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Redescription of two *Cymbasoma* (Copepoda: Monstrilloida) collected during the Siboga Expedition (1899-1900)

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Summary

Reexamination of monstrilloid copepods collected during the Siboga Expedition (1899-1900) and deposited in the Zoological Museum (Amsterdam) has yielded the opportunity of redescribing some of these species according to upgraded standards. The only two species of *Cymbasoma* (*C. gigas* A. SCOTT and *C. bullatum* A. SCOTT) collected in this expedition are redescribed in detail from the type (syntypic) specimens. The former species, which is the largest monstrilloid known, has several interesting characters including the relative length of the antennules, the ornamentation of the head, and the peculiar spines on the first exopodal segment of legs 1-4. The other one (*C. bullatum*) shows unique characters such as the basal swelling of the caudal setae, the ornamentation of the head with a pair of horn-like processes, and peculiar details of the antennular armament. Both species are compared with related forms for the first time; lectotype and paralectotype specimens are also designated herein.

Key words: Crustacea, invertebrate taxonomy, copepods

Introduction

Monstrilloid copepods are in urgent need of revision (HUYS & BOXSHALL, 1991). About half of the ca. 100 species known currently (see GRYGIER, 1995) were described during the last decades of the 19th century and the two first decades of the 20th century. The taxonomic descriptions of monstrilloid copepods have been very variable in terms of detail, extension, and quality. It is clear now that upgraded morphological descriptions are needed to conduct any further attempts to review these peculiar copepods. This task can be completed adequately only by reexamination of the type material, when available, and through detailed redescriptions using complete descriptive models. This process will eventually allow uniform descriptions of most species, so that a revision of the entire group becomes possible, supported on sounder bases. This is, of course, a long-term task of which this work represents a step.

The Siboga Expedition, charged with the research of the fauna and flora of the varied seas in the Indo-Australian Archipelago, started from Surabaya on March 1899. Although the Siboga main objective was in the first place the research of the deep basins of the archipelago, other environments such as reefs, shallower waters, and beaches were investigated as well. Coastal and reef-related areas are commonly inhabited by monstrilloid copepods (SUÁREZ-MORALES, 2001). About nine years after the expedition ended, the British copepodologist Andrew SCOTT (1909) published his descriptions and illustrations of 10 species of Monstrilloida of which two belong to the genus *Cymbasoma* (originally reported as *Thaumaleus*). He provided some drawings and a short diagnosis of each species which suffice to recognize both of them as previously unknown taxa. However, for each of these species of *Cymbasoma* only two drawings were published (see SCOTT, 1909); hence, several morphological details remained unknown. Moreover, these species were not compared with related forms and no holotype specimens were designated from the original series. Both species are fully redescribed herein based on the reexamination of the type material and following the upgraded standards for monstrilloid copepods descriptions set by GRYGIER & OHTSUKA (1995). Taxonomical comments and comparisons are made for both species; lectotype specimens are also designated herein.

Systematics

Order Monstrilloida

Cymbasoma gigas (A. SCOTT, *1909*)

(Figs. 1-19)

MATERIAL

Adult female lectotype, ethanol preserved, undissected. Plankton collection Siboga Expedition, Station 99, off North Ubian, Sulu Islands, Malayan Archipelago. Adult female paralectotype, ethanol-preserved, undissected. Plankton collection, Siboga Expedition, same locality, vial deposited at the Zoological Museum of the University of Amsterdam, The Netherlands under catalog number ZMA 201477.

DESCRIPTION

Female. Total body length of lectotype: 8.2 mm measured from anterior end of cephalic somite to posterior margin of anal somite. Lectotype specimen badly damaged, incom-

plete, broken in two parts, cephalothorax measured 4.8 mm, estimated total length: 7.2 mm. Cephalothorax of lectotype (incorporating first pedigerous somite) slightly curved, probably a result of fixation, accounting for 67% of total body length (Fig. 1). Paralectotype specimen with cephalothorax straight (Figs. 2,3). Forehead flat in dorsal view, without ornamentations, no sensillae were found. Anterior part of head with two (lectotype) or three (paralectotype) pairs of cuticular bumps located between antennule bases and oral papilla (arrowed in Figs. 5, 6). A short, narrow cuticular striation runs next to middle bump set of paralectotype. Oral papilla lying midventrally 0.95 (lectotype)- 0.92 (paralectotype) of way back along cephalothorax (Figs. 1, 3). Oral papilla protuberant in lectotype (Figs. 4, 6), noticeably lower in paralectotype (Fig. 5). Due to the tight, solid arrangement of internal structures, no other cuticular ornamentation nor the eye presence or structure was observed.

As usual in female monstrilloids, antennule four-segmented. Antennules absent in lectotype specimen, observations based on paralectotype only. Ratio of length of antennule segments, from proximal to distal: 17.4: 20: 15.5: 47.1= 100. Antennules relatively short, slightly longer than 16% of cephalothorax length, armed with 0,I; V; I; 6, II setae (Arabic numerals) and spines (Roman numerals) (Figs. 7, 8). In terms of pattern described by GRYGIER & OHTSUKA (1995) for monstrilloid antennular armature, elements found are: 1 on first, $2d_{1,2}$,$2v_{1-3}$ on second, 3 on third, and $4v_{1,3}$, $4d_{1.2}$, IVv, Vm, Vd, 6_1, 6_2, $b_{3,4}$ on fourth segment, some of those in latter, cut off short or recognized by sockets (see Figs. 7, 8). Most setae lost, only spines remain.

Incorporated first pedigerous somite and three free succeeding pedigerous somites each bearing a pair of biramous swimming legs. Basis with diagonal division articulating it with large, rectangular coxa. Intercoxal plate with some variation between legs, from clearly subquadrate on first leg (Fig. 12) to a rectangular shape on fourth leg (Fig. 11). In all cases with small knobs on posterior margin. No lateral hair-like seta was found on legs 1-4, probably lost. Endopodites and exopodites of legs 1-4, triarticulated. Legs 1-4 slightly decreasing in size posteriorly. 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. Spine on outer margin of first exopod of legs 1-4 bifid at distal end (arrowed in Figs. 15-17). All natatory setae showed remains of being biserially plumose except for seta on outer distal corner of third exopodal segments of legs 1-4, this being naked along inner side and with row of tightly distributed denticles along outer margin (Figs. 15, 18). Armature of swimming legs as:

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

Fifth legs of lectotype represented by two lobes (Fig. 13). Inner lobe shorter than outer one, subtriangular, joined at base with outer lobe, unarmed. Outer lobe with three subequal setae; setae absent on lectotype, but determined based on SCOTT's (1909) observations (see Fig. 19). Basal portion inserted on posterior half of fifth pedigerous somite. Outer setae about 3 times as long as lobe.

Urosome consisting of fifth pedigerous somite, genital double somite, and one free abdominal somite. Pedigerous somites 2-4 accounting for 23% of total length. Urosome relatively short, excluding furcal rami accounts for 10% of total body length. Genital double somite subquadrate, outer margins slightly globose, posterior margin straight. Somite with dorsal suture at midlength, with posterior ventral surface rugose, ending in pair of subtriangular processes (arrowed in Fig. 10) . Double genital somite representing slightly more than 1/3 of length of urosome. Ratio of length of fifth pedigerous somite, genital double somite and free abdominal somite being: 34.7: 39: 26.3 (= 100). Medial portion of genital double somite moderately swollen on ventral anterior margin, probably representing base of ovigerous spines, absent in the lectotype. Anal somite much narrower than genital double somite, with notched lateral margins (see Figs. 9, 10). Caudal rami rectangular, ca. 2 times longer than wide, moderately divergent, bearing three terminal setae, these broken off on lectotype, but recognized by remaining bases or sockets (Fig. 9). SCOTT (1909) depicted them as subequal in length and breadth.

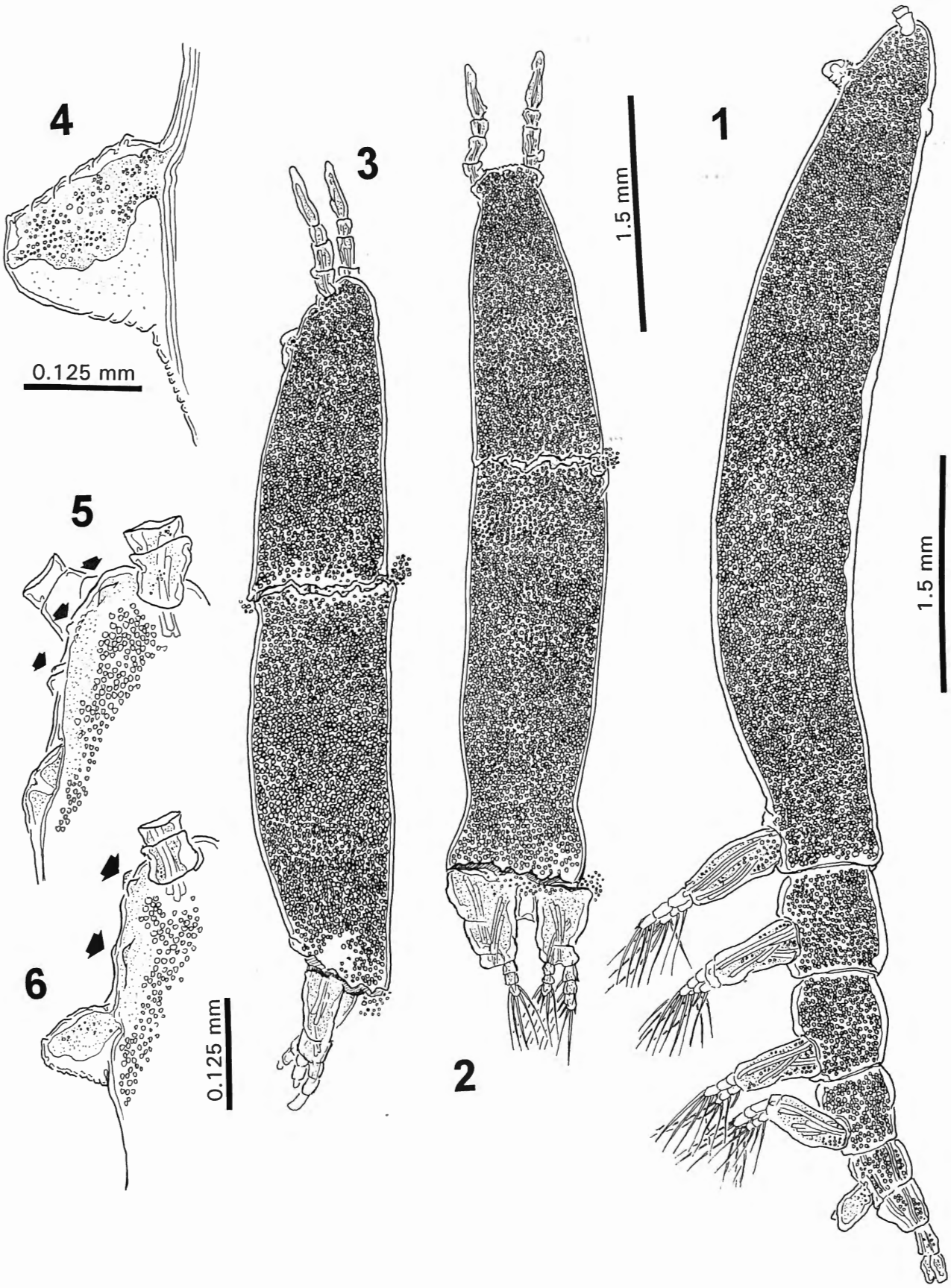
MALE

Unknown.

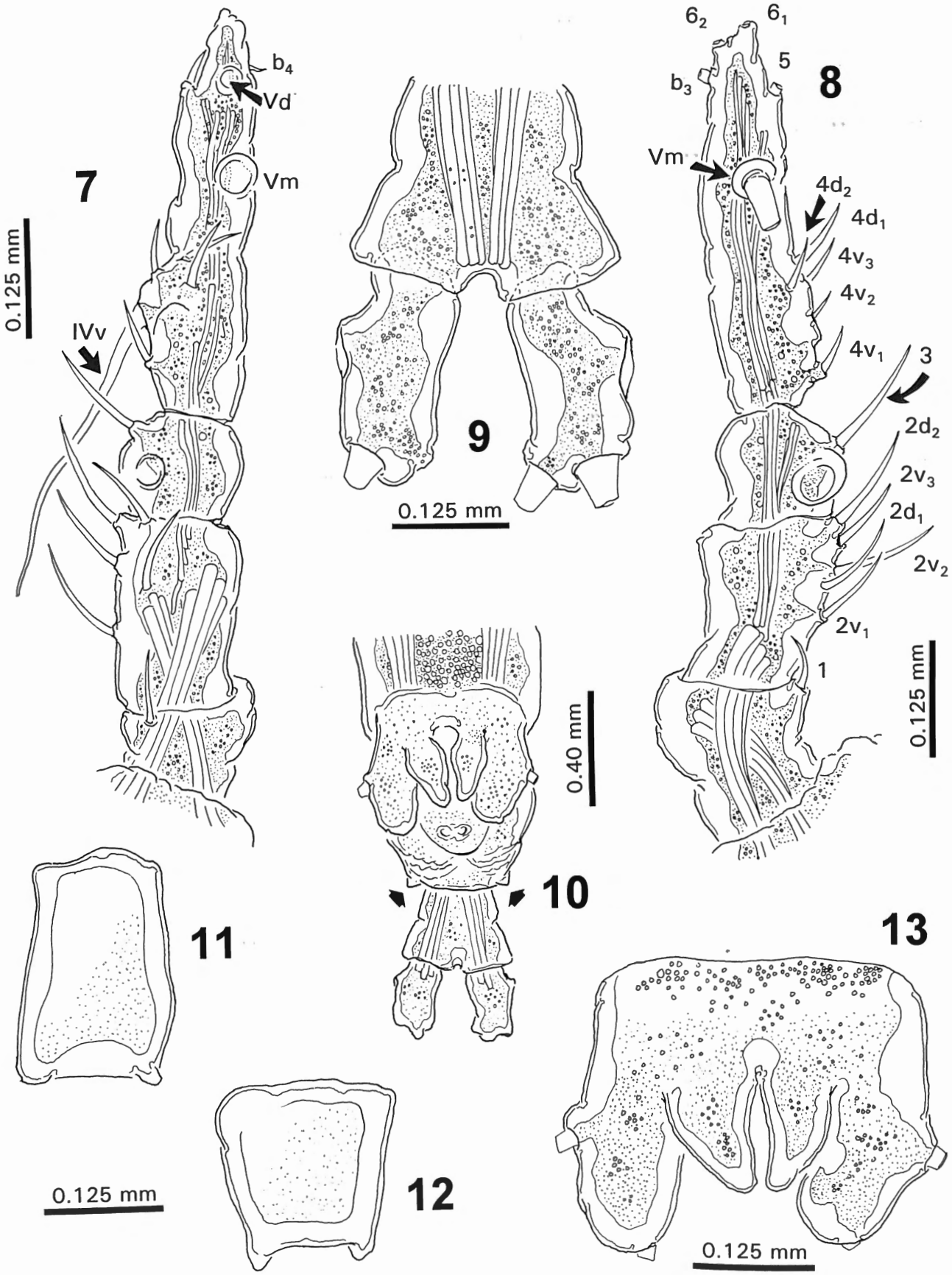
REMARKS

Although SCOTT (1909) mentioned the presence of three specimens of this species in the collection, only two were found in the museum's vial. Both of them were incomplete and due to the time of preservation (over 90 years), they are extremely fragile, thus making them quite difficult to handle for taxonomical examination. The lectotype is almost complete, its antennules are broken off at the first segment, it is the larger specimen. The paralectotype is broken in two parts, one includes the cephalothorax with the antennules and the incorporated first swimming leg, the other part are somites 1-3 only, with the swimming legs, the rest of the body is missing. Swimming legs are also incomplete in both specimens, with many setae broken and some have only one ramus.

In the original description of this species, SCOTT (1909) noticed the very large size of *C. gigas*, he reported a length of 8 mm for the female. Hence, it is probable that he made his observations based mainly on the larger specimen (actually measuring 8.2 mm), which is the one designated herein to be the lectotype. He also made notice of the proportional length of the cephalothorax, which represents almost 70% of the body length. This character alone relates this species with several other *Cymbasoma* with a cephalothorax representing over 60% of the total body length, such as *C. boxshalli* (SUÁREZ-MORALES, 1993), *C. bowmani* SUÁREZ-MORALES & GASCA, 1998, *C. californiense* SUÁREZ-MORALES & PALOMARES, 1999, *C. longispinosum* BOURNE, 1890, *C. morii* SEKIGUCHI, 1982, *Cymbasoma* sp from Toulon Bay SUÁREZ-MORALES (in prep.), *C. quintanarooense* SUÁREZ-MORALES, 1994, *C. striatus* (ISAAC, 1975), *C. thompsoni* (GIESBRECHT, 1892), *C. tumorifrons* (ISAAC, 1975), and *C. chelemense* SUÁREZ-MORALES & ESCAMILLA, 1997.



Figs. 1-6. *Cymbasoma gigas* (A. SCOTT). Female lectotype. 1) habitus, lateral view; female paralectotype, 2) habitus, dorsal view; 3) habitus, lateral view; lectotype, 4) oral papilla, lateral view; paralectotype, 5) anterior margin of head, lateral view; lectotype, 6) anterior margin of head, lateral view.



Figs. 7-13. *Cymbasoma gigas* (A. SCOTT). Female lectotype, 7) right antennule marked using setal nomenclature, dorsal view; 8) left antennule marked using setal nomenclature, dorsal view; 9) anal somite and caudal rami, ventral view; 10) urosomites showing fifth leg and posterior processes (arrowed), ventral view; paralectotype, 11) intercoxal plate, fourth leg; 12) intercoxal plate, first leg; lectotype, 13) fifth leg, ventral view.

Besides its size, *C. gigas* can be distinguished from most of these species by having a marginal notch on the anal somite; this character is shared only with *C. quintanarooense* and with *C. rigidum*, the latter with a relatively short cephalothorax, barely reaching 50% of the total length (SARS, 1921; ISAAC, 1975). It can be separated from *C. quintanarooense* by having a fifth leg with an inner lobe.

SCOTT (1909) correctly stated that the species could readily be separated from the other *Cymbasoma* by the structure of its fifth legs. Considering this group of species with relatively long cephalothorax, only *C. californiense, C. longispinosum, Cymbasoma* sp. from Toulon, *C. thompsoni, C. chelemense*, and *C. morii* have a fifth leg with an inner lobe. This lobe is clearly rounded and relatively smaller in *C. californiense* (see SUÁREZ-MORALES & PALOMARES, 1999), in *C. chelemense* (see SUÁREZ-MORALES & ESCAMILLA, 1997), and in *C. morii* (see GRYGIER, 1994). It is slightly elongated and distinctly mammilliform in *Cymbasoma* sp. from Toulon (SUÁREZ-MORALES, in prep.), and only in *C. thompsoni* and *C. longispinosum* (see SARS, 1921) the inner lobe is similar to that shown by *C. gigas*. The outer lobe in these two species is armed with three setae, but in *C. gigas* these setae are subequal in length and breadth whereas the innermost one is noticeably shorter and much slenderer than the other two in both *C. thompsoni* and *C. longispinosum*. Therefore, even considered alone, the structure of the fifth leg is a valuable character to recognize the female *C. gigas*. On the other hand, DESAI & KRISHNASWAMY (1962) stated that *C. bali* DESAI & KRISHNASWAMY, 1962 from Bombay resembles *C. gigas*, but differ in the structure of the fifth legs. The inner lobe in *C. bali* is quite reduced, appearing as a low, rounded protuberance, and its cephalothorax is relatively shorter (less than 58% of total body length).

SCOTT (1909) did not comment on the variation of the oral papilla nor on the presence of the cuticular ornamentations on the head area. In *C. gigas*, the position of the oral papilla, located very near of the antennule bases (at about 9% of the way back along the cephalothorax), seems to be also a unique feature when compared with other species of *Cymbasoma* with a similar condition, such as *C. tumorifrons* (12%), *C. striatus* (16%), *C. longispinosum* (15%), and *C. morii* (18%). SCOTT's drawing of the habitus is the only depicted reference on the proportion and probable armature of the antennule of *C. gigas*. This figure, although illustrated on a small scale, shows some setal pairs which seem to be correctly arranged and some can be identified in terms of GRYGIER & OHTSUKA's (1995) pattern. This is interesting since most of the setae are lost in the paralectotype, the only specimen with antennules. The presence and approximate size of some of the missing setae can be identified on the third (IIIv, IIId) and fourth (IVv, IVd, Vv, Vd) segments. Apparently, the terminal elements shown are in the position of 6_1 and 6_2 (commonly spiniform), in that case they are noticeably long in this species. These could also be "b" elements, more commonly setae which are subterminal in this group; in this case, they seem to be unbranched, a condition which is a secondary taxonomic character. The large ventral aesthetasc (4aes) on the fourth segment and the small terminal one (6aes) were not found in the paralectotype, both probably lost due to their fragility. The relative length of the antennules is yet another interesting character, it is smaller in *C. gigas* (11% of total body length) than in any other known species of *Cymbasoma* (14-28%).

The swimming legs show the usual pattern of armature and setation known for monstrilloids; hence, the basipodal external setae are probably present in this species although lost in the type specimens. A valuable character in the swimming legs is certainly the peculiar, bifid shape of the outer spine on the first exopod of legs 1-4. All the known species of Monstrilloida show the normal, acute pattern in this spine, with some variations such as a slight curvature or spinule ornamentations. Therefore, this one seems to be a key character which so far can be used to readily recognize this species.

The proportional length of the two last urosomites were considered by SCOTT (1909) relevant characters to separate *C. gigas* as a new species. However, it was found here that the proportion of the anal and genital double somites can hardly be considered a valuable taxonomic feature to recognize *C. gigas*, as several other species of the genus share the same or similar relative sizes (i.e. C. californiense, C. chelemense, C. morii, C. longispinosum). Instead, the main characters on these somites are: the peculiar ventral striation pattern near the posterior margin of the genital double somite and the latero-distal knob-like processes (arrowed in Fig. 10) on the same somite. SCOTT (1909) did not mention the presence of ovigerous spines, its insertion point is only suggested by a low protuberance on the ventral surface of the genital double somite. As discussed above, the most interesting character of the anal somite is its notched outer margins.

Mainly due to its body proportions and the structure of the fifth leg, *Cymbasoma longispinosum, C. californiense,* and *C. chelemense* are among the most similar species to *C. gigas*. It is expected that new collections in the Malayan area will yield a few more specimens of this conspicuous species so it can be studied completely.

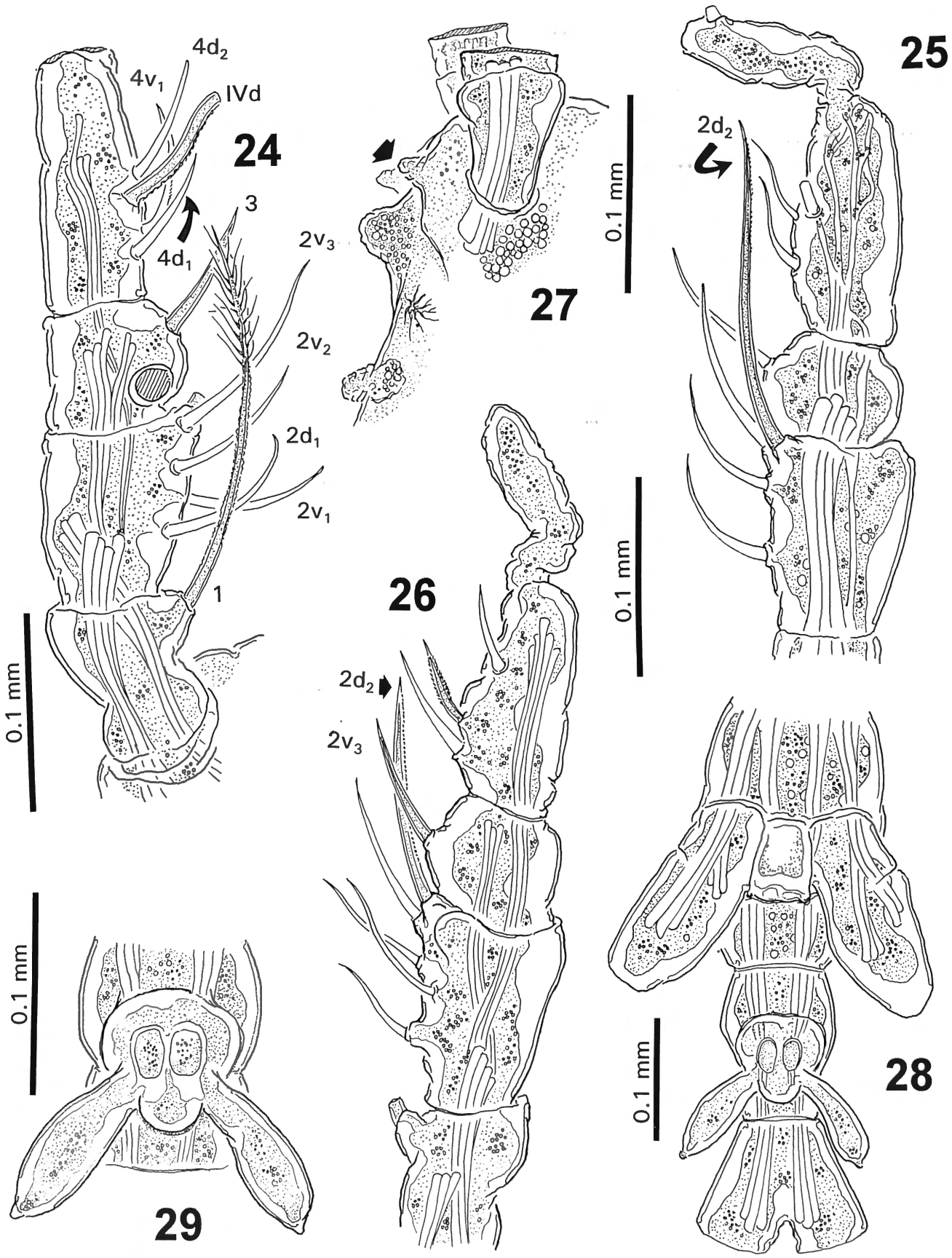
Cymbasoma bullatum (A. SCOTT, 1909)
(Figs. 20-34)

MATERIAL

Adult male lectotype, ethanol preserved, undissected. Plankton collection Siboga Expedition, Station 142, off Laiwui, Paternoster Islands, Malayan Archipelago. Twenty-one adult female paralectotypes, all damaged at different levels, ethanol-preserved, undissected. Plankton collection, Siboga Expedition, same locality, vial deposited at the Zoological Museum of the University of Amsterdam, The Netherlands under catalog number ZMA 201476.

DESCRIPTION

Male. Mean body length of lectotype specimen 1.62 mm, measured in dorsal view from anterior end of cephalothorax to posterior edge of anal somite. The few complete paralectotypes measured 1.65 mm, in average. Cephalothorax 0.70-0.73 mm long, representing almost 47% of total body length (Fig. 21). Oral papilla low, protruding from ventral surface (Fig. 20), located at almost 23% of way back along ventral surface of cephalothorax (Fig. 20). Cephalic region slightly protuberant on dorsal view. Dorsal



Figs. 24-29. *Cymbasoma bullatum* (A. SCOTT). Male paralectotype. 24) right antennule marked using setal nomenclature, ventral view; other paralectotypic specimen, 25) right antennule, dorsal view; lectotype, 26) right antennule, dorsal view; 27) anterior margin of head showing ventral processes (arrowed), lateral view; 28) fourth pedigerous somite plus urosome, showing genital complex, ventral view; 29) genital complex, ventral view.

ocelli present, close to anteriormost end of head, pigment cups relatively large, separated by a distance less than an eye diameter; poorly developed, almost unpigmented, rounded in dorsal view. No sensilla observed on anterior part of cephalic region. Anterior region of head between antennular bases and oral papilla with one pair of horn-like processes (arrowed in Fig. 27), and with relatively larger protuberant process almost between those mentioned above (arrowed in Fig. 20, Fig. 27). Pair of nipple-like cuticular process with convergent striae on the same ventral surface, between the large protuberance and the oral papilla (see Fig. 27).

Antennular length of lectotype specimen 0.42 mm, close to 27% of total body length, and *ca.* 67% as long as cephalothorax. As usual in male monstrilloids, antennule five-segmented, length ratio of antennular segments, from first to fifth: 15.6: 23.1: 13.7: 26.8: 20.8 (= 100) (Figs. 24-26). Several setae and spines broken off, mainly those of distal segment. Segments armed with 1-0; 0-V; 0-I; 3-IV; 1-0 setae (in Arabic numbers), spines (in Roman numbers), and aesthetascs (aes), respectively. In terms of basic setal nomenclature of GRYGIER & OHTSUKA (1995) for female monstrilloid copepod antennules, several elements were identified through examination of different paralectotypic individuals. Element present are, 1 on segment one, $2v_{1-3}$, $2d_{1,2}$ on segment two, 3 on segment three, and $4d_{1,2}$, $4v_1$, IVd on segment four (Figs. 24-26). The bases of "b"-group setae were observed in different specimens, none complete. The most complete setal groups identified in this specimen are on segments 1 and 2. In the former, element 1 extremely long, biserially setulated, reaching beyond distal margin of third segment. On second segment, element $2d_2$ very well developed, in some specimens almost reaching proximal margin of fifth segment (Fig. 25), in others reaching midway of fourth segment (Fig. 26). Seta $2d_2$ with biserial minute spiniform ornamentations or remains of setule bases.

First pedigerous thoracic somite incorporated into cephalothorax. This and succeeding three pedigers each bearing well developed swimming legs. Coxae of each pair unarmed, joined by intercoxal sclerite slightly longer than wide, with subtriangular to rounded processes on each side of posterior margin (Fig. 30). Basis separated from coxa posteriorly by diagonal articulation. Legs 1 and 2 slightly larger than 3 and 4; exopods longer than endopods in all cases. Usual seta on outer margin of basis of swimming legs 1-4 not found. All swimming legs with 3-segmented rami and with same armament pattern, except for leg 1 exopod (see Fig. 32). 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 biserially setulated except for seta on outer distal corner of third exopodal segments of legs 1-4, this being naked along inner side, but bearing row of small denticles along outer margin (Figs. 31,32,34). Inner seta on first exopodal segment relatively shorter than any other swimming seta.

Armament formula of swimming legs as:

	basis	exopod	endopod
Leg 1	0-0	I-1;0-1;I,2,2	0-1;0-1;1,2,2
Legs 2-4	0-0	I-1;0-1;I,2,3	0-1;0-1;1,2,2

As usual in monstrilloid males, fifth leg absent from fifth pedigerous somite. Genital complex on succeeding somite, represented by cylindrical structure (Figs. 28, 29), moderately elongated in lateral view (Fig. 20). Pair of relatively long subterminal digitiform genital lappets present on distal 1/3 of genital structure, both appearing elongated, strongly divergent, distally mammilliform. Lappets reaching halfway of preanal somite (Fig. 20). Rounded process present at common basal joint of lappets (Fig. 29).

Urosome consisting of four somites: fifth pedigerous (with no appendages), genital somite (with genital complex) and two free somites, the last of which is the anal somite. From dorsal view, genital somite much smaller than anal somite, somite expanded laterally. Anal somite being the largest of the urosome, representing almost 40% of the urosome.

Caudal rami subquadrate,approximately as long as wide (Fig. 22). With three terminal and one subterminal setae, setae incomplete in most specimens (Figs. 22,23). Basal part of two outer setae with rounded swelling; this is more evident in dorsal view and in some specimens.

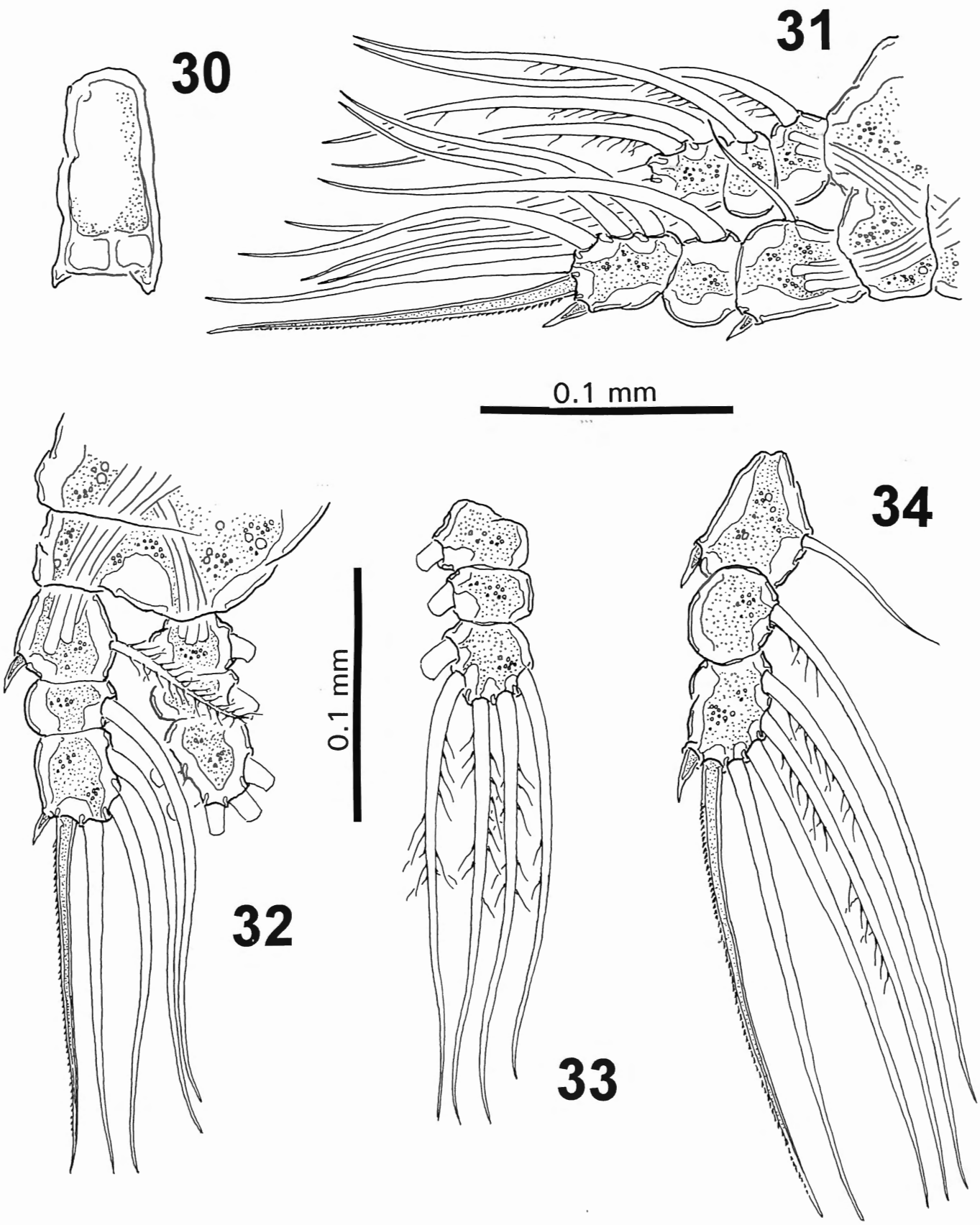
FEMALE

Unknown.

REMARKS

The specimens studied were in poor conditions for taxonomic examination. SCOTT (1909) reported the presence of thirty specimens in the collection. Only twenty-three were found in the museum's vial. Most of these specimens were broken and quantification of individuals was made on the basis of the number of cephalothorax in the vial. Only three specimens were complete; the lectotype was selected out from these, and all the remaining specimens were designated as paralectotypes.

This species was included in the recently published (SUÁREZ-MORALES, 2000) key for the identification of the males of *Cymbasoma*. In this key, *C. ghardaqanum* (ISAAC, 1975b) is considered to be the most similar species to *C. bullatum*. In fact, AL-KHOLY (1962), who made the original observations of this species, considered it to be a variety of *C. bullatum*. SUÁREZ-MORALES (2000) separated *C. ghardaqanum* by having a set of genital lappets with a bifid terminal process; this part is mammilliform in *C. bullatum*. There are other structures which, due to this analysis, can be used to differentiate both species. One of the most striking character is the length of the seta on the first antennular segment, it is very long in *C. bullatum* (see Fig. 24) and short or not particularly long in *C. ghardaqanum* (see AL-KHOLY, 1962, Fig. 23). The males of other species of *Cymbasoma* have a well developed seta on the first antennular segment, such as *C. mcalicei* SUÁREZ-MORALES, 1996, *C. longispinosum* BOURNE, 1899 (as depicted by GIESBRECHT, 1892), and *C. chelemense*. However, besides the differences on the genital complex among these species, it is only in *C. bullatum* and in *C. mcalicei* where this seta reaches beyond the distal margin of the third antennular segment. The length of setal element $2d_2$, reaching between halfway and the distal margin of the fourth antennular segment in *C. bullatum*, is yet another character separating this species from *C.*



Figs. 30-34. *Cymbasoma bullatum* (A. SCOTT). Male paralectotype. 30) intercoxal plate, fourth swimming leg; 31) third swimming leg; 32) first swimming leg; 33) endopod of fourth swimming leg; 34) exopod of fourth swimming leg.

ghardaqanum, in this species this element shows a regular development only. Other species with particularly long seta $2d_2$ are *C. longispinosus* (see GIESBRECHT, 1892, Fig. 23) and *C. chelemense* (see SUÁREZ-MORALES & ESCAMILLA, 1997). Another important character to distinguish *C. bullatum* from *C. ghardaqanum* is the relative length of the anal somite, it is about 28% of the urosome in the latter species whereas the figure is 40% in *C. bullatum*. Other species with relatively large anal somite are: *C. tumorifrons* and *C. rigidum* (33% of urosome) (see SARS, 1921; SUÁREZ-MORALES, 1999).

The genital complex is one of the main characters used to distinguish species of male monstrilloids (MCALICE, 1985). Particularly in *Cymbasoma*, the genital lappets have a narrow range of variation, all of them show the same general pattern. The genital complex of *C. bullatum* is similar to that of *C. longispinosum, C. tenue* (ISAAC, 1975) (as redescribed by Suárez-Morales & Riccardi, 1997), and *C. chelemense*. However, only *C. tumorifrons* (ISAAC, 1975) and *C. rigidum* THOMPSON, 1888 (see SARS, 1921) show the same type of mammilliform shape on the distal end (see SUÁREZ-MORALES, 1999). Hence, unless there are peculiar characters such as associated processes or a distinctive shape, the genital complex is a relevant but not a definitive identifying character per se.

The presence of a medial ventral protuberance on the head region together with two adjacent horn-like processes seems to be a strong character to distinguish *C. bullatum* from all other species of the genus. A similar protuberance, but without the adjacent horn-like processes has been depicted for *C. tenue* (see Suárez-Morales & Riccardi, 1997), with a much lower process, and in a new species of *Cymbasoma* from Brazil (SUÁREZ-MORALES & DIAS, this volume).

No data on the structure or armature of the swimming legs was provided in SCOTT's (1909) work. Examination of the swimming leg structure showed a normal pattern. The absence of the usual basipodal setae on legs 1-4 in the studied material is most probably related to the time of preservation and the consequent deterioration of the specimens. Another interesting character is the absence of setules on the inner margin of the terminal spiniform seta of the third exopodal segments of legs 1-4. The inner margin is commonly ornamented with setules.

The male of another species (*C. bali*) shows affinities with *C. bullatus*, this species was not considered in SUÁREZ-MORALES' key. Several characters are shared by the two species: 1) the size (1.5 mm in *C. bali* vs 1.6 mm in *C. bullatum*); 2) four caudal setae; 3) very long antennular element $2d_2$; 4) very long seta on first antennular segment; 5) relatively large anal somite. Both species could be confused easily, but examination of the genital complex will reveal a quite different structure for each species, as described above in *C. bullatus*, this structure is much shorter, without a mammilliform end, and with some asymmetry in *C. bali* (see DESAI & KRISHNASWAMY, 1962, Fig. 11).

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