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***Brachycalanus rothlisbergi*, a new species of planktobenthic copepod (Calanoida, Phaennidae) from the Gulf of Carpentaria, Australia**

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ABSTRACT. *Brachycalanus rothlisbergi* n.sp. females sampled from the Gulf of Carpentaria are described and figured. Comparisons are made between this species and the four others belonging to this genus.

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During studies of copepods of the Gulf of Carpentaria, females of a new species of copepod from the family Phaennidae were encountered, and are described below. This species was taken in stepped-oblique hauls from near-bottom to the sea surface using plankton nets of mesh aperture size 140 μ m. The specimens were examined, measured and dissected in glycerine/water medium and drawings were all made using a Leitz HM-LUX microscope with the aid of a camera lucida.

***Brachycalanus rothlisbergi* n.sp.**

Figs 1,2

Type material. Type materials are deposited in the Queensland Museum (QM) as follows: female holotype of total length (TL) 1.57 mm, 1 female paratype. Reference nos. QM W12198, QM W12199.

Type locality. Gulf of Carpentaria, 11°55.5'S, 138°49.5'E.

Material examined. 1 female, sample no. 28A2, 14°01.5'S, 138°E, 19 Aug 1975; 1 female, sample no. 447A4, 11°55.5'S, 138°49.5'E, 7 Nov 1977; 2 females, sample no. 971A3, 14°S, 140°E, 11 May 1977 (see Rothlisberg & Jackson (1982) for sample details).

In the following descriptions medial refers to that border of an appendage or segment which faces the

midline of the body and lateral to that border directed toward the lateral surface of the body.

Description of female (Figs 1A-F, 2A-H). *Size:* TL (tip of prosome to end of furcal rami) is 1.61 mm (mean from 3 measurements range 1.57-1.68 mm standard deviation 0.0214). Prosome length-to-width ratio 1.91:1, prosome to urosome length ratio 4.36:1.

Body very robust, oval in dorsal view, with relatively short urosome (Fig. 1A). In lateral view, head smoothly rounded, ending in short rostrum with 2 filaments. Head separated from first thoracic somite, fourth and fifth thoracic somites fused. Very distinct setae arise near midlateral surface of third thoracic somite (Fig. 1A,B). Posterior thoracic margins symmetrical, margins appear triangular in shape but are well rounded posteriorly both in dorsal and lateral views.

Urosome 4-segmented, surfaces of each somite covered densely with spinules. Anal segment extremely short, relative lengths of visible somites as follows:

Somites	1	2	3	4	caudal rami	
Proportions	47	20	13	11	9	= 100

Caudal rami symmetrical, with 4 subequal apical

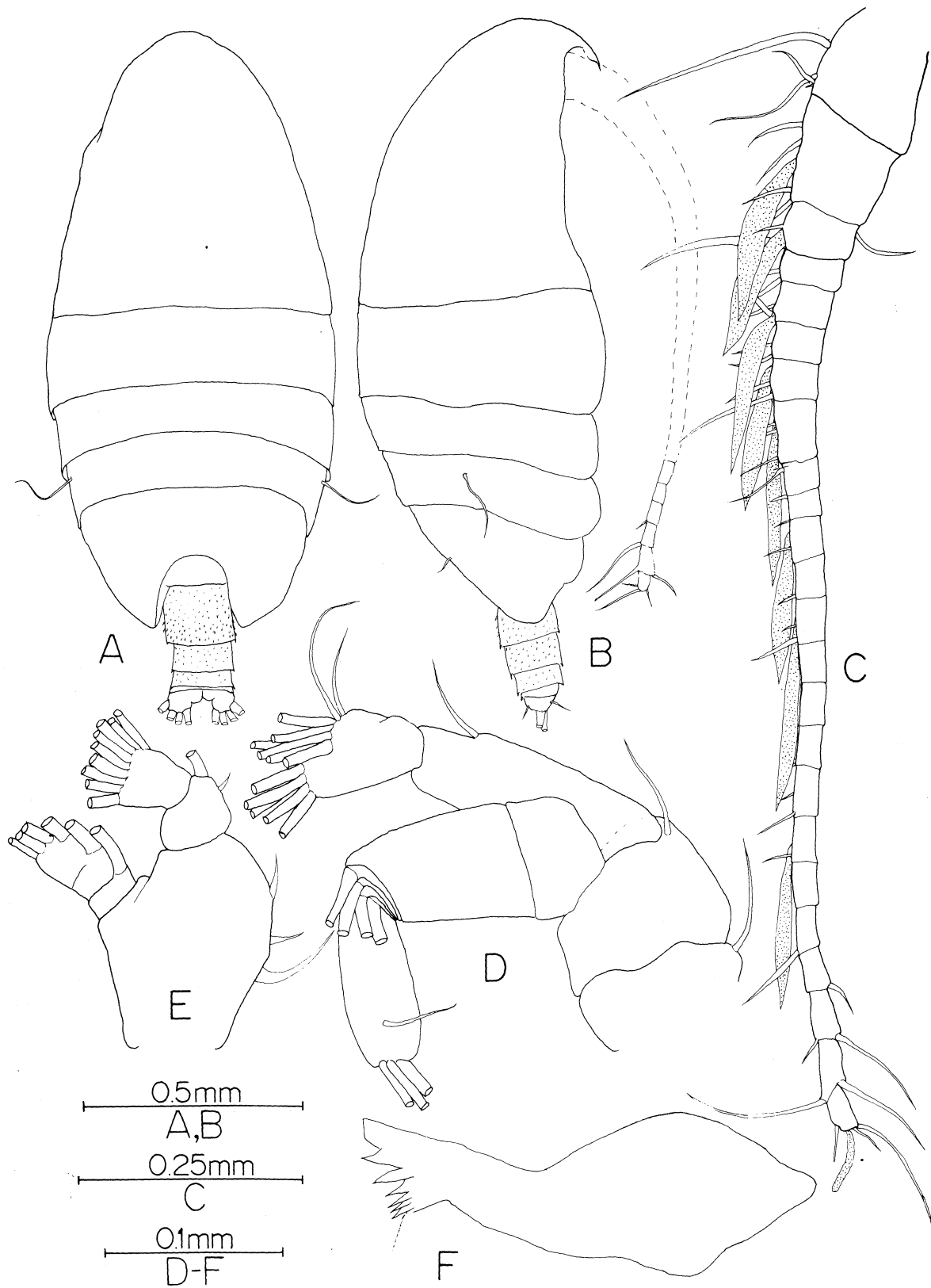


Fig.1. *Brachycalanus rothlisbergi* n.sp. female; A - dorsal view; B - lateral view; C - 1st antenna; D - 2nd antenna; E - mandibular palp; F - mandibular blade.

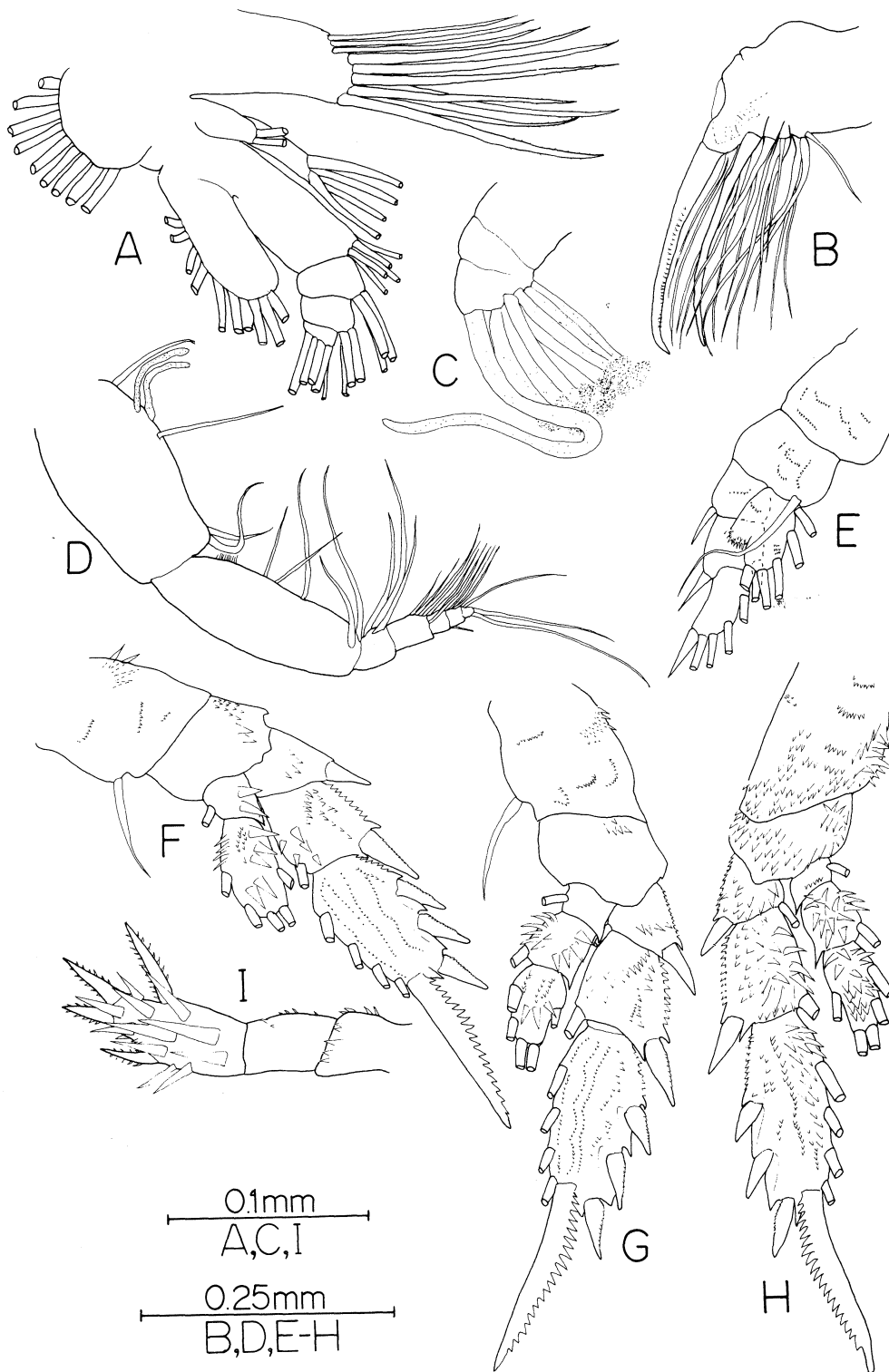


Fig.2. *Brachycalanus rothlisbergi* n.sp. female; A - 1st maxilla; B - 2nd maxilla; C - endopod of 2nd maxilla; D - maxilliped; E - 1st leg; F - 2nd leg; G - 3rd leg; H - 4th leg; I - 5th leg.

setae (Fig. 1A) and 2 minute setae (Fig. 1B). Length to breadth ratio of caudal ramus is 0.75:1.

First antenna 24-segmented, reaches to middle of last thoracic somite. The segments are of various sizes, the proportional lengths are given below:

Segments	1	2	3	4	5	6	7	8	9	10	11	12	13
Proportions	91	75	42	23	37	33	33	55	29	23	38	35	40

Segments	14	15	16	17	18	19	20	21	22	23	24	
Proportions	35	40	35	47	42	40	40	38	45	49	35	= 1000

Exopod of second antenna slightly longer than endopod (Fig. 1D). First protopod segment short, with 1 seta at distomedial margin; second segment twice length of first, with 2 setae at distomedial margin. Exopod 7-segmented; segments 2 and 7 of similar length, segment 1 is half length of these segments, segments 3–6 very short with combined length less than one third length of first segment; first 2 segments devoid of setae, third to sixth each with 1 inner distal seta, seventh with 1 small subapical and 3 terminal setae. Endopod 2-segmented, first segment with 1 medial seta about one quarter length from distal end; second segment with 5 apical setae on lateral lobe, 6 large and 2 minute apical setae on medial lobe.

Mandibular palp with stout basipod bearing 3 inner setae (Fig. 1E). Exopod 3-segmented, first 2 segments each carry a medial distal seta, third segment with 1 medial and 3 apical setae. Endopod as long as exopod, 2-segmented; first segment with medial and distomedial seta, second segment with 9 apical setae. Mandibular blade (gnathobase) only slightly expanded at apex, bears row of 7 sharp denticles (Fig. 1F).

Basipod of first maxilla with 9 lateral marginal setae (Fig. 2A). Medial margin of basipod with 3 processes, large proximal process bears 10 elongate spines, short subterminal process bears 2 setae, long distal process bears 4 setae. Apical lobe of basipod with 5 distal setae. Exopod with 10 setae on distolateral margins. Endopod 3-segmented, first 2 segments each with 3 inner distal setae, terminal segment with 5 setae.

Second maxilla exopod without distinct segmentation (Fig. 2B) but 5 medial lobes are recognisable; first lobe with 5, second and third lobe each with 3 setae, fourth lobe has 1 spine and 2 setae, fifth lobe carries 2 setae and 1 strong inwardly curved pectinate spine. Endopod indistinctly segmented, bearing vermiform aesthetasc distally, 10 brush-like aesthetascs subterminally (Fig. 2C).

Maxilliped 7-segmented (Fig. 2D); first with 4 setae and 2 aesthetascs on medial margin; second with 3 medial setae at midlength and 2 distal setae; third with 3 medial setae; each of segments 4–6 carries 4 setae; terminal segment with 3 setae.

First leg has 2 protopod segments, first without setae, second with distomedial seta (Fig. 2E), both protopod segments with many lines of minute spinules on the surface. Exopod 3-segmented,

distolateral spine on each; first segment has no medial seta, second with 1 medial seta, third with 4 setae around distomedial margin, 2 marginal and 2 apical setae. Only first exopod segment has row of spinules on its surface. Endopod 1-segmented, reaching to distal end of second exopod segment; lateral margin has lobe, apex of which bears numerous spinules; inner margin with 3 marginal setae, 2 apical setae.

Second, third and fourth legs (Fig. 2F–H) are covered with numerous spinules on posterior and anterior surfaces. Those on posterior surface usually larger, those on anterior surface more widespread and consistently near uniform minute-sized. First protopod segment with medial seta, second (basipod) segment devoid of setae on all legs. Spinulation on posterior surfaces of basipod segments rather sparse on second and third legs, but very dense on the fourth. First and second exopod segments with a distomedial seta, lateral marginal spine flanked by 2 minute spines; third segment with 4 medial setae, 2 medial and 1 distomedial spines with serrate margins, 1 large terminal spine with denticulate lateral margin (19 denticles on each). Length of terminal spines slightly greater than that of third segment. Spinules on posterior surfaces of exopods on second and third legs smaller than those on fourth leg. First endopod segment of second leg, first and second endopod segments of third and fourth legs bear medial marginal seta and lateral acute spinous process. Terminal endopod segment with 1 lateral, 2 medial and 2 apical marginal setae on all legs. Spinules on posterior surfaces of endopods are large sized on all legs.

Fifth leg uniramous, symmetrical and 3-segmented (Fig. 2I). First 2 segments of equal length with a few relatively small spinules on medial or distomedial margin. Terminal segment approximately 1.6 times length of penultimate segment, with 1 medial, 1 lateral and 2 terminal spines; medial spine longest, others of similar length; surface of segment covered with numerous (approximately 10) large-sized spines.

Etymology. The species is named in honour of Dr P.C. Rothlisberg of CSIRO Division of Fisheries Research, Cleveland, Australia for providing materials which made this study possible.

Remarks

Brachycalanus is a genus of peculiar benthopelagic copepods which bear close resemblance to *Xanthocalanus* species. The genus was created by Farran (1905) to include *X. atlanticus*, being distinguished from true species of *Xanthocalanus* in the shape of the rostrum and also the short first antenna.

Besides having the characteristics detailed by Campaner (1978) in his redefinition of the genus, *Brachycalanus* can be distinguished from other members of the family by the presence of the knife-

Table 1. Comparison of some characteristics of 5 species of *Brachycalanus*. (Abbreviation used: Th – thorax).

Feature	<i>B. atlanticus</i> <i>sensu stricto</i>	<i>B. atlanticus</i> <i>sensu Farran</i> 1905	<i>B. bjornbergae</i>	<i>B. ordinarius</i>	<i>B. rothlisbergi</i>
Size (mm)	2.5	2.0–2.5	1.6–2.0	2.9–3.4	1.57–1.68
Whether Th4 & Th5 fused/free	fused	free	free	fused	fused
Extent of the 1st antenna length in relation to Th segment	middle end of Th ₁	end of Th ₁	end of Th ₂	middle of Th ₃	middle of fused Th ₄ and Th ₅
No. of denticles on outer margin of terminal spine of legs 2–4	14–15	13	15	10–11	19
Ratio of terminal:penultimate segments of 5th leg	2.4:1	1.64:1	3.0:1	2.83:1	1.67:1
Spinulation of 1st and 2nd segments of 5th leg	dense	dense	dense	dense	sparse

shaped aesthetascs on the 1st antenna. There are eight such aesthetascs which originate from segments 2, 3, 5, 7, 8, 11, 13 and 18 of the first antenna. There are at present four species belonging to this genus. They are *B. atlanticus* (Wolfenden, 1904); *B. ordinarius* (Grice, 1973), *B. bjornbergae* Campaner, 1978, and *B. atlanticus sensu Farran, 1905*. Grice (1973) described *B. ordinarius* as *Xanthocalanus ordinarius* but his species was appropriately transferred to the correct genus by Campaner (1978) (see also Bradford *et al.*, 1983). Two other species have been erroneously ascribed to this genus, *B. gigas* Scott, 1909 was removed to *Lophothrix* (Grice & Hulsemann, 1968, and Bradford, 1973), and *B. minutus* (Grice, 1973) was regarded as *incertae sedis* by Campaner (1978). Bradford *et al.* (1983) listed the genus as having four species but acknowledged the *incertae sedis* status of *B. minutus*.

Farran's (1905) description of *B. atlanticus* differed grossly from *B. atlanticus* (Wolfenden, 1904). The fourth and fifth thoracic segments are fused in *B. atlanticus sensu stricto* but free in *B. atlanticus sensu Farran*; the first antennae, when fully extended, reach the middle of the first thoracic segment in *B. atlanticus s.s.* but reach the end of the second thoracic segment in *B. atlanticus sensu Farran*; the general shape of the fifth legs and their surface spinulations are very different in the two descriptions; also, the shape and length ratios of each of four spines on the terminal segment of the fifth legs are noticeably different in the two descriptions, those being longer in *B. atlanticus s.s.* compared with *B. atlanticus sensu Farran*; and lastly, the ratio of the terminal: penultimate segment of the fifth leg is 2.5:1 in *B. atlanticus s.s.* but is 1.64:1 in *B. atlanticus sensu Farran*. Clearly, then, the two descriptions were not of the same species, Farran's misidentified specimens being of an as yet undescribed species. It is premature for the authors to here name Farran's (1905) specimens.

All species of *Brachycalanus*, including the one described in the present study, are known only from the female.

Brachycalanus rothlisbergi can be distinguished from other members of the genus by the shape and size of the body, the spinulation on the posterior surfaces of legs 1 to 4, the number of denticles on the terminal spines of legs 1 to 4, the shape and spinulation of the fifth leg, and the presence of very prominent and long setae on both lateral surfaces of the third thoracic segment. Detailed differences in body size, shape and relative lengths of the appendages between *B. rothlisbergi* and other members of the genus are given in Table 1.

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