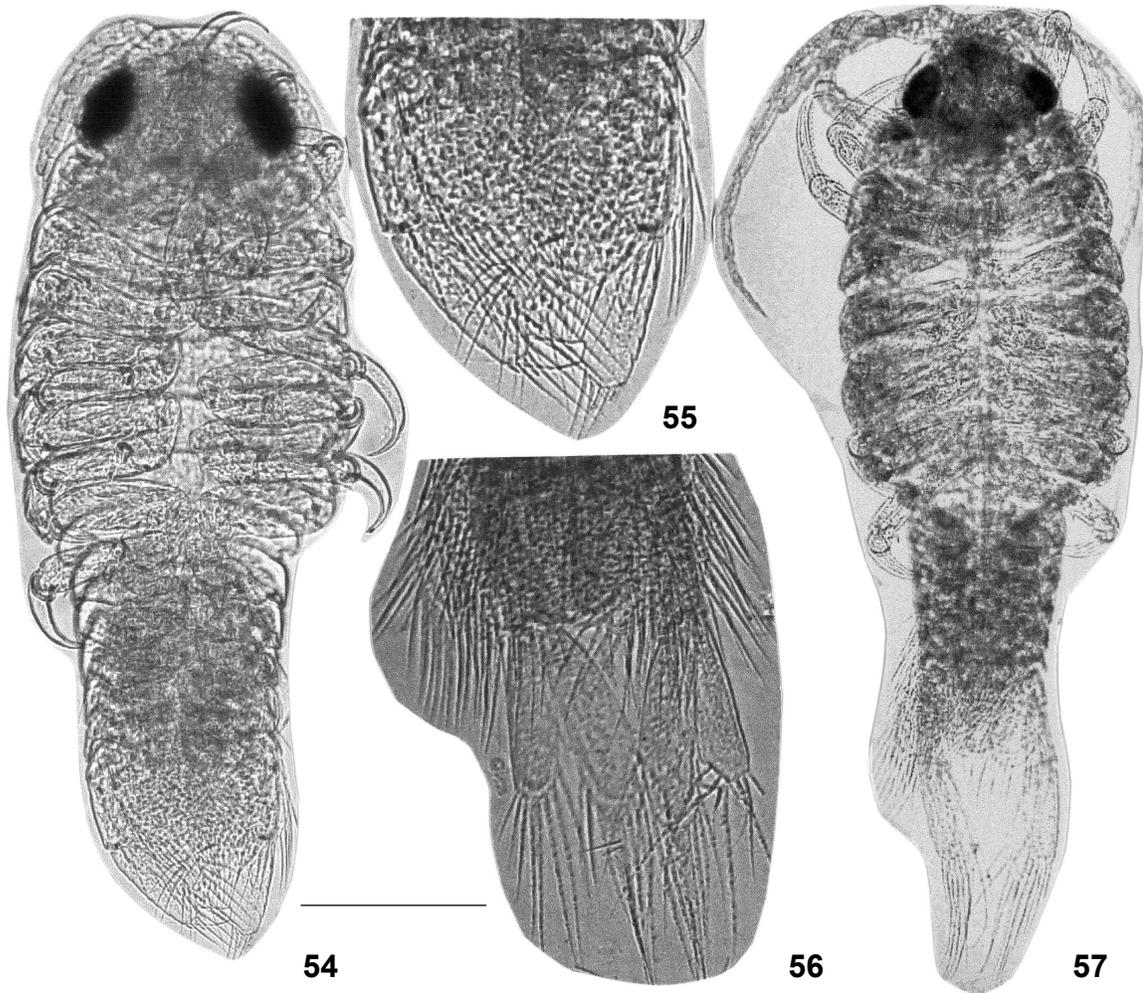
Fig. 77

Host: *Chloroscombrus chrysurus*.

Site: Mouth, over tongue.

Geographic distribution: Rio de Janeiro to Rio Grande do Sul States, Brazil.

Species description (adapted from SARTOR & PIRES 1988): Female: Body elongate, sides nearly parallel, expanding slightly



Figures 54-57. Mancas. (54-55) *Cymothoa catarinensis* sp. nov.: (54) dorsal view; (55) pleotelson and uropods. (56-57) *Cymothoa oestrum*: (56) pleotelson and uropods; (57) dorsal view. Scales: 54 and 57 = 500 μ m, 55-56 = 250 μ m.

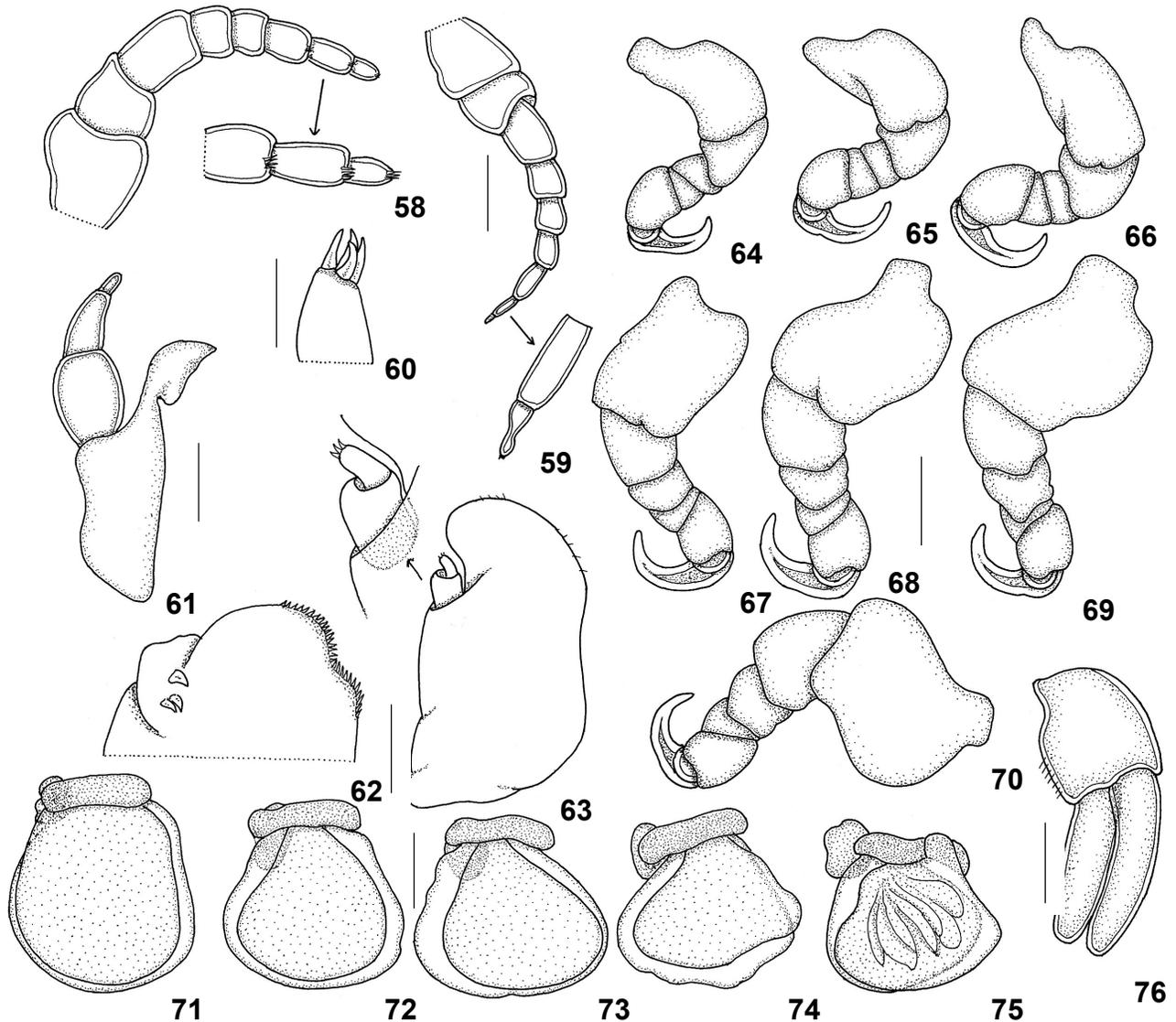
posteriorly, with dark brown chromatophores; widest at level of pereonites 4-6. Cephalon slightly wider than long, deeply immersed in pereonite 1; eyes vestigial or absent. Antennules of 8 articles; antennae of 8 articles, shorter and narrower than antennules. Pereonite 1 longest, 2-5 subequal in length, 6 shorter and 7 very short; lateral margins of pereonite 7 reaching level of pleonite 3. Pereopods 4-7 with low carinae on bases. Pleon abruptly narrower than pereon, not deeply immersed in pereonite 7; pleopod 2 with appendix masculinum. Pleotelson broadly rounded posteriorly; about as long as wide. Uropods short, reaching a little beyond middle of pleotelson. Measurements: 13-27.5 (19) mm long and 6-12 (8.4) mm wide.

Adult male: Similar to female, but smaller. Eyes small, but visible. Antennules with 8 articles; antennae with 8-9 articles. Pereonite 1 longest, 7 shortest; pereopod 7 longer than 6; large carinae on bases of all pereopods. Penis well developed; pleopod 2 with appendix masculinum longer than

endopod. Pleotelson slightly wider than long. Uropods not reaching posterior margin of pleotelson. Measurements: 5.5-14 (10) mm long and 2.7-6.5 (4.6) mm wide.

Manca: SARTOR & PIRES (1988) described the manca of their new species in some detail. They reported the following: Body 1.95-2.50 (2.19) mm long and 0.7-1.0 (0.86) mm wide. Cephalon subtriangular, 1.2 times wider than long. Antennule of 8 articles, reaching pereonite 1; antenna of 12-14 articles reaching pereonite 6. Uropods surpassing posterior margin of pleotelson. The manca of this species strongly resembles that of *Cymothoa oestrum* in view of its long antennae and uropods. Neither of these mancas resembles that of *Cymothoa catarinensis* sp. nov.

Discussion. Distinguishing characters of adult females of *C. liannae* are: a deeply immersed cephalon with vestigial eyes; a pereon with nearly parallel sides; a pleonite 1 with low, blunt anterolateral angles; a pleon that is little immersed and a rounded pleotelson.



Figures 58-76. *Cymothoa oestrum* female: (58) antennule; (59) antenna; (60) maxillule; (61) mandible and palp; (62) maxilla; (63) maxilliped; (64-70) pereopods 1-7; (71-75) pleopods 1-5; (76) uropod. Scales: 58, 59 and 60 = 500 μ m, 61-62 = 200 μ m, 63 and 76 = 1000 μ m, 64-75 = 2000 μ m.

Cymothoa brasiliensis Schiödte & Meinert, 1884

Fig. 79

Hosts: *Sargus* sp., *Caranx* sp.

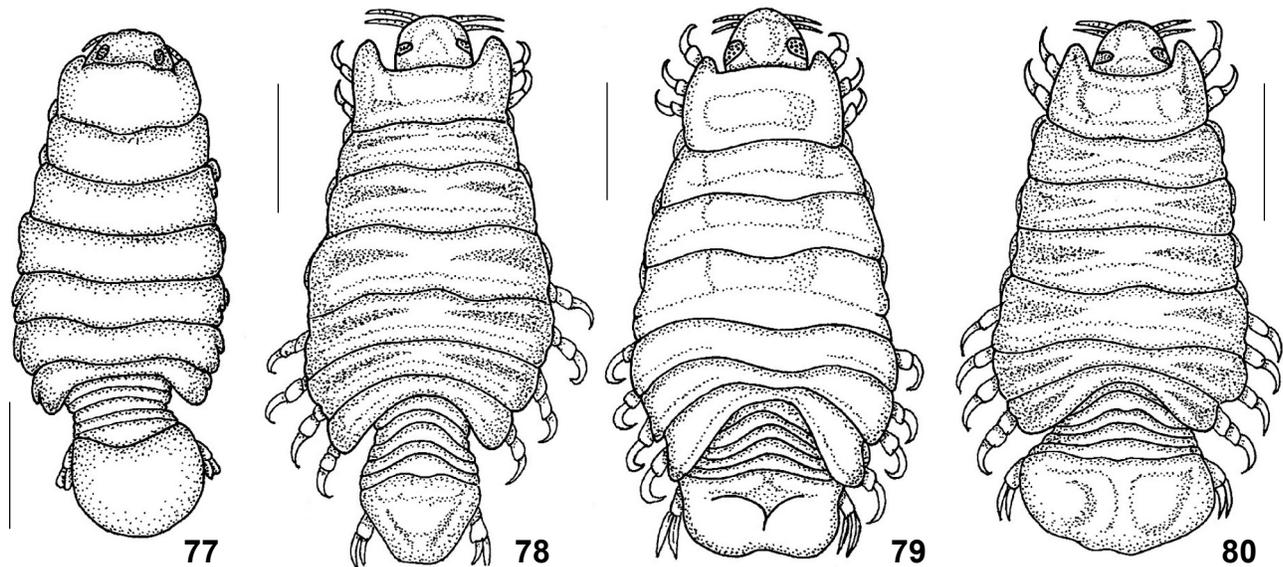
Site: Mouth, over tongue.

Geographic distribution: Western Atlantic Ocean from Trinidad to Rio de Janeiro, Brazil.

Species description: No detailed description of this species is available and apparently the type material has been lost. Ac-

ording to TRILLES (1979, 1981) this species is rare, at least in collections. He was able to examine 5 specimens, he identified as *C. brasiliensis*, in Holland. They ranged in length from 11 to 21 mm.

Distinguishing characters. According to the figure of *Cymothoa brasiliensis* in SCHIÖDTE & MEINERT (1884), redrawn here as figure 79, the adult female has a free cephalon with prominent eyes, low and blunt anterolateral angles on pereonite 1, a deeply immersed pleon and lateral margins of pereonite 7 that reach or even overlap the pleotelson.



Figures 77-80. Females of other species of *Cymothoa*: (77) *C. liannae*; (78) *C. geris*; (79) *C. brasiliensis*; (80) *C. ianuarii*. Scales: 78 = 3000 μ m, all other scales = 5000 μ m.

Cymothoa gerris Schiödte & Meinert, 1884

Fig. 78

Host: *Gerres brasiliensis* (Cuvier, 1824).

Site: Mouth, over tongue.

Geographic distribution: The description of this species was based on a single female specimen collected along the coast of Northeastern Brazil in the 1880's and it has not been reported since.

Species description (adapted from SCHIÖDTE & MEINERT 1884): Ovigerous female: Body about twice as long as wide; widest at level of pereonites 4 and 5. Cephalon slightly wider than long, not immersed in pereonite 1, frons rounded, eyes present. Anterolateral angles of pereonite 1 large, blunt, surpassing eyes. Antennules of 8 articles; antennae of 9 articles. Pereopods 1-3 smaller, 4-7 of increasing length; low carinae on bases of 4-7; dactyls long, stout, curved. Pleon abruptly narrower than pereon, not immersed in pereonite 7. Pleotelson triangular; uropods reaching posterior margin of pleotelson. Measurement: 13 mm long.

Distinguishing characters. According to the figure of *Cymothoa gerris* in SCHIÖDTE & MEINERT (1884), redrawn here as figure 78, the adult female has a free cephalon with visible eyes; high, blunt anterolateral angles on pereonite 1 that surpass the eyes anteriorly; a pleon that is not immersed in pereonite 7; a triangular pleotelson and uropods that reach the posterior margin of the pleotelson.

Cymothoa ianuarii Schiödte & Meinert, 1884

Fig. 80

Hosts: *Priacanthus* sp., *Platessa* sp.

Site: Mouth, over tongue.

Geographic distribution: Two females of this species were

collected near Rio de Janeiro, Brazil, in the 1880's.

The species has not been found since and apparently the type material has been lost.

Species description (adapted from SCHIÖDTE & MEINERT 1884): Female without eggs: Body twice as long as wide; widest at level of pereonite 5. Cephalon wider than long, immersed in pereonite 1, frons rounded, eyes visible. Anterolateral angles of pereonite 1 surpassing eyes. Antennules of 8 articles; antennae of 9 articles. Pereopods 1-3 manifestly smaller than 4-7 which gradually increase in length; 4-7 with carinae on bases. Pleon immersed in pereonite 7, increasing in width posteriorly. Pleotelson twice as wide as long. Uropods not reaching posterior margin of pleotelson. Measurements: 13.5-20 mm long.

Distinguishing characters. According to the figure of *Cymothoa ianuarii* in SCHIÖDTE & MEINERT (1884), redrawn here as figure 80, the female has a cephalon immersed in pereonite 1 and prominent eyes; anterolateral angles of pereonite 1 that surpass the eyes; a tapered pleon that is immersed in pereonite 7 and a pleotelson that is twice as wide as long.

A key is presented herein as an aid to the separation of the species of *Cymothoa* known from Brazilian waters.

Key to adult females of Brazilian *Cymothoa*

1. Eyes absent. Pereopods 4-7 manifestly larger than 1-3 (Figs 52-53) *C. oestrum*
2. Eyes present. Pereopods 1-7 subequal in size 3
3. Pleon not immersed in pereonite 7:
 - A. Pleotelson triangular (Fig. 78) *C. gerris*
 - B. Pleotelson rounded, shield-like (Fig. 77) *C. liannae*
4. Pleon immersed in pereonite 7 to a greater or lesser degree.
 - A. Pleon deeply immersed in pereonite 7:
 - (1) Cephalon not immersed in pereonite 1. Pleotelson

- about 2 times wider than long (Fig. 79)
 *C. brasiliensis*
- (2) Cephalon immersed in pereonite 1. Pleotelson about
 3 times wider than long (Figs 1-2)
 *C. catarinensis* **sp. nov.**
- B. Pleon less deeply immersed in pereonite 7:
- (1) Cephalon not deeply immersed in pereonite 1. Pereonites
 5-6 much wider than 4 (Fig. 80) *C. ianuarii*
- (2) Cephalon deeply immersed in pereonite 1. Pereonites 4-6
 subequal in width (Figs 27-28) *C. excisa*

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