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TWO NEW SPECIES OF CRABS OF THE GENUS CYMONOMUS FROM NEW ZEALAND (CRUSTACEA: BRACHYURA)

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ABSTRACT

Two new species of *Cymonomus* are described from New Zealand waters, *C. bathamae* (belonging to the "quadratus" group) from southern New Zealand, and *C. aequiloniensis* (allied to the "granulatus" group) from the Bay of Plenty. The known species of the genus are listed.

INTRODUCTION

During 1969 Dr E. J. Batham of the Portobello Marine Biological Station sent some Crustacea from off Otago to the author for identification. Amongst them were specimens of *Cymonomus*. Then Dr J. C. Yaldwyn located another specimen from off Mayor Island amongst unsorted Crustacea in the Dominion Museum collections. The New Zealand Oceanographic Institute also made some material available for study. In order to evaluate these New Zealand forms the literature of the described species from other parts of the world was assembled and studied. Although the general characters of the twelve described species are remarkably uniform, a range of characters allows specific differentiation. Several species have been described from one sex only and little information has been published on sexual differences. The male pleopods have been illustrated for only two species and some species have never been adequately figured.

Surprisingly the New Zealand specimens proved to belong to two different species groups and are distinct enough from other forms to be described as new species.

The first species to be described in *Cymonomus* (although originally placed in another genus) was *granulatus*. It was proposed in a rather off-hand fashion in a semipopular account of deep sea exploration (Norman, in Thomson, 1873). Norman never formally described it, and the figures originally prepared by Norman were finally published for the first time by Lankester (1903). The first figure of *granulatus* to be published (Milne Edwards and Bouvier, 1900) showed no eye stalks at all, and it has since been shown by Lankester (1903) that Norman's original material included two distinct species. Representatives of the genus have since been described from most major geographical areas.

Barnard (1950, p. 391) arguing for the full specific status of the South African *trifurcus* Stebbing, remarked, "There seems to be an unusual disinclination on the part of most authors who have dealt with this genus to regard the forms from various parts of the world as full species. There would seem to be, however, quite a lot of difference between a form with separate, more or less movable eye-stalks, and one where the eye-stalks are fused together on the rostrum".

Barnard also commented that no comparison of the male pleopods had been made.

Perhaps the original fundamental error published by Thomson, to the effect that the same species occurring in different depths showed a succession of modification from forms with well developed functional eyes, through forms with no eyes but with well developed eyestalks, to those in which the eyestalks had become fixed, has given subsequent authors a false standard of intra-specific variability in the genus.

It is also unfortunate that the use of trinomial nomenclature has been applied in rather a muddled fashion in the group. For instance the nominate subspecies for each of the main groups has been quoted as *C. granulatus typicus* Norman and *C. quadratus typicus* A. Milne Edwards by Ihle (1916) and even by Barnard (1950) whereas the accepted form would be *C. granulatus granulatus* and *C. quadratus quadratus* respectively, even if at our present stage of knowledge the use of trinomial nomenclature may indicate an unwarranted precision of relationship.

Genus ***Cymonomus*** A. Milne Edwards, 1880

Bull. Mus. Comp. Zool. 8, p. 26

Type Species (ICZN opinion 712) *Cymonomus quadratus*

A. Milne Edwards, 1880 (Gulf of Mexico to Lesser Antilles)

The most comprehensive account of the generic characters is that given by Alcock (1905).

Cymonomus bathamae n.sp. Figs. 1-8, 9, 10

Carapace in male quadrate, slightly swollen posteriorly; in female larger and rather more swollen. Surface finely granular. Regions not very distinct, a deep furrow marking the lateral border of the cardiac. Front clearly marked by rostrum and prominent extra-orbital borders, con-

siderably wider in female. Rostrum short, narrowly triangular, sides ornamented by granules or scales, equal to one-twelfth or one-eleventh of total carapace length. Eyestalks narrowly tapering, armed with quite strong, rather blunt spines, no visible cornea although corneal area is smooth and polished. Eyestalks solidly fixed in position, from 2 to 3 times the length of the rostrum. Antennae and antennules long and prominent. Basal joint of antenna stout, shorter than eyestalks. Second segment of antennules extending well beyond the eyes.

Manus of cheliped deep and swollen in the male (Fig. 9) with comparatively short fingers, heavily granulate. In the female manus much narrower, with more elongate fingers (Fig. 10).

First and second pleopod (Figs. 6, 7) very much as described and figured by Gordon (1963) for *C. granulatus*, except that the apical part of the second pleopod is narrower and lacks the "heel"-like basal knob of *granulatus*.

Abdomen of six segments (Figs. 1, 8) narrow in the male, much wider and larger in the female.

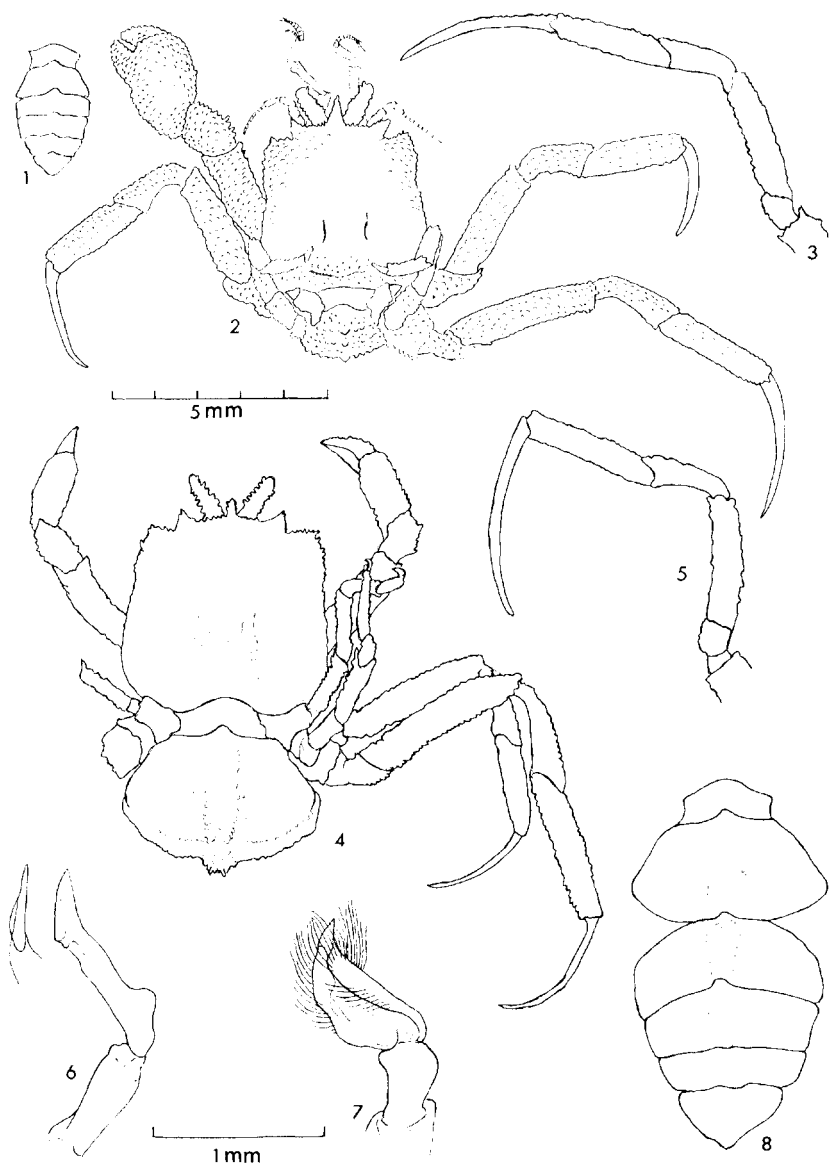
Holotype male (Cr. 1867) and paratype female (Cr. 1868) in Dominion Museum, other paratypes in Portobello Marine Biological Station and in N.Z. Oceanographic Institute. Females from off Otago carried 12, 14, 17, 19, 21 and 23 eggs respectively. Eggs comparatively very large, up to 1.4mm in diameter.

Localities: Portobello Station Mu. 67-142, 45°51'S, 170°02'E, Papanui Canyon, off Otago in 732 metres, 30-11-1967 (holotype male, three male and three female paratypes); Portobello Station Mu 68-27, 45°38'S, 171°08'E to 45°38'S, 171°07'E, Karitane Canyon, off Otago in 720 to 540 metres, 8-5-1968 (one male and four female paratypes); NZOI Station G.184, 44°06'S, 179°25'W, Chatham Rise, in 344 metres, 18-1-1968 (one female paratype); NZOI Station G.696, 46°18.5'S, 170°34.5'E, off Otago, in 680 metres, 21-1-1970 (one female paratype).

One of the most useful results of being able to examine a reasonable number of specimens of both sexes from the one area is the light it throws on sexual dimorphism in *Cymonomus*. The difference in carapace shape and in the cheliped, in addition to the usual differences in abdomen between the sexes, demonstrates the difficulties of comparison between forms when specimens of the same sex are not available. Such differences have not been mentioned previously in the literature. It would appear that such a range of material has never been available before when a species of *Cymonomus* has been described.

Cymonomus bathamae appears to belong to the *quadratus* group of species, and when these forms can be properly evaluated, may well prove to be best ranked as a subspecies of *quadratus*. To use such a ranking now would suggest stronger evidence than at present exists.

C. quadratus quadratus appears to differ in having a more strongly developed rostrum and much larger chelae, judging by the figure given by Rathbun (1937, pl. 30, fig. 3). At the same time *quadratus* is not well



Figs. 1-8 *Cymonomus bathamae* n.sp.

Fig. 1, Abdomen of male. Fig. 2, Holotype male. Fig. 3, Second walking leg of male. Fig. 4, Paratype female. Fig. 5, Second walking leg of female. Fig. 6, Second pleopod. Fig. 7, First pleopod. Fig. 8, Abdomen of female. (All to same scale except for Figs. 6 and 7).

documented and good illustrations, especially of the frontal area, would be very useful. *C. quadratus curvirostris* Sakai was described only from a female specimen in which the rostrum is much shorter and the carapace more heavily granulate. The carapace is not so swollen posteriorly in

curvirostris but this could be a matter of growth. Judging by the figure of *C. quadratus valdiviae* Lankester given by Ihle (1916, p. 122) the rostrum in this form is about one-seventh the total carapace length while the eyestalks are almost twice the length of the rostrum. In *bathamae* the rostrum is between one-eleventh and one-twelfth the total carapace length. Of the three species, *caecus*, *cubensis* and *rostratus* described by Chace from off Cuba, two were compared with *quadratus* while the third, *rostratus*, was compared with *andamanicus* Alcock. Of these *cubensis* is the most like *bathamae* in general proportions but has seven segments to the abdomen, an anomalous feature in the genus as noted by Chace. *C. andamanicus* has a more inflated carapace with the lateral margins convex even in males, lacks the spine at the antero-lateral angle, and has a much smoother extra-orbital spine.

***Cymonomus aequilonius* n.sp. Figs. 11-15**

Carapace in female wider posteriorly than anteriorly, lateral margins slightly convex, tapering fairly rapidly to the orbits. Carapace surface with sparse, fine, rounded granules, some fine hairs especially near the margins. Regions not distinctly marked except for the cardiac. Rostrum long, narrowly triangular, sides ornamented with granules. Length of rostrum one-quarter the total carapace length. Eyestalks tapering, set with spines and scales especially along inner margins, no marked cornea. Eyestalks solidly fixed, a little more than two-thirds the length of the rostrum. Antennae and antennules well developed. Basal joint of antennae almost as long as eyestalks, second segment of antennule extending beyond the eyestalks, approximately to the level of the rostrum.

Manus of cheliped (Fig. 11) more elongate with longer fingers than in female *C. bathamae*.

Abdomen in female (Fig. 15) of six segments.

Male not known.

Holotype female (Cr. 1866) in Dominion Museum.

Locality: B.S. 210, 37°10'S, 176°23.5'E, N.E. of Mayor Island, Bay of Plenty in 731 metres, 28-2-1957, m.v. *Alert*, one female (holotype).

This new species belongs to the *granulatus* group, and is quite close to *granulatus granulatus* Norman. Comparison with other described forms is difficult since the only known specimen is a female. In *granulatus granulatus*, *indicus* Ihle and *japonicus* Balss the length of the rostrum is approximately one-quarter the total length of the carapace, as it is in *aequilonius*. The rostrum in *indicus* is parallel-sided in contrast to the tapering rostrum in *aequilonius*. The eyestalks are about two-thirds the length of the rostrum in *aequilonius*, seven-tenths in *granulatus granulatus* and about a half in *granulatus japonicus*. The most consistent difference between *granulatus granulatus* and *aequilonius* is the development of a very long, spiny extra-orbital spine in *g. granulatus* compared with the single obtuse angled spine in *aequilonius*. In *granulatus* the eyestalks are apparently movable while they are fixed in *aequilonius*. The distinction between "slightly movable" and "fixed" in preserved material is relatively slight.

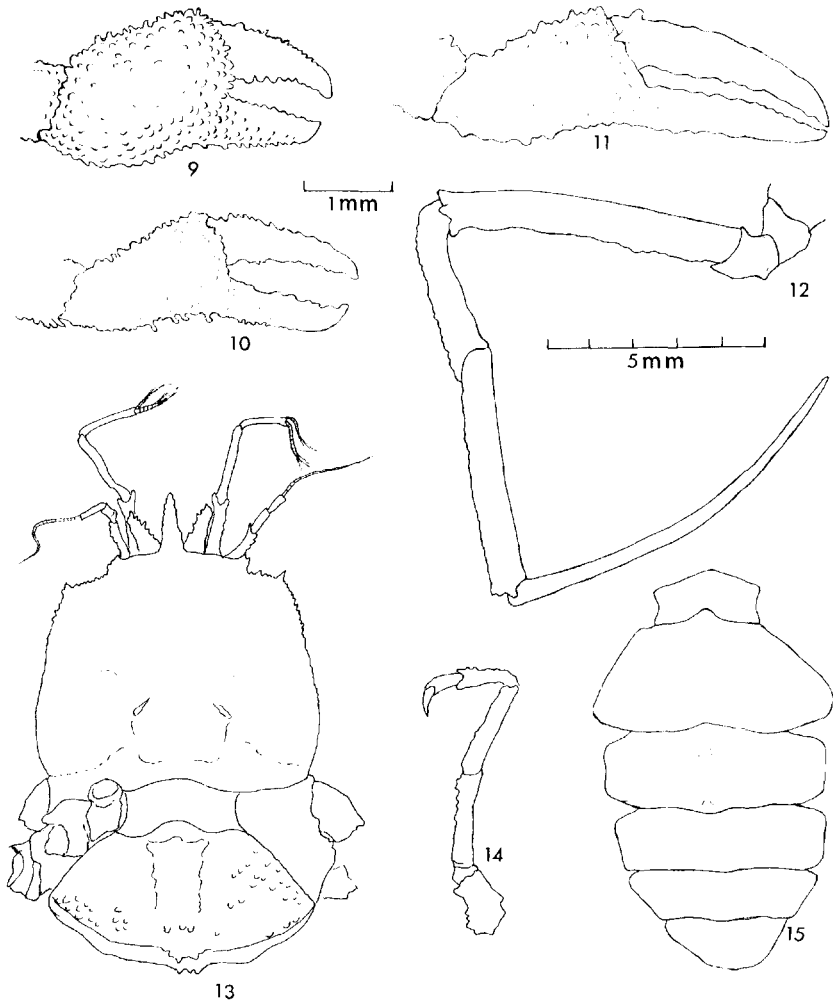


Fig. 9 Chela of holotype male of *Cymonomus bathamae* n.sp.

Fig. 10 Chela of paratype female of *Cymonomus bathamae* n.sp.

Figs. 11-15 *Cymonomus aequilonius* n.sp., female holotype.

Fig. 11, Chela. Fig. 12, Second walking leg. Fig. 13, Carapace. Fig. 14, Third walking leg. Fig. 15, Abdomen. (Figs. 9, 10, 11 to same scale. Figs. 13, 14, 15 to same scale as Fig. 12).

In *normani* Lankester the rostrum is minute and the eyestalks are fused together, the fused section extending beyond the rostrum.

Measurements

	<i>bathamae</i> Holotype male	<i>bathamae</i> Paratype female	<i>aequilonius</i> Holotype female
Length of carapace including rostrum	4.4mm	4.7mm	6.9mm
Length of rostrum	0.5	0.4	1.5
Width at branchial level	4.1	5.3	6.5
Width at anterolateral level	3.3	4.1	5.0
Width at exorbital level	2.6	2.6	3.3
Length of eyestalk	1.0	1.3	1.1
Length of chela	3.1	3.1	4.6
Length of palm	2.0	2.0	1.5
Length of dactylus	1.5	1.4	2.9
Height of palm	1.9	1.4	2.2
Length of merus of first walking leg	3.0	3.7	5.8
Length of carpus	1.9	2.1	2.9
Length of propodus	2.5	2.8	4.1
Length of dactylus	3.2	2.6	6.0
Length of merus of second walking leg	3.6	4.1	3.3
Length of carpus	2.1	2.6	5.6
Length of propodus	3.0	4.0	4.2
Length of dactylus	4.1	5.0	6.4

DISTRIBUTION

The two New Zealand species are known from a restricted number of stations, *C. bathamae* in depths from 344 to 730 metres off Otago and from the Chatham Rise, *C. aequilonius* from a single station in the Bay of Plenty in 731 metres. There can be little question of geographic replacement of the two species since they are so decidedly distinct.

Species of the genus are now known from most major geographic areas of the world though specimens do not appear to have been collected plentifully from any one area. These two New Zealand species are the first records from the South Pacific. The genus has not yet been recorded from Australian waters although it undoubtedly occurs there.

THE SPECIES OF *Cymonomus*

The species of the genus so far described are listed below. In view of the uncertainty of the actual relationships trinomial forms are not used:

- aequilonius* Dell, n.sp.
- andamanicus* Alcock, 1905
- bathamae* Dell, n.sp.
- caecus* Chace, 1940
- cubensis* Chace, 1940
- curvirostris* Sakai, 1965
- granulatus* Norman, 1873
- indicus* Ihle, 1916
- japonicus* Balss, 1922
- normani* Lankester, 1903
- quadratus* A. Milne Edwards, 1880
- rostratus* Chace, 1940
- trifurcus* Stebbing, 1920
- valdiviae* Lankester, 1903

Reference to these species are so scattered that they have been listed below for the convenience of subsequent workers:

andamanicus Alcock, 1905

- 1905 *Cymonomus andamanicus* Alcock, Ann. Mag. Nat. Hist. 7 (15), p. 568, pl. 18.
1905 *Cymonomus andamanicus* Alcock, Ill. Zool. Investigator, pl. 79, fig. 2.
1922 *Cymonomus granulatus andamanicus*: Balss, Arch. Naturgesch., 1922, p. 118. Off Andaman Islands, in 700 metres.

caecus Chace, 1940

- 1940 *Cymonomus caecus* Chace, Torreia, 4, p. 12, figs. 1, 2. Off Cuba, in 841 metres.

cubensis Chace, 1940

- 1940 *Cymonomus cubensis* Chace, Torreia, 4, p. 16, figs. 5, 6. Off Cuba, in 475 to 1,006 metres.

curvirostris Sakai, 1965

- 1965 *Cymonomus granulatus curvirostris* Sakai, The Crabs of Sagami Bay, p. 19, pl. 10, fig. 1, text fig. 2. West of Jagashima, Misaki, Japan, in 85 metres.

granulatus (Norman, 1873)

- 1873 *Ethusa granulata* Norman, in Thomson. *The Depths of the Sea*, p. 176.
1881 *Cymonomus granulatus*: A. Milne Edwards, C.R. Acad. des Sc. 93, p. 879.
1900 *Cymonomus granulatus*: A. Milne Edwards and Bouvier, Exped. Sci. Travailleur et Talisman pendant les Années 1880, 1881, 1882, 1883 Crustac. Decap. 1st Part, p. 34, pl. 11, figs. 5-19.
1903 *Cymonomus granulatus*: Lankester, Quart. Journ. Micros. Sci. 47 (n.s.), p. 455, pl. 33-4, figs. 2, 3, 4, 5, 6, 7, 9, 12, 13.
1904 *Cymonomus granulatus*: Doflein, Wiss. Ergebn. Deutschen Tietsee Exped. "Valdivia" 1898-1899, 6, p. 33, figs. 66-68, pl. 11, fig. 5, pl. 12, figs. 1-3.
1916 *Cymonomus granulatus typicus*: Ihle, Siboga Rep. 39b, p. 282, fig. 66.
1940 *Cymonomus granulatus*: Bouvier, Faune de France 37, p. 197, pl. 6, figs. 7-10.
1956 *Cymonomus granulatus*: Monod, Mem. Inst. France. d'Afrique Noire 45, p. 84.
1963 *Cymonomus granulatus*: Gordon, Phylogeny and Evolution of Crustacea, Museum Comp. Zool. Special Publ., p. 53, fig. 11B (pleopods figured). Off Ireland, Bay of Biscay, off Portugal, Mediterranean, in 200-1,200 metres.

indicus Ihle, 1916

- 1916 *Cymonomus granulatus* subsp. *indicus* Ihle, Siboga Rep. 39b, p. 119, figs. 65, 66. East Indies, in 918 metres.

japonicus Balss, 1922

- 1922 *Cymonomus granulatus japonicus* Balss, Arch. Naturgesch., 1922, p. 117, fig. 5. Off Misaki, Japan, in 600 metres.

normani Lankester, 1903

- 1903 *Cymonomus normani* Lankester, Quart. Journ. Micros. Sci. 47 (n.s.), pp. 452, 456, pls. 33-4, figs. 1, 8, 10, 11.
- 1908 *Cymonomus normani*: Hansen, Ingolf-Exped. 3 (2), p. 20, pl. 1, figs. 2a-2i.
- 1916 *Cymonomus normani*: Ihle, Siboga Rep. 39b, pp. 154, 283, fig. 67. North Atlantic, in 875 to 1,269 metres.

quadratus A. Milne Edwards, 1880

- 1880 *Cymonomus quadratus* A. Milne Edwards, Bull. Mus. Comp. Zool. 8, p. 26.
- 1903 *Cymonomus quadratus*: Lankester, Quart. Journ. Micros. Sci. 47 (n.s.), p. 453, fig. 10.
- 1937 *Cymonomus quadratus*: Rathbun, Bull. U.S. Nat. Mus. 166, p. 98, text, fig. 23, pl. 30, fig. 3, pl. 31, fig. 3 (range of references). Gulf of Mexico to Lesser Antilles, in 185 to 929 metres.

rostratus Chace, 1940

- 1940 *Cymonomus rostratus* Chace, Torreia, 4, p. 14, figs. 3, 4. Off Cuba, in 648 metres.

trifurcus Stebbing, 1920

- 1920 *Cymonomus trifurcus* Stebbing, Ann. S. Afr. Mus. 17, p. 245, pl. 100 (includes drawings of pleopods).
- 1950 *Cymonomus trifurcus*: Barnard, Ann. S. Afr. Mus. 38, p. 392, figs. 74a-f (figures rostrum, eyestalks and pleopods). Off east coast of South Africa, in 78 to 549 metres.

valdiviae Lankester, 1903

- 1903 *Cymonomus valdiviae* Lankester, Quart. Journ. Micros. Sci. 47 (n.s.), p. 459, fig. 11.
- 1904 *Cymonomus granulatus*: Doflein, Brachyura Valdivia, p. 33, pl. 11, fig. 5, pl. 12, figs. 1-3, pl. 44, fig. 7.
- 1916 *Cymonomus quadratus valdiviae*: Ihle, Zool. Anz. 46, p. 361.
- 1916 *Cymonomus quadratus valdiviae*: Ihle, Siboga Rep. 39b, p. 121, fig. 67, pl. 11, fig. 5. Off East Africa, in 638 metres.

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