

NEW SPECIES OF *CYMONOMUS* FROM SOUTHEASTERN AUSTRALIA  
(BRACHYURA, CYMONOMIDAE) WITH A KEY TO THE INDO-WEST  
PACIFIC SPECIES

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ABSTRACT

Two new species of *Cyonomus* A. Milne-Edwards, are described and illustrated, representing the only species of the genus known from Australia. *Cyonomus kapala* sp. nov., from New South Wales, most closely resembles *C. curvirostris* Sakai, 1965, from Japan. *Cyonomus soela* sp. nov., from Tasmania, most closely resembles *C. bathamae* Dell, 1971, from New Zealand. *Cyonomus soela* also superficially resembles the East African *C. valdiviae* Lankester, 1903, but that species differs most significantly in having seven instead of six abdominal somites. Therefore, *C. valdiviae* is transferred to *Cyonomoides* Tavares, 1993. A key to the Indo-West Pacific Cyonomidae is given.

RÉSUMÉ

Deux espèces nouvelles de *Cyonomus* A. Milne-Edwards, sont décrites et illustrées; elles représentent les seules espèces connues du genre en Australie. *Cyonomus kapala* sp. nov., de Nouvelles-Galles du Sud ressemble à *Cyonomus curvirostris* Sakai, 1965, du Japon. *Cyonomus soela* sp. nov., de Tasmanie ressemble à *C. bathamae* Dell, 1971 de Nouvelle-Zélande. *Cyonomus soela* ressemble aussi à l'espèce d'Afrique orientale *C. valdiviae* Lankester, 1903, mais cette espèce diffère significativement en ayant sept somites abdominaux au lieu de six. En conséquence, *C. valdiviae* est transféré dans le genre *Cyonomoides* Tavares, 1993. Une clé des Cyonomidae de l'Indo-Ouest pacifique est fournie.

INTRODUCTION

Cyonomidae Bouvier, 1898, at present comprises five genera: *Cyonomus* A. Milne-Edwards, 1880, *Cymopolus* A. Milne-Edwards, 1880, *Curupironomus* Tavares, 1993 and *Cyonomoides* Tavares, 1993 (both cf. Tavares 1993b), and *Elassopodus* Tavares, 1993 (cf. Tavares, 1993a). Three genera are represented in the Indo-West Pacific: *Elassopodus*, *Cyonomoides*, and *Cyonomus*. The first cyonomid to be reported from Australian waters was *Cyonomus delli* Griffin

& Brown, 1976. Tavares (1993b) restricted *Cymonomus* to species with a six-segmented abdomen and transferred Griffin & Brown's (1976) species to a new genus, *Cymonomoides*, on the basis of its seven-segmented abdomen. To date, however, no further cymonomids have been reported from Australia. Therefore, the two new species described below represent the only Australian records of *Cymonomus*.

#### MATERIALS AND METHODS

Measurements of specimens are in millimetres (mm). Carapace width (cw.) is the greatest width and carapace length (cl.) includes the rostrum. Pereiopods 1-5 are abbreviated as P1-5, respectively. Specimens examined are deposited in the collections of the Australian Museum (AM).

#### SYSTEMATIC ACCOUNT

##### CYMONOMIDAE Bouvier, 1898

##### *Cymonomus* A. Milne-Edwards, 1880

##### *Cymonomus kapala* sp. nov. (figs. 1-2)

Type material. — Holotype: AM P26639, ovigerous female (cl. 3.0, cw. 3.2 mm), off Sydney, New South Wales, 33°46'S 151°43'E, 176 m, coarse sand and shell, dredge, FRV "Kapala", K77-23-01, coll. D. Brown, 5 Dec. 1977. Paratypes: AM P62850, 1 male (cl. 2.7, cw. 2.6 mm), type locality; AM P62849, 2 ovigerous females (cl. 2.8-3.1 mm, cw. 3.1-3.2 mm), type locality.

Diagnosis. — Carapace with large smooth, hemispherical boss on each posterolateral border; dorsal and lateral surfaces covered with stalked, globular, club-shaped, or pointed tubercles; lateral frontal projections tuberculate, slightly shorter than rostrum, situated below plane of eyestalks, and about two-thirds their length. Pereiopods covered with globular or elongate tubercles. P4-5 dactylus with small spines on inner margin. Abdomen adorned with stalked, club-shaped, rounded or acute tubercles.

Description. — Carapace subquadrate, regions distinct, with large smooth, hemispherical boss on each posterolateral border. Dorsal and lateral surfaces covered with stalked, globular, club-shaped, or pointed tubercles, becoming larger and more pronounced laterally, particularly in hepatic and anterolateral regions, smaller and lower medially. Frontal region about half carapace width; lateral frontal projections tuberculate, slightly shorter than rostrum, situated below plane of eyestalks, and about two-thirds their length. Rostrum slender, tapering distally, minutely serrate and setose laterally, about two-thirds length of eyestalks. Eyestalks

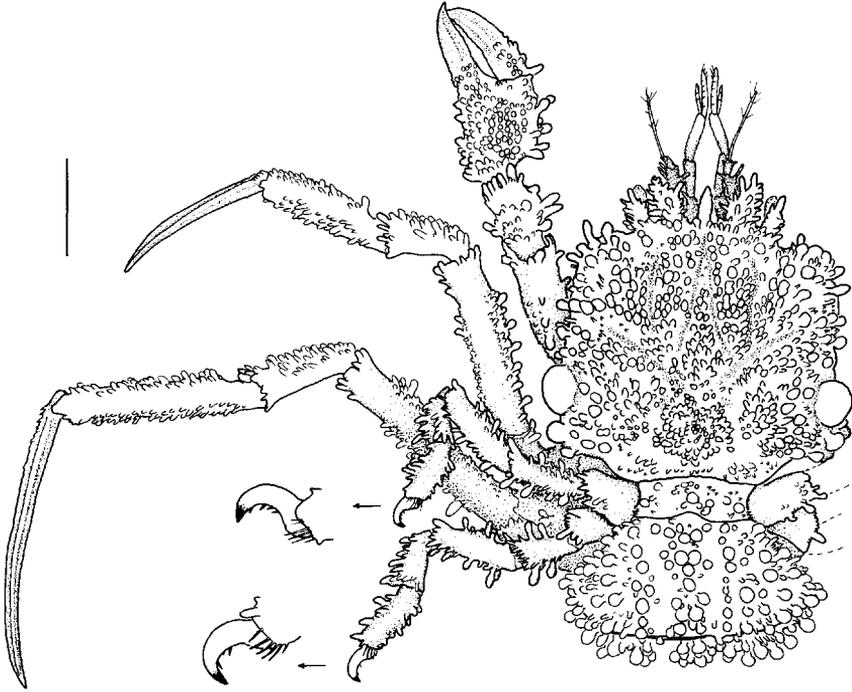


Fig. 1. *Cymonomus kapala* sp. nov., holotype female (AM P26639), dorsal. Scale = 1.0 mm.

flattened, distinctly divergent; completely fused to carapace lateral to base of rostrum; dorsally and ventrally covered with globose, elongate or acute tubercles; margins setose.

First segment of antennular peduncle with blunt, elongate, distal projections; other segments minutely granulate. Antennal peduncle segments with blunt, slender projections and tubercles.

Endopod of third maxilliped sparsely adorned with stalked, globose, slender or acute tubercles; dactylus with few blunt tubercles; propodus with short spines on margins; carpus with short spines on margins and globose tubercles distally; merus with row of slender spines on mesial margin and globose tubercles on outer surface; ischium with sparsely distributed tubercles and few larger globose tubercles. First segment of exopod distally exceeding merus of endopod; adorned with scattered spinules and several globose tubercles.

Chelipeds (P1) equal in size and spination in both sexes; occlusal surfaces of dactylus and pollex crenulate; outer, dorsal and ventral surfaces covered with globular or elongate tubercles; distal half of dactylus and distal three-quarters of pollex smooth, without tubercles. Propodus with outer surface adorned with granular tubercles, and with larger globular tubercles dorsally and ventrally; inner surface smooth. Carpus covered with elongate and globose tubercles. Merus

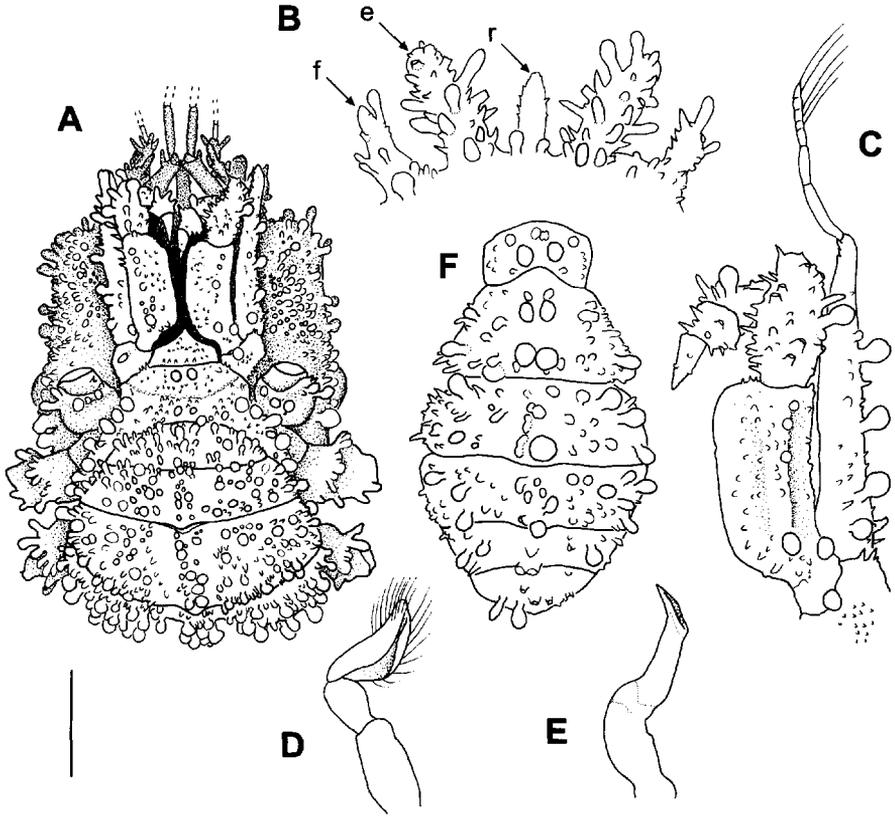


Fig. 2. *Cymonomus kapala* sp. nov. A-C, holotype female (AM P26639). D-F, paratype male (AM P62850). A, ventral surface; B, carapace frontal region (e, eyestalk; f, lateral frontal projection; r, rostrum); C, third maxilliped, left; D, male pleopod 1, right posterior; E, male pleopod 2, right posterior; F, male abdomen. Scale A, F = 1 mm, B-E = 0.5 mm.

with stalked, globose tubercles distally, dorsally and ventrally, and with smaller tubercles proximally. Ischium and basis with elongate, club-shaped tubercles distally.

P2 and P3 long, third longest; all segments except dactyl with club-shaped, rounded, or acute tubercles dorsally and ventrally; dactylus broadly curved, longer than propodus, minutely serrate dorso-proximally.

P4 and P5 reduced, lengths equal to combined length of carpus and merus of P3; all segments except for dactyl adorned with club-shaped, rounded, or acute tubercles dorsally and ventrally; dactylus markedly shorter than propodus, falcate, with corneous apex, inner margin with 3 or 4 small spines.

Male and female abdomen 6-segmented, adorned with stalked, club-shaped, rounded, or acute tubercles. Telson about one third as long as wide in male, half as long as wide in female.

First male pleopod 3-segmented; distal segment cannulate, forming copulatory tube, with moderately long distal setae. Second male pleopod with segments fused; distomesial margin slightly hollowed, apex acute.

Colour in life. — Carapace and pereiopods dirty-white, that of females with faint pinkish cast. Eggs pink-red.

Etymology. — Named for the FRV "Kapala" (formerly New South Wales Fisheries) in recognition of the enormous contributions made to the knowledge of the eastern Australian crustacean fauna by the ship and its crew; used as a noun in apposition.

Remarks. — *Cyonomus kapala* sp. nov. is unique in the family for bearing the large, hemispherical boss on each posterolateral border of the carapace. *Cyonomus kapala* most closely resembles *C. curvirostris* Sakai, 1965, in bearing the numerous, globose, or club-shaped tubercles covering the dorsal and ventral surfaces of the body and pereiopods. Aside from the large, hemispherical posterolateral carapace bosses, *C. kapala* differs from *C. curvirostris* in having relatively shorter eyestalks and in having fewer, less uniformly distributed tubercles on the carapace and abdomen. In *C. curvirostris*, the carapace tubercles are uniformly distributed whereas in *C. kapala*, regions are demarcated by narrow areas devoid of tubercles. Similarly, the abdomen is uniformly and densely tuberculate in *C. curvirostris* whereas in *C. kapala*, a narrow 'strip' on either side of the abdominal midline generally lacks tubercles. *Cyonomus trifurcus* Stebbing, 1920, also resembles *C. kapala* and *C. curvirostris* in having globose tubercles on the pereiopods, the anterior portion of the carapace, and the thoracic sterna, but differs chiefly in having a longer rostrum and in lacking the lateral frontal processes on the carapace. Other species of *Cyonomus* may have some club-shaped tubercles on the chelipeds, but the carapace surface is granulate or adorned with small, low tubercles.

*Cyonomus kapala* bears small, short spines on the inner margins of the dactyli of P4-5. The presence of dactylar spines on P4-5 is not mentioned by Sakai (1965, 1976) for *C. curvirostris*, but their presence in *C. kapala* and *C. trifurcus* suggests that they might be present in Sakai's species.

Specimens in the type series of *C. kapala* are morphologically uniform, but one female paratype is abnormal. In that specimen, the general tuberculation on the right posterolateral margin is reduced and the large hemispherical boss is absent suggesting that the right portion of the carapace may have been damaged.

All three female specimens of *C. kapala* are ovigerous. Two specimens bear two eggs and the third bears one. The eggs of *C. kapala* (1.0-1.1 mm in diameter) are massive relative to body size (2.7-3.2 mm cl.). Moreover, the large egg size coupled with their low number suggests that larvae may hatch at a late stage of

development thereby limiting dispersal potential. The egg number and size in *C. kapala* contrasts strongly with that of *C. soela* sp. nov. In both species the eggs are of similar absolute size, but in *C. soela* the carapace dimensions are more than double that of *C. kapala* and the clutch size is larger by an order of magnitude. Apparently, *C. kapala* favours K-selective reproductive strategies in comparison to *C. soela*.

Distribution. — Known only from off Sydney, New South Wales, at a depth of 176 m.

### ***Cymonomus soela* sp. nov. (figs. 3-4)**

Type material. — Holotype: AM P62846, ovigerous female (cl. 7.2, cw. 7.0 mm), off St. Patricks Head, Tasmania, 41°37.3-39.8'S 148°41.4-40.5'E, 940-990 m, RV "Soela", S05/87/06, coll. K. Graham, 11 July 1987. Paratype: AM P62847, female (cl. 7.0, cw. 6.8 mm), type locality.

Diagnosis. — Carapace dorsal surface minutely granulate, with granules becoming larger and longer anterolaterally; with blunt hepatic spine; frontal region not distinctly advanced beyond anterolateral margins; lateral frontal projections elongate, subequal to length of rostrum. Rostrum slender, about half-length of eyestalks. Eyestalks dorsally and ventrally tuberculate, distinctly divergent. Chelipeds granulate, coarsest dorsally. P2-5 granulate, coarsest on upper margins. P4-5 dactylus with corneous spines on inner margin. Female abdomen with margins and surface evenly granulate; telson about 0.4 times as long as wide.

Description. — Carapace subquadrate, regions weakly indicated, except for intestinal and cardiac regions; with blunt hepatic spine and with lower pterygostomian region swollen. Dorsal and lateral surfaces entirely covered with minute granules, with granules becoming larger and longer anterolaterally. Frontal region not distinctly advanced beyond anterolateral margins; about half anterior carapace width; lateral frontal projections elongate, situated below plane of rostrum, laterally tuberculate, with acute apices, subequal to length of rostrum. Rostrum slender, tapering to acute apex, minutely serrate laterally and tuberculate dorsally, about half-length of eyestalks, margins with 3-5 short setae. Eyestalks flattened, fused to carapace below rostral base, distinctly divergent; dorsally and ventrally tuberculate; cornea apparently vestigial; margins without setae.

First segment of antennular peduncle laterally tuberculate; other segments minutely granulate or smooth. Antennal peduncle segments tuberculate.

Endopod and exopod of third maxilliped tuberculate; first segment of exopod not exceeding merus of endopod.

Chelipeds (P1) equal in size and spination. Occlusal surfaces of dactylus and pollex crenulate; outer, dorsal and ventral surfaces tuberculate; distal half of dactylus and pollex smooth, without tubercles. Propodus outer surface granulate; dorsal

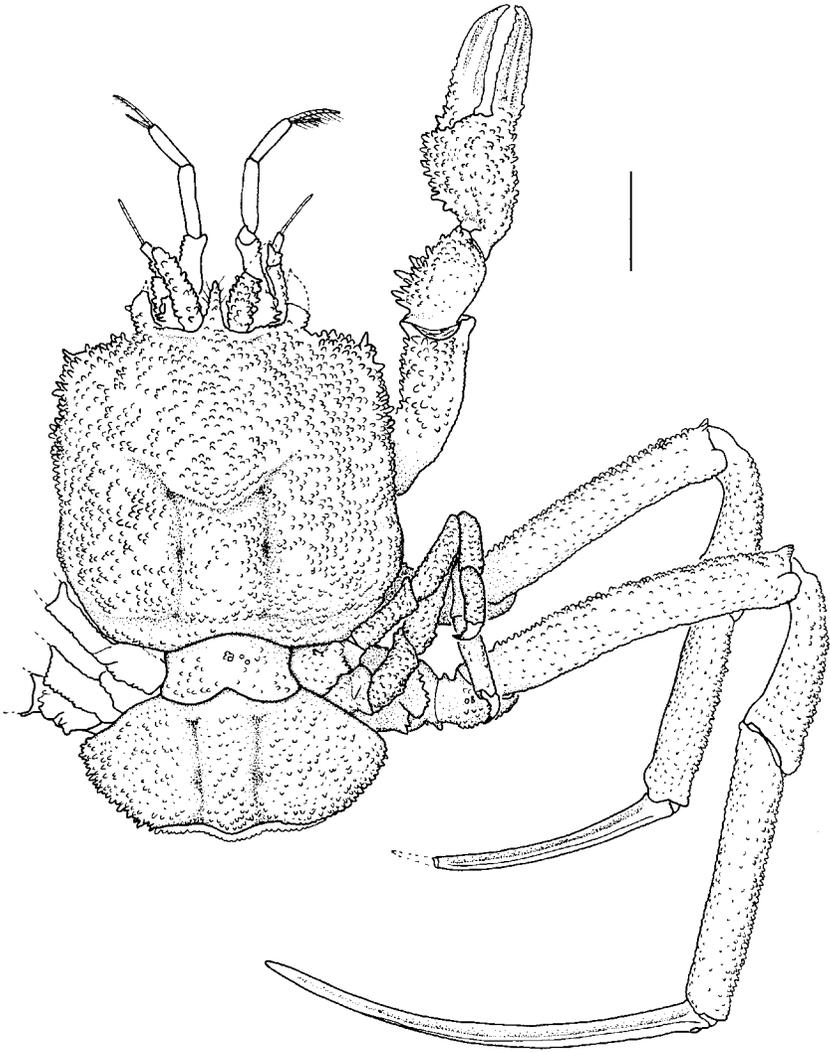


Fig. 3. *Cymonomus soela* sp. nov., holotype female (AM P62846), dorsal. Scale = 2 mm.

and ventral margins granular or with blunt spines; inner surface smooth. Carpus with granules and blunt spines dorsally. Merus, ischium, and basis granulate.

P2 and P3 long, slender, third longest; all segments except for dactylus granulate, coarsest dorsally; dactylus broadly curved, longer than propodus.

P4 and P5 reduced, lengths equal to merus of P3; all segments except for dactylus granulate; dactylus markedly shorter than propodus, falcate, with corneous apex and 4 or 5 corneous spines.

Female abdomen 6-segmented, margins and surface evenly granulate; telson length about 0.4 times width.

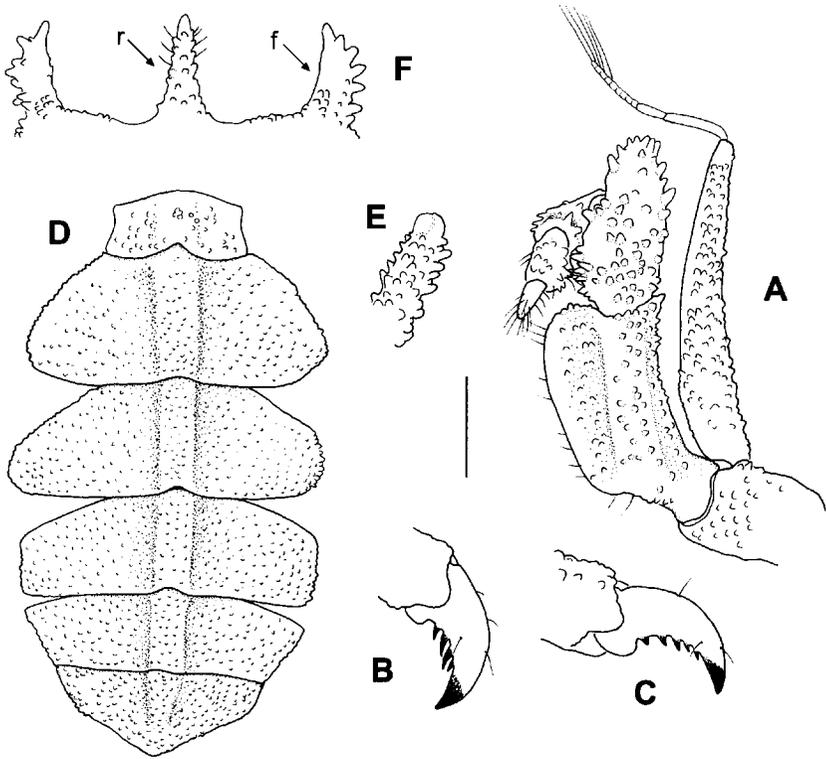


Fig. 4. *Cynomomus soela* sp. nov. A-E, holotype female (AM P62846). F, paratype, female (AM P62847); A, third maxilliped, left; B, pereiopod 4 dactylus, right; C, pereiopod 5 dactylus, right; D, abdomen; E, eyestalk, left distal portion; F, carapace frontal region (f, lateral frontal projection; r, rostrum). Scale A, E, F = 1.0 mm; B, C = 0.5 mm; D = 2.0 mm.

Colour in alcohol. — Completely faded.

Etymology. — Named for the CSIRO Research Vessel “Soela”, which has made large collections of deepwater Crustacea around Australia; used as a noun in apposition.

Remarks. — *Cynomomus soela* sp. nov. most closely resembles *C. bathamae* Dell, 1971 from New Zealand. It differs from *C. bathamae* in: (1) the lateral frontal projections of the carapace are as long as instead of distinctly shorter than the rostrum; (2) having the front not advanced beyond the anterolateral margins of the carapace; and (3) in having the telson length less than instead of more than half its width.

*Cynomomus soela* also closely resembles an Indonesian specimen described and partially figured by Ihle (1916b) as *C. valdiviae* Lankester, 1903. Whereas *C. soela* agrees in most respects with Ihle’s figure (1916b, fig. 67) of the frontal carapace region, he noted of the Indonesian specimen that the margins of the abdomen were lined with conical tubercles and that sparse setation was present

on the chelae and anterolateral carapace margins. In contrast, *C. soela* lacks setae on the chelae and carapace, and bears weakly granulate abdominal margins. Unfortunately, Ihle (1916b) did not mention the number of abdominal somites of his specimen. Nevertheless, *C. soela* seems unlikely to be conspecific with Ihle's Indonesian specimen, though this cannot be confirmed without re-examination of the specimen.

Whereas *C. soela* resembles the specimen identified by Ihle (1916b) as *C. valdiviae*, *C. soela* cannot be identified with *C. valdiviae* sensu stricto. *Cyonomus valdiviae* was named by Lankester (1903) based on Doflein's (1903) remarks and figure of the eyes and rostrum of a specimen identified as *C. granulatus* (Norman, 1873) collected by the "Valdivia" Expedition off East Africa. Doflein's (1903) East African specimen became the holotype of *C. valdiviae* Lankester, 1903. Doflein (1904) provided several additional figures and a more complete description of the holotype of *C. valdiviae* (as *C. granulatus*). Comparison of *C. soela* with Doflein's (1904) account and figures of the holotype of *C. valdiviae* shows the following differences: (1) numerous long setae are present on the pereopods and carapace margins of *C. valdiviae*, absent in *C. soela*; (2) the eyes are distinctly more divergent in *C. soela*; (3) the carapace regions are more distinctly indicated in *C. valdiviae*; (4) the lateral frontal projections in *C. valdiviae* appear to be much shorter than the rostrum instead of as long as the rostrum as in *C. soela*; (5) the dorsal surfaces of the chelipeds are strongly tuberculate in *C. soela*, weakly tuberculate in *C. valdiviae*; (6) the telson is as long as and  $3/4$  the width of the preceding segment in *C. soela* instead of being  $1/3$  as long and  $1/4$  the width of the preceding segment in *C. valdiviae*; and (7) the abdomen of *C. soela* comprises six instead of seven somites (*C. valdiviae*). The last mentioned difference is the most significant feature distinguishing *C. soela* from *C. valdiviae*, for the difference in abdominal segmentation distinguishes *Cyonomus* from *Cyonomoides*. Six abdominal somites are present in *Cyonomus* and seven in *Cyonomoides*. Doflein's (1904) account of the holotype of *C. valdiviae* (as *C. granulatus*) does not explicitly mention the number of abdominal somites although he does note that the last somite is narrow and triangular: "Das Abdomen des mir vorliegenden Weibchens endet mit einem dreieckigen Glied, welches mäßig schlank zuläuft" (Doflein, 1904: 33). A close examination of Doflein's (1904) figures (pl. 12 figs. 1-3) shows that seven abdominal somites are present, the last of which is markedly smaller and narrower than the preceding somite. Therefore, *Cyonomus valdiviae* must be transferred to *Cyonomoides*. The holotype of *C. soela* is ovigerous, bearing 24 eggs of 1.0-1.2 mm diameter.

Distribution. — Currently known only from off St. Patricks Head, Tasmania at 940-990 m depth.

## DISCUSSION

Three genera of the Cymonomidae are represented in the Indo-West Pacific: *Cymonomus*, *Cymonomoides*, and *Elassopodus*. With the transfer of *C. valdiviae* to *Cymonomoides* (discussed under the account of *C. soela*) and the addition of *C. kapala* sp. nov. and *C. soela* sp. nov., 24 species are at present included in *Cymonomus*, 12 of which occur in the Indo-West Pacific (Tavares, 1993a, b; Campos, 1997). Of the five species of *Cymonomoides*, two occur in the Indo-West Pacific. Many species of *Cymonomus* require revision, in particular since the number of abdominal somites, diagnostic for the genus, has not been confirmed for all species. Sakai (1965, 1976) did not indicate the number of abdominal somites in *C. curvirostris*, but unpublished figures of type material provided by K. Meguro (Biological Laboratory, Akasaka Imperial Palace, Tokyo) show that six abdominal somites are present. The number of abdominal somites requires confirmation in the following Indo-West Pacific species: *C. andamanicus* Alcock, 1905, *C. indicus* Ihle, 1916 (cf. Ihle, 1916a), *C. japonicus* Balss, 1922, *C. sagamiensis* Sakai, 1983, and *C. umitake* Takeda, 1981. The key below is included as a preliminary aid to the identification of the known Indo-West Pacific Cymonomidae.

## KEY TO INDO-WEST PACIFIC SPECIES OF CYMONOMIDAE

1. P4 and P5 vestigial, smaller than coxa of P3 . . . . . *Elassopodus stellatus* Tavares, 1993a
- P4 and P5 well-developed, though markedly smaller than P2-3 . . . . . 2
2. Abdomen 7-segmented . . . . . *Cymonomoides* 3
- Abdomen 6-segmented . . . . . *Cymonomus* 4
3. Rostrum short, triangular, about as long as wide, unarmed laterally . . . . .
- Rostrum long, slender, with lateral tubercles or projections . . . . .
- . . . . . *C. delli* (Griffin & Brown, 1976)
- . . . . . *C. valdiviae* (Lankester, 1903) comb. nov.
4. Rostrum extending anteriorly beyond eyestalks . . . . . 5
- Rostrum not extending anteriorly beyond eyestalks . . . . . 8
5. Rostrum less than 1.5 times as long as wide. Eyestalks completely fused with base of rostrum; demarcation between rostrum and eyestalks completely obscured . . . . .
- . . . . . *C. trifurcus* Stebbing, 1920
- Rostrum more than twice as long as wide. Eyestalks fused to base of rostrum, but demarcation between rostrum and eyestalks visible . . . . . 6
6. Eyestalks more than  $\frac{3}{4}$  rostral length . . . . . *C. aequilonius* Dell, 1971
- Eyestalks about  $\frac{1}{2}$  rostral length . . . . . 7
7. Frontal margin lateral to rostrum transverse . . . . . *C. indicus* Ihle, 1916a
- Frontal margin lateral to rostrum sloping posteriorly . . . . . *C. japonicus* Balss, 1922
8. Carapace, abdomen, and pereopods covered with large, stalked, globose, club-like tubercles. Eyestalks completely fused with anterior margin of carapace; demarcation between carapace and eyestalks completely obscured . . . . . 9
- Carapace, abdomen, and pereopods granular or with low tubercles, but without large, stalked, globose, or club-like tubercles. Eyestalks fused with carapace but demarcation between carapace and eyestalks distinct . . . . . 10

9. Carapace with large, hemispherical boss on posterolateral border . . . . . *C. kapala* sp. nov.  
 – Carapace without large, hemispherical boss on posterolateral border . . . . .  
 . . . . . *C. curvirostris* Sakai, 1965
10. Eyestalks subparallel, angle of divergence from midline not exceeding 10° . . . . . 11  
 – Eyestalks strongly divergent, diverging from midline by 30-45° . . . . . 13
11. Lateral frontal projections of carapace more than double rostral length . . . . .  
 . . . . . *C. hakuhoae* Takeda & Moosa, 1989  
 – Lateral frontal projections of carapace shorter than or as long as rostrum . . . . . 12
12. Rostrum about as long as lateral frontal projections . . . . . *C. umitake* Takeda, 1981  
 – Rostrum markedly longer than lateral frontal projections . . . . . *C. sagamiensis* Sakai, 1983
13. Lateral frontal projections of carapace minute or obsolete. Anterolateral margin of carapace rounded, unarmed . . . . . *C. andamanicus* Alcock, 1905  
 – Lateral frontal projections of carapace well developed, triangular. Anterolateral margin of carapace angular, with spinules . . . . . 14
14. Rostrum as long as lateral frontal projections of carapace. Frontal region not distinctly advanced beyond anterolateral margins of carapace . . . . . *C. soela* sp. nov.  
 – Rostrum distinctly longer than lateral frontal projections of carapace. Frontal region advanced beyond anterolateral margins of carapace . . . . . *C. bathamae* Dell, 1971

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## NOTE ADDED IN PROOF

Since the present paper went to press, Dr. Tomoyuki Komai kindly forwarded to us two Japanese specimens of *Cyonomus curvirostris* Sakai, 1965, held by the Natural History Museum and Institute, Chiba (CBM ZC-6450: male cl 2.9 mm, cw 2.7 mm; ovig. female cl 3.6 mm, cw 3.4 mm). We can now confirm that the abdomen comprises six somites and the dactyli of P4 and P5 bear small spines on their inner margin.

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